

**AN EMPIRICAL ANALYSIS OF THE
EVOLUTION OF THE STATISTICAL
PROPERTIES AND THE VOLATILITY
STRUCTURE OF THE NAIROBI STOCK
EXCHANGE 20-SHARE INDEX RETURNS**

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FOC/04751112006

STRATHMORE UNIVERSITY

A SUBMISSION IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS OF THE MASTERS IN COMMERCE DEGREE

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DECLARATION

Declaration by the student

I, TERRY MWENDE KIMUNDI, declare that this work is a presentation of my original research work. Wherever contributions of others have been used, every effort is made to indicate this clearly, with due reference to the literature. This work was done under the supervision of **DR. SILAS ONY ANGO** at Strathmore University.

Signed: _____ Date: 14 July 2009

Declaration by the supervisor

In my capacity as a University supervisor of the candidate's thesis, I certify that the above statements are, to the best of my knowledge, true.

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ACKNOWLEDGEMENTS

I would like to thank the following persons for various forms of support they have provided during the preparation of this thesis: my supervisor, Dr. Silas Onyango, for his guidance; the proposal reviewing panel (Dr. Ruth Kiraka, Mr. Wang'ombe, Mrs. Dimba, Mrs. Hellen Otieno) for pointing out the way forward; Dr. James McFie and Elsie Onsongo for extremely useful comments and criticisms.



DEDICATION

This thesis is dedicated to my parents, for their unfailing support all these years, and continuous encouragement during the writing of this work.

ABSTRACT

Time series of financial and economic data have been found to exhibit unique statistical properties not found in other time series. The statistical properties of the NSE 20-share index returns are examined over a period of 16 years, from January 2, 1992 to December 24, 2007. In addition, I use the General Autoregressive Conditional Heteroskedasticity (GARCH) model of Bollerslev (1986) to estimate the volatility present in the NSE-20 index returns. This period is marked by significant growth in market capitalization and structural change, with increased usage of information technology and increased regulation of the financial and money markets. I find that: 1) The index returns display evidence of return predictability, but the degree of predictability has reduced over time; 2) The index returns are non-normal, with significant skewness and leptokurtosis; 3) There is evidence of volatility clustering in the returns, where periods of high volatility are followed by periods of low volatility and periods of low volatility are followed by periods of high volatility; 4) The frequency of fluctuations or volatility has increased over time. The statistical and volatility properties of returns from the market have evolved as the Nairobi Stock Exchange has developed over time.

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GLOSSARY AND ABBREVIATIONS

ARCH: The AutoRegressive Conditional Heteroskedasticity model of measuring volatility introduced by Engle (1982). Robert Engle received the 2003 Nobel Prize for Economics for his influential contributions to the field of volatility modelling. ATS: Automated Trading System

BUX: Index for the Budapest Stock exchange in Hungary.

CAC-40: the index for the bourse in Paris, France. It comprises 40 of the 100 major shares listed on the settlement market.

CDS: Central Depository System

Central Limit theorem: This theorem states, "If the sum of independent identically distributed random variables has a finite variance, then it will be approximately normally distributed (i.e., it will follow a Gaussian distribution, or bell-shaped curve)".

CIC: Capital Issues Committee

CMA: Capital Markets Authority

EAC: East African Community

Efficiency of an estimator: a measure of the accuracy of an estimate of a parameter, such as the mean. It is calculated as the variance of a benchmark estimator divided by the variance of that particular estimator, $\text{Efficiency (Estimator)} = \frac{\text{Variance (Benchmark)}}{\text{Variance (Estimator)}}$

EMH: Efficient Markets Hypothesis

Fifty Leaders Index: The full name of the index is the Australian Fifty Leaders Statex - Actuaries Accumulation Index.

FTSE 100: an index created by the Financial Times comprising 100 of the largest shares listed on the London Stock Exchange

FTSE All-Share Index: the Financial Times Actuaries All Share Index is a broad-based index made up of 802 shares representing 80 percent of the market value of shares listed on the London Stock Exchange.

GARCH: General Autoregressive Conditional Heteroskedasticity

GDP: Gross Domestic Product

IFC: International Finance Corporation

KShs.: Kenya Shillings

Mid 250: a Financial Times index that encompasses a range of medium-to-large companies falling directly beneath the FTSE-100.

Mid 350: a Financial Times index combining the companies included in the FTSE-100 and the Mid 250 indexes of the London Stock Exchange.

NSE: Nairobi Stock Exchange

PACF: Partial Autocorrelation Function

S&P 500: The Standard and Poor's 500 Composite Index is an amalgam of other indexes produced by Standard and Poor's (a major financial information provider), including: the S&P Industrial Average, S&P Transportation Average, Utility Average and Financials Average.

WIX: Index for the Warsaw Stock exchange in Poland.

1.0 INTRODUCTION

The behaviour of share prices has generated a lot of interest over time, both from financial market participants and academic researchers. According to Voit (2003), by looking at a simple chart showing the evolution of a market over time, several questions can be raised. What statistical laws do the price changes in the market obey? How smooth are these changes? How frequent are the jumps? Can price changes be predicted? The study of the statistical properties of market returns is intended to address these questions. Existing literature on the statistical properties of asset returns is rooted in the findings of Mandelbrot (1963) and Fama (1965).

Mandelbrot (1963) found that changes in share prices exhibit two unique characteristics: 1) the tails of the distributions of price changes are extraordinarily long or heavy, a trait known as leptokurtosis, and 2) large changes in asset prices tend to be followed by large changes - of either sign - and small changes tend to be followed by small changes, a characteristic known as volatility clustering. Fama (1965) studied the extent to which the past history of a common share's price be used to make meaningful predictions concerning the future price of the share. He concluded that future asset returns are independent of past returns and prices tend to behave randomly. Various empirical studies (Franses and van Dijk, 1996; Maimsten and Terasvirta, 2004; Polzehl and Spokoiny, 2006; Cont, 2001) have found that economic and financial time series such as exchange rates, inflation rates, interest rates, share prices and stock indexes do exhibit these unique statistical properties, albeit in varying degrees.

The observation of the statistical behaviour of market returns over time has led to the realization that the rate at which market prices fluctuate - volatility - is not constant over time (Voit, 2003). Unlike the price of an asset, volatility is unobserved or latent, and evolves stochastically through time (Andersen, Bollerslev, Christoffersen and Diebold, 2005). This makes volatility difficult to measure, and has led to the continuous development of volatility estimation and forecasting models that measure the processes by which financial prices or indicators change. Moix (2001) suggests that the rise in market volatility in recent years has increased the importance of accurate risk measurement to limit the exposure of investors to financial losses. The volatility estimation process involves fitting one of these risk measurement models to a given historical data

set, with the aim of observing the volatility structure of the data. The observation of statistical patterns is crucial for correct model specification, estimation and forecasting of volatility (Aydemir, 1999).

1.1. Background

Figure 1.1 below traces the movement of the Nairobi Stock Exchange twentyshare index from January 2, 1992 to December 24, 2007. This 16-year period can be divided subjectively into three sub-periods in which the stock market followed a distinctive trend: 1) January 2, 1992 to December 24, 1997, where the index increased continuously to 1994 and then decreased in value at varying rates; 2) January 2, 1998 to December 31, 2002, where the index declined at a sharper rate; and 3) January 2, 2003 to December 24, 2007, where there is a steep continual rise of the index until the commencement of 2007, then a rollercoaster downward trend in 2007. Splitting the study period into three sub-periods of comparable size allows for observation of the behaviour of the NSE-20 share index within smaller time periods, hence providing a more precise result. It also facilitates comparison of characteristics between time periods.

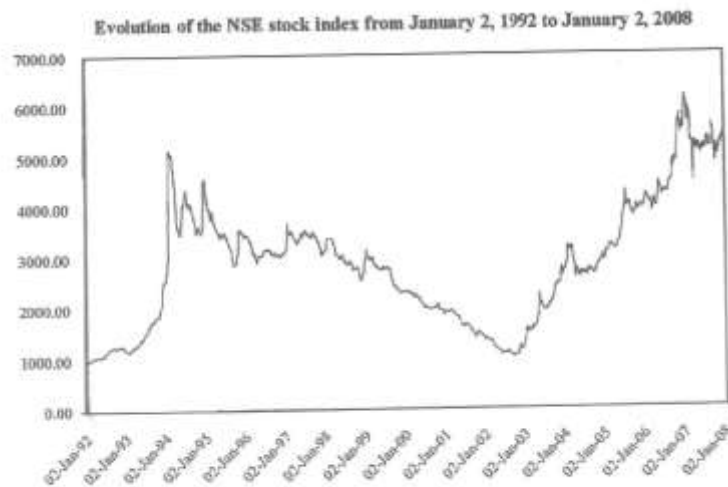


Figure 1.1: Evolution of the NSE-20 share index from January 2, 1992 to January 2, 2008

The evolution of the index from early 1992 to the end of 2007 can be related to changes in the business volume, regulatory structure and technological advancement of the exchange. The floor-based trading system introduced in 1991 formalized the exchange, which was previously run through a call-over system. There is marked growth in the index after this date, propelled by the government's privatization of several companies. In 1994, the International Finance Corporation rated the NSE as the best performing emerging market in the world, with a 179 per cent rate of return in dollar terms (NSE Handbook, 1998). The rate of growth decreased between 1993 and 1997, and then increased again. This increase was short-lived, and the index slumped in 1998 due to deteriorating economic conditions in Kenya

In 1999, the Central Bank hiked interest rates in efforts to reduce liquidity in the domestic market and prop up the Kenya shilling, which was performing poorly against foreign currencies, especially the US dollar. In this year, real GDP growth declined to 1.4 percent compared to 1.8 percent in 1998. The difficult economic environment caused a drop of 664.93 points in the value of the index. Market capitalization also declined by KShs. 22 billion. The economic decline continued in the period from 2000 to 2002, propelled by several factors: inadequate infrastructure for business investment; prolonged drought which contributed to reduced water supply and electric power; general insecurity, and inefficient delivery of public services. The tense political situation in the country during this period also contributed to the worsening economic performance.

Following the long spell of deteriorating performance, the market experienced a turnaround in 2003. A successful transition period after the popular result of the December 2002 general election, and a change of the political leadership increased investor confidence in industry. Anti-corruption campaigns and purges were launched, restoring, to some extent, the confidence of foreign investors in Kenya. The International Monetary Fund (IMF) resumed lending to Kenya, which it had suspended in 2000 due to poor governance and lack of transparency in government. The World Bank pledged to resume support, while the European Union offered a budgetary support facility. Other monetary commitments were made available by countries such as Denmark, the United Kingdom and the United States. 2006 was by far the most successful year for the exchange, as three companies - Equity Bank, Access Kenya and Scangroup -

sought to raise capital through initial public offers. Another company - Kengen - was listed publicly as part of the government's privatization programme.

Ongoing developments are expected to contribute to the size of the exchange. The decentralized electronic trading system introduced in 2007 has paved a way for extended trading hours, greater trading volumes and higher liquidity in the market. Further, the Kenyan government has expressed its intention to continue divestiture of holdings in state-owned firms. This would improve the investment opportunities available to investors and attract additional foreign investment in the exchange. Plans are also underway to create a regional exchange for the member countries of the East African Community - Kenya, Uganda, Tanzania, Rwanda and Burundi.

The continuous development of the exchange has led to the emergence of a class of investors who are more active and more knowledgeable in the operations of the stock market. However, the stability of the exchange has been eroded by the recent collapses of 3 major stockbrokers. In February 2007, stockbroker Francis Thuo and Partners was suspended for 14 days after facing financial difficulties, but was unable to resume operations after the suspension period had elapsed. A second broker, Nyaga Stockbrokers, collapsed in March 2008, after it emerged that the broker had engaged in fraudulent activity by selling clients' shares without their consent for a period of two years. Finally, Discount Securities was placed under statutory management by the Capital Markets Authority in March 2009, after a 5-month restructuring period failed to yield a return to stability. Other brokers have faced financial difficulties, but avoided extended suspension from operations after injecting capital into their businesses. The systemic risk posed by the collapse of these brokers illustrates the need for more rigorous risk management at the NSE.

1.2. Problem Statement

The Nairobi Stock Exchange has changed significantly since the introduction of a floor-based trading system. As depicted by Figure 1.1 on page 2, the market has experienced variations in the index level. The purpose of this study is to examine the statistical properties of historical NSE-20 index returns and illustrate the

application of an advanced risk measurement technique that can be used by market participants to provide a measure of the volatility present in the market.

While considerable research has been carried out on the statistical properties and volatility structure of developed markets such as the United States and Far Eastern stock markets, there is a significant lack of similar literature on the Kenyan stock market. To the best of the author's knowledge, there exists only one such study.

Ogum, Beer and Nouyrigat (2005) examine the daily values of the NSE-20 share index to determine the unpredictability of returns, the autoregressive behaviour of conditional volatility and the response of this volatility to new information. They find evidence of predictability in index returns from past observations of stock markets in Kenya and Nigeria. Their major focus, however, is on the asymmetric behaviour of conditional volatility. They establish that the conditional volatility behaves in an autoregressive manner. The asymmetric volatility coefficient is found to be significant and positive, suggesting that positive shocks to the Kenyan market increase volatility more than negative shocks of an equal magnitude. For this reason, they employ Nelson's (1991) Exponential GARCH model which is suited to the purpose of explaining the asymmetric behaviour in volatility of the index.

Their study differs from this one, however, in terms of the focus of the study. Ogum et al are focused on how the conditional volatility behaves asymmetrically under different (positive or negative) shocks or market innovations. In contrast, I seek to describe the basic conditional volatility structure of the index over a longer time frame of 16 years. Bollerslev's (1986) GARCH model captures the statistical properties observed in this study, and is a sufficient volatility model for the purposes defined here. This study also expands Ogum et al by increasing the range of statistical properties studied. Specifically, the predictability of returns from past observations, the skewness, kurtosis and volatility clustering properties of the index return data are examined.

1.3. Research Objectives

The research objectives of this study are to:

- i) determine whether the local data series exhibits the stylized characteristics found to occur in most financial time series, and how these characteristics have evolved with time; and
- ii) observe different volatility regimes, and compare the current level of volatility to previous levels.

1.4. Research Questions

The research questions are:

- j) Do the returns of the NSE-20 share index exhibit predictability from past observations over time? Does the level of predictability change with time?
- ii) What is the distribution of the NSE index's return data from 1992 to 2007? What are the levels of skewness and kurtosis of returns over the three time periods: i) 1992 to 1997, ii) 1998 to 2002, and iii) 2003 to 2007? Are there significant differences in these estimates?
- iii) Is there any evidence of volatility clustering - that is, periods of high volatility that are followed by periods of more high volatility and periods of low volatility followed by periods of more low volatility - in the NSE index?
- iv) Using the GARCH model, what is the estimated volatility of the NSE in the three distinctive periods i) 1992 to 1997, ii) 1998 to 2002, and iii) 2003 to 2007? Is the current volatility higher or lower than previous years?

1.5. Scope of the study

This research is limited to investigating the statistical properties and volatility structure of the Nairobi Stock Exchange twenty-share index, for the period January 2, 1992 to December 24, 2007. This period is marked by significant changes in market structure, with increased usage of information technology and increased regulation infrastructure of the financial and money markets, and significant growth in market capitalization. It is also a sufficiently long period to allow various volatility regimes to be observed. Bollerslev's (1986) GARCH model is used to estimate volatility levels at different periods to allow for comparison. No conclusions are drawn on the causes of volatility in the market.

1.6. Justification and motivation of the study

A correlation has been found between the movement of the stock market and the economic growth rate. Ungerer (2003) suggests that, on average, the stock market and economy move in stride. The market, however, tends to fluctuate much more than the economy as a whole. Past estimates of market volatility are therefore important to policy makers as an indicator of the future vulnerability of financial markets and the economy (Poon and Granger, 2003). High levels of market volatility may also lead to a general erosion of investor confidence and a flow of capital away from equity markets (Kupiec, 1991; Nicholls and Tonuri, 1995). For example, the post-election violence in Kenya in early 2008 resulted in the Nairobi Stock Exchange (NSE) losing almost fifty billion shillings of its market capitalization, value in January 2008 alone (author's own calculation).

Market volatility may also affect the level of business investment; a rise in stock market volatility can be interpreted as a rise in the risk of investment in equity products, and may result in a shift of funds by investors to less risky assets (Mala and Reddy, 2007; Zulu, 1995). In the shift to less risky assets, equity investors shun small firms and turn to purchase shares in larger, well-known firms, affecting the ability of these smaller firms to obtain financing from the market. A more extreme effect would be the withdrawal of investors from the market completely.

While these examples are not exhaustive, they establish the importance of measuring stock market volatility, due to the placement of the stock market as a key component of a country's financial markets. Individuals, corporations and governments would benefit from an indication of the volatility present in the market at any particular time, to provide information upon which sound investment decisions can be made.

This research project is motivated by a desire to better understand the movement of the Kenyan stock market. After the liberalization of the Kenyan money and capital markets in the early 1990s, the NSE-20 share index rose continuously to a value of 3118.75 at the beginning of 1998. Shortly afterwards, the index dropped steadily until it reached a low of 1004.70 in September 2002. After the General election in late 2002, when the opposition party National Rainbow Coalition (NARC) won the Presidency, the index rose to a high of 6161.46 in January 2007, but again the index fell over the whole of the year 2007. While such cyclical movements are common in share indexes, the need to obtain a

numerical estimate of these movements is becoming increasingly important in finance, as a means of risk management. This can be investigated only by examining the statistical properties of the NSE-20 share index and its volatility structure.

The results of this study will give an indication of the level of volatility present in the Kenyan stock market. Such an estimate would be useful in the formulation of monetary policy, as the performance of the stock market is identified as a key leading economic indicator. Market regulators would also benefit from this estimate, as they seek to find ways in which to improve the performance of the stock exchange. Estimates can also be applied as a benchmark by institutional investors such as asset managers, where they compare the level of market volatility to the return expected by the investors whose funds they manage. By observing the volatility structure in the stock market, a measure of comparison between the NSE and other stock markets will also be established.

According to Bekaert and Harvey (1994), the behavioural differences exhibited by returns in emerging equity markets and returns in industrial equity markets imply that the global investor would benefit from diversification in emerging markets. A volatility measure for the local market would therefore be useful to foreign investors as information for decision making purposes. From an academic perspective, this study will expand the existing literature on stock return volatility in developing markets.

The remainder of this thesis is structured as follows:

In chapter 2, the theoretical framework of the study is presented, The development of the Nairobi Stock Exchange during the period being studied, 1992 to 2007 is also presented, and factors that have contributed to its growth are identified. Chapter 3 presents the research methodology employed in this study. The methods of data collection, verification and analysis are discussed in detail.

Chapter 4 is a discussion on the empirical results on the statistical properties of the NSE index returns and the volatility estimation process using the GARCH(1,1) specification.

Chapter 5 presents concluding remarks and recommendations for future research.

2.0 LITERATURE REVIEW

2.1. INTRODUCTION

In this chapter, I survey the development of the Nairobi Stock Exchange from its early years to date, exploring several factors that have influenced the growth of the exchange. I also look at three of the statistical properties exhibited by asset prices: unpredictable returns, leptokurtic and skewed distributions and volatility clustering, and review the various models proposed to estimate volatility and prior studies in which these have been applied. Finally, I present the conclusions made from the literature review and their implications for the study.

2.2. THE NAIROBI STOCK EXCHANGE

The Nairobi Stock Exchange (NSE) is Kenya's only capital market and facilitates trading in two types of instruments: 1) company shares and 2) bonds. The exchange was established in 1954 by an association of six stockbrokers with the objective of providing private companies with access to long-term capital. There was no physical trading floor; trading was carried out through a periodic (call) auction trading system where transaction prices were exchanged via telephone and in coffee-house forums (Ngugi, 2003).

Because of this set-up, the exchange existed for a long time with low trading activity. According to Kimura and Amoro (1999), the lacklustre performance of the NSE was a result of several factors: 1) A general lack of awareness and information on the role, functions and operations of the stock exchange by the public; 2) Companies were wary of the risks associated with the additional disclosure required from listed companies by regulators. In their view, these risks were not adequately compensated by additional returns; 3) Banks tended to indirectly discourage the stock exchange as a means of raising capital, since they played the dual role of being investment advisors as well as lenders; 4) The stock exchange itself did not carry a sufficient number of products to attract the investing public, and there was lack of adequate marketing of the exchange; and 5) the Capital Gains Tax imposed from 1975 to 1985 was a significant impediment to the volume of trading.

Trading volume picked up in the 1991, with the establishment of a formal trading floor and policy revisions that encouraged participation of more investors. As of the end of December 2007, which is the end of the period covered by this study, there were 54 listed firms with a market capitalization of KShs 824.5 billion (author's own calculation), which excludes the market capitalization of four companies which are suspended from trading.

2.2.1. The development of the Nairobi Stock Exchange: 1954 to 2007

Over time, various changes have been made to the NSE. Incentives have been introduced by the Kenyan government, through the Ministry of Finance, to spur growth and increase liquidity. Most of the incentives have been tax-based, but others are policies on foreign ownership. A formal regulatory structure was established in 1989 under the Capital Markets has been formulated to protect investors and develop the capital markets. Technological improvements have been made, and regional integration efforts pushed forward. These incentives and innovations are discussed in the following sections.

2.2.1.1. Listed companies at NSE

The number of listed companies has fluctuated between 50 and 60 for a long time (NSE Annual Report, 1999). When the NSE was first formalized as a securities exchange in 1954, there were 45 companies with ordinary shares, 28 companies with preferential shares, and 12 municipal and government shares. By 1971, the number of ordinary-share companies had increased to 67, and this remains the highest figure to-date. The collapse of the East African Community in 1975-6 resulted in a series of nationalizations by the Ugandan government. Ugandan companies or their subsidiaries that were listed on the Nairobi Stock Exchange were withdrawn, leading to a reduction in the number of quoted companies (Ngugi, 2003).

In the period 1980 - 1985, four new companies went public; there were also a number of companies delisted from the exchange during this period, as a result of takeovers, mergers or Uganda's nationalization programme. In 1988, the government began a partial divestiture of Kenya Commercial Bank, issuing 20 percent of its shareholding to the public, and retaining 80 percent. Seasoned offers

were made in 1990, 1996 and 1998, which, in total, reduced the government's shareholding in KCB to 35 percent.

According to Ngugi and Njiru (2005), the reform period 1990-1999 witnessed nine new public offers. Various measures were put in place to promote the exchange as a source of capital for private companies, including lower listing costs and tax reforms. Four of the nine public offers were part of the on-going privatization process of government parastatals: Uchumi Supermarkets in 1992, National Bank in 1994, Kenya Airways in 1996 and Tourist Promotion Services (TPS Serena) in 1997.

In 2000, the NSE was reorganized into four distinct market segments - the Main Investment Market Segment (MIMS); the Alternative Investment Market Segment (AIMS); the Fixed Income Market Segment (FIMS) and the Futures and Options Market Segment. In 2001, Mumias Sugar Company was privatized, and ICDC Investment Company floated its shares in October 2001, then again in December 2001.

Five companies were delisted by the CMA in 2002 due to non-compliance with listing requirements. The general election of December 2002 infused increased confidence in both individuals and the business sector, leading to an upward trend in the market's performance. In 2006, four companies - Kengen, Eveready, Scangroup and Equity Bank - issued shares to the public. The initial public offers caused a notable rise in the NSE index value, from 3991.18 at the beginning of 2006 to 5645.91 at the end of that year. As the effect of the IPOs wore off, the market's growth peaked in January 2007, and then begun a downward trend till it reached its lowest point in over six months, a level of 4465.09 on 23 March 2007. The index then rose steadily to close at 5444.83 on 24 December 2007.

To encourage new listings, the government introduced tax incentives for newly listed companies in the 2000/01 fiscal budget - these would attract a lower corporate tax rate of 25 percent for a period of five years after listing, provided the firm listed a minimum 30 percent of its full issued and authorized share capital on the NSE, and a tax rate of 27 percent for 5 years if a minimum 20 percent of the share capital was listed (Ngugi, 2003) .. This is compared to the 30 percent corporate tax rate levied on unlisted local companies and 37.5 percent on foreignowned companies. Divestiture of state-owned corporations has proved to be

beneficial for Kenya's stock exchange, as evidenced by the privatization of Kenya Airways and several banking institutions. Recently, in 2006, the Kenyan Parliament passed the Privatization Bill, which provides the legal and institutional framework for the divestiture of state assets. This Bill paves a way for future privatizations, which are expected to improve the size of the market, attract more local and foreign investors and contribute towards greater liquidity.

2.2.1.2. Technological advances

The continuous improvement of technology has been instrumental in improving the trading volume at the NSE. In its early years, the NSE operated using a callover trading system where trades were conducted by way of personal meetings and telephone conversations. One of the major problems of this form of trading was the lack of accurate record keeping, caused by the dispersion of stockbrokers. In the course of this study, it has been found that there is incomplete information on the day-to-day performance of the NSE index and listed companies for the period between 1954 and 1991.

The call-over system was replaced by the open-outcry system in 1991, where trading took place on a formal trading floor and trades were recorded manually on a board. The trading floor brought together the stockbrokers and investors, thus aiding information collection. In addition, active record-keeping was carried out, in compliance with the newly-formulated regulations of the CMA. A customized application system, DASS, was employed to support the clearing, settlement and delivery functions of the exchange. The system performed a variety of functions - generated trading slips, captured all delivery and settlement cheques and produced reports. Share ownership was confirmed by the physical delivery of share certificates.

During the early 1990s, the physical delivery of securities sufficed, since the exchange was not a major investment vehicle for most Kenyans and had low business volumes (NSE Annual Report - Chairman's Statement, 1997). The settlement period was T+7 days, which meant transactions took at least 7 days to be effected. However, government privatizations in the mid-90s increased market volume and liquidity, and the share certificate system became an impediment to

the operation and growth of the NSE. To address these issues, the NSE leadership proposed continuous improvement in technology over the years.

The technological advancement of the NSE was planned as four subprojects to be implemented consecutively; the establishment of: 1) a Central Depository System (CDS); 2) an Automated Trading System (ATS); 3) Back and front office systems for stockbrokerage houses; and 4) a Real Time Information Dissemination system. A draft bill to be presented to Parliament was prepared in 1997 by a UK consulting company, Brian Taylor Associates. The bill constituted the legal structure necessary for the formation of the Central Depository System Company (CDSC).

The CDS system was expected to achieve several objectives: 1) reduce transaction costs by shortening the registration process; 2) attain international standards, entice foreign investors and encourage cross-border listings, in preparation for integration of the regional exchanges; 3) create new employment opportunities; 4) boost liquidity in the market and increase market activity by reducing the settlement period to T+3 days; and 5) reduce operational, systemic and counter-party risk (NSE Annual Reports and Financials: 1999,2000; Ngugi, 2003). According to Yartey and Adjasi (2007), CDS systems also eliminate the risks associated with paper-based systems, such as loss, mutilation and theft of certificates, and reduce errors and delays associated with paper-based systems.

By 2001, the transaction settlement time had been reduced to T+5 days, and shareholders received their shares within 7 days of settlement; however, the CDS had not yet been established (NSE Annual Report, 2001). In December 2002, the NSE launched its official website, with the purpose of improving information dissemination to the public. After a series of delays in the approval of the CDS Bill by Parliament, the CDS system was finally set up in 2004.

The next phase of the technological improvements began, and culminated in the Automated Trading System (ATS) going live in September 2006, resulting in the removal of the block trades board. The ATS was sourced from Millennium Information Technologies (MIT) of Colombo, Sri Lanka; this company is also the supplier of the Central Depository System (NSE Handbook, 2006). The ATS system provided a boost to market liquidity and increased efficient execution of transactions. This resulted in the increase of the trading period from two hours

(10:00 am -12:00 pm) to three hours (10:00 am - 1:00 pm). The system also facilitated the trading of rights issues in the same manner as equities.

The back and front office support system for brokerage houses BrokerKnow - was established in 2007. The dealers could now make share and bond trades from decentralized office locations by means of a wide area network, marking the end of floor-based trading at the exchange. Following the decentralization of operations, the exchange closed the spectator gallery at its premises, and arranged data vending licenses for companies interested in distributing market data. Thus, the Real Time Information Dissemination phase was initiated. Vendors obtain real-time market data from the exchange's systems and distribute it to interested parties for a fee.

2.2.1.3. Foreign participation incentives

In January 1995, the government relaxed exchange controls that were in place at the time and permitted foreign investors to participate in the trading of locally controlled companies. According to the Kenya Gazette Supplement (6 January 1995), foreign investors could now purchase up to 20 percent of shares issued for sale by a company through an initial public offer. A limit of 2.5 percent per company was set for an individual or joint foreign investor(s).

New regulations were issued in July 1995. Foreign investors could now own up to 40 percent (in aggregate) of a listed company. A limit of 5 percent was set for a single foreign owner or joint foreign owners of shares in a listed company. In the event of a public issue, the total shares purchased by foreign investors could not exceed forty percent of the total shares on offer, as documented in the Kenya Gazette Supplement (24 August 1995). This served to draw foreign capital into the Kenyan market, with total turnover from foreign investors estimated at KShs 222 million (6.6 percent of market turnover) by the end of 1995. These figures increased in subsequent years, standing at KShs 747 million (19 percent of total market turnover) in 1996, and KShs 2.232 billion (36.3 percent of total market turnover) in 1997 (NSE Annual Report, 1997).

In July 2002, a directive allowing foreign investors to acquire shares freely in the stock market provided each company reserved a minimum 25 percent of issued share capital for domestic investors was issued by the government (Kenya

Gazette Supplement, 2002). This left a 75 percent aggregate share in local companies that could be purchased by foreign investors. To facilitate further foreign participation in the local market, the government allowed foreign investors to acquire up to 49 percent of local stockbrokerage houses, and up to 70 percent of local fund managers.

The foreign investor regulations were revised again in June 2007, through a legal notice stipulating that the threshold for foreign investor ownership of publicly listed companies had been reduced to 60 per cent from 75 per cent (Ministry of Finance, 2007).

2.2.1.4. Taxation

In June 1975, the government introduced a 35 percent capital gains tax to be levied on profits realized from the sale of shares. This tax was aimed at generating additional revenue and curbing excessive speculation (Ngugi, 2003). This tax caused a slump in an already aggravated market, as it resulted in lower liquidity because investors withheld from selling their shares (NSE Handbook, 2006). The tax was progressively reduced by 50 percent in 1981, by 25 percent in 1982 and finally suspended in 1985, as the government embarked on a reform process to develop the capital market in Kenya (Ngugi, 2003).

In June 1996, the withholding tax on dividends was lowered from 7.5 percent to 5 percent, while the non-resident rate was reduced from 15 percent to 10 percent. This was aimed at enhancing the competitiveness of shares compared to alternative investment vehicles such as savings accounts, which were subject to a withholding tax of 15 percent (raised from 10 percent), and bearer instruments and certificates of deposit, which suffered a withholding tax of 20 percent, up from 10 percent.

2.2.1.5. Regional Integration efforts

When the NSE was established in 1954, it was created as an East African venture, with companies and investors from all three countries - Uganda, Tanzania and Kenya - participating. The collapse of the East African Community (EAC) in 1975-6 damaged Nairobi's standing as a regional centre, which in turn affected the exchange based in Nairobi. Further, Uganda compulsorily acquired and

nationalized some of the companies listed on the exchange, or their subsidiaries (NSE Handbook, 2006). The closure of the Kenya-Tanzania border led to a further breakdown in the trade relationships between the three countries, causing restrictions in the flow of capital to the exchange.

With the re-establishment of the EAC in 1999 - 2000, there was renewed interest in East African cooperation. With the objective of creating a regional exchange ultimately, the Uganda Securities Exchange (USE) and the Dar-esSalaam Stock Exchange (DSE) were established in 1998. The NSE was a major facilitator in the establishment of both exchanges, through provision of personnel, expert advice and training. In addition, both the USE and the DSE are shareholders in the Central Depository System Company. The formation of a regional exchange was directed through the Capital Markets Development Committee, a working group of the EAC Secretariat. The aim of a unified stock exchange was to bring together a greater pool of resources, enable cross-border listing of securities, increase liquidity and diversification opportunities, and attract foreign investment with the increased investment opportunities. These integration efforts paid off, with the cross listing of two Kenyan companies on the USE - East African Breweries in 2001 and Kenya Airways in 2002. Other companies have been cross listed since then, including Jubilee Holdings, Equity Bank and Kenya Commercial Bank.

In November 2004, the East African Stock Exchanges Association was established with the following objectives: 1) growth and development of the capital markets in the EAC; and 2) market integration in the EAC through crossborder listing and development of infrastructures that facilitates and promotes cross-border trading, delivery and settlement.

2.2.1.6. Regulatory Structure

In the early years, the Kenyan government intervention on the operations of the stock exchange was carried out through the Capital Issues Committee (CIC). The CIC was active between 1971 and 1988. It was set up as an agency within the Treasury and mandated to handle the issue of prevalent capital outflow from Kenya following attainment of independence in 1963 (Oyaro, 1991).

A joint study by the Internal Finance Corporation and the Central Bank of Kenya culminated in the formation of a regulatory body, the Capital Markets Authority, to assist in the creation of an environment suitable for growth and development of the country's capital markets (NSE Handbook, 1998). The principal objectives of the CMA are established in the Capital Markets Act (2002).

The regulatory structure was further improved with the establishment of the Capital Markets Tribunal in 2001. The purpose of the tribunal was to hear appeals made by persons aggrieved by directives made by the Capital Markets Authority and make decisions on those appeals (Capital Markets Act, CAP 485A, Section 35A). The tribunal deals with appeals on decisions by the CMA. When an appeal is made, the tribunal may require the CMA to show the reasons behind a particular action it has taken. Following this, the tribunal then affirms or overturns the Authority's decision.

2.2.2. The Computation of the NSE Twenty Share (NSE-20) Index

The Nairobi Stock Exchange identifies several types of indicators to track the performance of the equity market in a given period of time: NSE-20 share index; equity market capitalization; the number of shares traded; the number of transactions; total foreign turnover; and, the number of deals and total turnover from the equity market. The NSE-20 share index is the main market indicator (NSE Annual Report, Chief Executive's Statement, 2002). According to Adams, Booth, Bowie and Freeth (2003), share indexes which chart aggregate changes in market levels have several possible uses: 1) measurement of short-term changes in the level of the market; 2) decision-making, in respect of the whole market; 3) historical studies; 4) portfolio performance measurement; 5) form the basis of derivative instruments, such as futures and options, which can be used as a means of hedging against market movements or speculating in such movements, and 6) the construction of index funds designed to track the index. While other indicators may provide a representation of the movement of the stock market over time, they cannot be considered a financial price, and as such cannot be used as extensively as indexes.

The NSE-20 share index, first published in 1966, consists of the twenty most lucrative public companies in Kenya, chosen for their size, liquidity and industry group representation. The criteria used for selecting index constituents include: 1) the company must have been quoted for at least one year; 2) the company must have a minimum market capitalization value of KShs 50 million; 3) twenty percent of the company's shares must have been floated for trading at the stock market and, 4) the liquidity of the company's shares, as indicated by the turnover, number of shares traded and number of deals made on the company's shares (NSE Index Revision Press Statement, 2007). All the twenty constituents are given equal weighting, that is, each of the companies makes up an equal part of the index, regardless of its price or market capitalization. The index is computed at the end of each trading day.

The daily change in value of the index is computed as a geometric average of the price changes in for each of the companies that make up the index. First, for each share, the ratio of its closing price today to the close on the previous trading day is computed. For instance, if Barclays Bank goes from KShs72.50 to KShs71.50 in one day, its ratio is:

$$\frac{\text{KShs } 71.50}{\text{KShs } 72.50} = 0.9862$$

The next step is to multiply all of these ratios together, forming a single number. Finally, this number is raised to the power of the reciprocal of the number of shares in the index (currently the index includes 20 shares, thus the power will be $1/20$). The result is the ratio of today's index value to the previous trading day's index value. Today's index value is therefore yesterday's index closing value multiplied by this ratio. This computation process can be expressed mathematically as:

$$\begin{aligned} I_t &= I_{t-1} * \sqrt[20]{\frac{P_{1t}}{P_{1t-1}} * \frac{P_{2t}}{P_{2t-1}} * \frac{P_{3t}}{P_{3t-1}} * \dots * \frac{P_{20t}}{P_{20t-1}}} \\ &= I_{t-1} * \sqrt[20]{\prod_{j=1}^{20} \frac{P_{jt}}{P_{jt-1}}} \end{aligned} \quad (3.1)$$

where: I_t = index value at time t ; I_{t-1} = index value at time $t-1$; P_j = price of share j at time t ($j = 1, 2, \dots, 19, 20$); $P_{j,t-1}$ = price of share j at time $t-1$ ($j = 1, 2, \dots, 19, 20$).

One advantage of this method of computing an index is that it allows for easy adjustment following share splits and rights issues. The adjustment is made by simply adjusting the base price of the individual share in question, rather than having to 'rebase' the whole index (Adams et al, 2003). However, an index computed in this manner cannot be used as a reliable benchmark to assess the performance of a portfolio of securities. A portfolio consisting of equal amounts of the constituent shares in a geometric index will always show the same performance as or better performance than the index over the period from the base date.

2.3. REVIEW OF THE STYLIZED FACTS OF FINANCIAL TIME SERIES

Empirical studies on financial time series have established that variations in asset prices - which may seem random - share some important statistical properties. These properties, as first observed in the seminal works of Mandelbrot (1963) and Fama (1965), are called *stylized empirical facts*.

The range of stylized facts has been investigated in various studies, including Granger and Ding (1995) and Cont (2001). These authors present a set of eleven stylized empirical facts common across a wide range of instruments, markets and time periods: 1) Absence of auto correlations in returns, 2) Heavytailed distributions, 3) Gain/loss asymmetry, 4) Aggregational Gaussianity, 5) Intermittency, 6) Volatility clustering, 7) Conditional heavy tails, 8) Slow decay of autocorrelation in absolute returns, 9) Leverage effect, 10) Volume/volatility correlation, and 11) Asymmetry in time scales.

Some of these properties cannot be observed in share indexes, because indexes are aggregate indicators rather than the price of an individual asset. For example, volume-volatility correlation, which entails the observation of relationships between the trading volume and the volatility level, would be more significant when conducted for an individual share. Engle (2004) identifies three ever-present characteristics of financial returns from holding a risky asset: returns are almost unpredictable, they have surprisingly large numbers of extreme values, and both the extremes and quiet periods are clustered in time. These three stylized facts are addressed here, as: 1) Absence of autocorrelations in returns; 2) Heavy-

tailed distributions; and 3) Volatility clustering. These can be observed in a share index, and will therefore be the extent of this discussion

2.3.1. Unpredictability of returns

The theory that share prices move in a random manner, and therefore it is impossible to predict future returns, can be traced back to Bachelier (1900). Tills study first documented the random manner in which share prices move, and that short-term changes in share prices have a finite, restricted variance, i.e., they vary over a certain range. Based on the Central Limit theorem, Bachelier concluded that changes in share prices could be modelled using the Normal (Gaussian) distribution.

Early authors, including Cowles (1933, 1944), Kendall (1953), and Roberts (1959) found evidence of the absence of correlations in share prices of US markets. Fama (1970) summarised the empirical findings on the unpredictability of returns of these early authors, and placed them within the framework of the Efficient Market Hypothesis (EMH).

2.3.1.1. The Efficient Markets Hypothesis

The Efficient Market Hypothesis suggests that market prices adjust instantaneously to the arrival of new information, and current prices will reflect all available and relevant information. Because information arrival is a random process, changes in price will also be random and unpredictable. Fama (1970) defines an efficient market as one where "there are large numbers of rational profit maximizers actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants". The level of efficiency in a market is classified into three, based on the subsets of available information: 1) Weak form efficient - the information subset of interest is past prices (or return) histories, 2) Semi-strong form efficient - the information subset is publicly available information, such as interim dividend announcements and annual reports, and 3) Strong-form efficient - the information subset is private information held by an investor that is unknown to other investors.

Tests on the validity of the EMH theory have provided mixed evidence, with some authors finding evidence for efficiency and other finding evidence

against it. Tests of the semi-strong form of efficiency have been the most divergent, and have led to the identification of anomalies, such as the *January anomaly*. Reilly and Brown (2003) provide a discussion of various market anomalies. The existence of these anomalies has led to the development of new theory to explain why a relationship exists between prices and publicly-available information such as price-earnings ratios and the size of the firm.

Behavioural finance theory recognizes that the EMH is applicable within certain boundaries, but is deficient in that it does not consider the psychological behaviour of individual investors, analysts and portfolio managers (Olsen, 1998). Proponents of behavioural theory suggest that investors tend to make investment decisions based on cognitive biases, which are deviations from rational behaviour. Literature on the behavioural aspects of markets includes DeBondt and Thaler (1985), Kahneman and Tversky (1979), and Mullainathan and Thaler (2001). Proponents of the EMH and behavioural theorists disagree on the behaviour of investors, and the existence of arbitrage opportunities. According to the EMH, all investors behave rationally, with the objective of making profits. Because of this rational behaviour, any arbitrage opportunities in a market are quickly neutralized, thus the market prices assets accurately. Behavioural theorists on the other hand, argue that investors may act irrationally at times and base investment decisions on objectives other than profit. This behaviour leads to the creation of arbitrage opportunities. Recent developments such as the Adaptive Markets Theory of Lo (2004) have attempted to reconcile the EMH and behavioural theory. The divergence in opinions between the two theories leaves the question of accuracy and completeness of market prices unanswered, and has led to a class of literature that attempts to prove or disprove the existence of predictable returns in a market.

Malkiel (2003) provides a treatment of the criticisms that have been levelled at the three classes of the EMH by opposing theories. These criticisms present instances in which one of the three forms of the EMH theory fails to be observed. Consequently, they provide evidence against the validity of the EMH theory. Of particular interest to this study is Malkiel's discussion on the evidence of short-run predictability presented in opposing literature.

Malkiel uses Lo, Mamaysky and Wang (2000) and Shiller (2000) as examples of authors who find evidence of some momentum in short-run share prices and suggest that technical analysis may allow traders to obtain superior

returns. To counter these findings, Malkiel argues that the magnitude of these correlations found between present and past prices may be statistically significant, but are not sufficient enough to provide a return over and above the transaction costs that would be involved in an effort to make superior returns from them. Similar arguments are found in Cowles (1960). Further, Malkiel argues that whatever deviations from the EMH may exist in a market, they are not systematic or regular, and can therefore not offer investors a dependable source of returns. Any evidence of predictable patterns also seems to disappear after they are published in the finance literature or in the public domain. Using these arguments, he concludes that the EMH is still valid, and the market is still weak-form efficient despite correlations found.

2.3.1.2. Review of studies on unpredictability of share index returns

The study of weak-form efficiency in markets seeks to verify the proposition that prices and returns cannot be predicted from past security market information. According to Reilly and Brown (2003, p. 179), there are two ways of testing for independence of returns: 1) an autocorrelation test, which measures whether the return on day t correlates with the return on day $t-1$, $t-2$, $t-3$, and so on. Autocorrelation, or serial correlation, is therefore a measure of the relationship between the value of a random variable today and its value some days in the past; and 2) a runs test, which assigns a plus sign (+) if there is a price increase, or a minus sign (-) in the event of a price decrease. Two or more consecutive changes of the same sign constitute a run; the run is broken when there is a change in the opposite direction. The total number of runs in a price series is compared to an expected value to determine whether the series contains predictability.

The evidence on the unpredictability of index returns is divergent; while some studies find evidence of return predictability, others find no such evidence. Engle (2004) studies daily levels of the Standard and Poor's 500 Composite index from 1963 through late November 2003, and finds that return auto correlations are almost all insignificant at a 5 percent confidence level, and are therefore uncorrelated and unpredictable.

Dickinson and Muragu (1994) test the validity of the weak-form efficiency theory for share prices of 30 companies in the Nairobi Stock Exchange from 1979 to 1989. They use three sets of prices: the transaction price, the bid price and ask

price of a share, in an effort to bring out market microstructure effects. Their hypothesis is that share price returns are independent, that is, no correlations exist between past returns and present ones. Various techniques are used to prove independence: the autocorrelation test, the binomial test, the Ljung-Box Qstatistic, and a runs test. All tests return the same result: there is no evidence of interdependence in share returns for the period. While the results do not provide categorical evidence that the market is weak-form efficient, they do not contradict the weak-form of the EMH theory. They propose the need for extensive tests to prove the existence of a weak-form efficient market.

Conflicting viewpoints on return predictability have been presented in other literature. Harvey (1995) examines empirically the differences in behaviour of 20 emerging market returns and 3 developed markets, using a long-term data sample (1900-2001) from the United States, Japan, the United Kingdom, Germany, and France as well as a shorter-term data sample (1970-2000) for 15 countries. He reports higher serial correlation of monthly returns in emerging markets, compared to developed markets. 12 of the 20 emerging markets studied have serial correlation coefficients greater than 10 percent and 8 of the markets have coefficients above 20 percent, indicating significant predictability of returns. In contrast, he finds that all three developed markets have first-order serial correlations less than 1 percent.

Jefferis and Smith (2005) investigate weekly index data from 1990 to 2001 in several African stock markets: South Africa, Egypt, Morocco, Nigeria, Zimbabwe, Mauritius and Kenya. They employ a test of evolving efficiency (TEE) to detect changes in weak form efficiency through time. The results show that the Johannesburg stock market is weak form efficient throughout the period, and three stock markets become weak form efficient towards the end of the period: Egypt and Morocco from 1999 and Nigeria from early 2001. These contrast with the Kenya and Zimbabwe stock markets which show no tendency towards weak form efficiency and the Mauritius market which displays a slow tendency to eliminate inefficiency. The authors suggest that these results on efficiency to broader economic factors and the institutional characteristics of markets. This evidence of return predictability in the NSE is echoed in Ogum et al (2005).

2.3.2. Volatility clustering

According to Mandelbrot (1963), large price variations in asset returns tend to be followed by large price variations, of either sign, and small price variations tend to be followed by small price variations. This trend is known as volatility clustering, and is evidenced by the presence of serial correlation in squared asset returns. While asset returns are unpredictable in most cases, squared returns are found to be serially correlated, and therefore predictable.

While studies of correlations in returns have found differing evidence, most empirical studies are in agreement that the squares of the returns exhibit significant serial correlation. Engle's (2004) analysis of the S & P 500 index finds autocorrelation in the squared returns. Gokcan's (2000) examination of the indexes of seven emerging markets (Argentina, Brazil, Colombia, Malaysia, Mexico, Philippines, Taiwan) finds evidence of auto correlations in the squared returns for all markets except Brazil and Philippines.

Chortareas, McDermott and Ritsatos (2000) examine the statistical behaviour of the Athens Stock Exchange (ASE) Index to observe the effects of liberalization measures instituted in the late 1980s and early 1990s. They find evidence of serial correlation in both the squared daily returns and squared weekly returns for the Athens Stock Exchange Index for the period. Further, they split the sample into two periods. The two periods, 1987 to 1991 and 1991 to 1997, exhibit significant changes in the time series properties of the ASE index. Specifically, autocorrelations in returns decrease in the second period. The conclusion is that the time series properties of an emerging market may be expected to change over time with market maturation.

Nicholls and Tonuri (1995) find strong autocorrelations in the squared return series for the Fifty Leaders Index in Australia for the period 1988 to 1991. Patev and Kanaryan (2004) also find autocorrelation evidence for the squared returns of the Bulgarian stock index SOFIX for the period 2000 to 2004. Similar results are documented in Shields (1997) for the WIX, BUX and CAC-40 indexes. The presence of auto correlations in the squared returns is proof of a non-constant conditional variance (Engle, 2004).

2.3.3. Leptokurtosis **and** Skewness

In contrast to the findings of Bachelier (1900), Mandelbrot (1963) found that: 1) price changes are erratic and fluctuate irregularly; some periods have large changes in prices, while others have small ones. He suggested that the variances of prices often behave as if they were infinite. 2) He found that probability distributions of share returns are leptokurtic, that is, they have positive kurtosis, and longer and fatter tails than the normal distribution. The tails of the distributions of price changes are in fact so extraordinarily long or heavy that the sample second moments typically vary in an erratic fashion heavy-tailed distribution of returns.

This departure from the properties of the normal distribution - which has a finite variance and a kurtosis level of 3 - prompted Mandelbrot to discount Bachelier's postulation that the normal distribution was suitable in modelling share prices. He proposed instead the *stable Paretian* class of probability distributions, whose variances are infinite, as a more suitable basis.

Mandelbrot's Stable Paretian Hypothesis has formed the basis of the study of kurtosis and skewness in financial time series. Engle (2004) defines *kurtosis* is a measure of the magnitude of extreme values taken by a random variable. As noted earlier, the kurtosis level for a normal distribution is equal to three, while its skewness level is zero.

Variable distributions whose kurtosis levels are greater than three are leptokurtic, while distributions with kurtosis less than three are platykurtic. Leptokurtosis in a data series is exhibited by too many values occurring near the mean and in the tails of the distribution, lending the distribution a sharp peak and fat tails. The sharp peak indicates that asset returns variable have a higher probability of attaining values near the mean compared to a normally distributed variable, i.e., most values are clustered around the mean. The fat tails indicate that when asset returns do deviate from the mean value, the deviations are larger than in a normal distribution, leading to outliers in the distribution.

Leptokurtosis in share price distributions is usually accompanied by skewness, that is, the distributions have long tails either on the left side or the right side. Left-skewed distributions indicate that the market gives higher probability to decreases than increases in asset pricing (Leon, Rubio and Serna, 2005). On the contrary, right-skewed distributions indicate that market increases are more likely to occur compared to market declines. Other than kurtosis and

skewness measures, proof of non-normality in the index return distribution is usually supported by an extremely high value of for the Jarque-Bera test for normality. For normal distributions, the Jarque-Bera (1987) test returns a value of zero. The presence of the two properties in financial time series has been confirmed in various literature (Mandelbrot, 1963; Fama, 1965; Baillie and de Gennaro, 1990; Bollerslev, Chou and Kroner, 1992; Cont, 2001; Premaratne and Bera, 2001).

2.3.3.1. Review of studies on the presence of leptokurtosis and skewness in share index returns

Various studies investigate and document the presence of leptokurtosis and skewness in share indexes. Mills (1995) examines empirically the daily returns of three indexes on the London Stock Exchange - the FTSE 100, the Mid 250 and the Mid 350, with the objective of determining the distribution of returns. Two sample periods: 1) 1986 to 1992, and 2) 1988 to 1992, are identified. The split sample is used to observe the behaviour of the data when the 2-year period of the deregulation of the London Stock Exchange in October 1986, and the effects of the market crash of October 1987 is excluded. They find that returns in these indices are characterized by highly non-normal behaviour, with skewness and extreme kurtosis. The longer sample period including 1986 and 1987 displays high negative skewness; when these years are excluded, the returns display a positive, much smaller, skewness and a decline in the kurtosis level. The results reveal that the deregulation of the market in October 1986 and the crash in 1987 alters the shape of the return distributions quite dramatically.

Worthington and Higgs (2001) in their study of the transmission or contagion effects of returns and volatility in Asian markets, analyze the skewness and kurtosis properties of returns. They use sample data from three developed markets (Hong Kong, Japan and Singapore) and six emerging markets (Indonesia, Korea, Malaysia, the Philippines, Taiwan and Thailand) from 1988 to 2000, and find that all the markets have kurtosis values higher than the normal 3, with Indonesia, Korea and Malaysia posting values higher than 20. All the seven markets but Japan are negatively skewed.

Harris and Kucukozmen (2001) compare the empirical distribution of the FTSE All-Share Index and the S&P 500 index from 1993 to 1999. They find that

both markets are not normally distributed. Specifically, they find significant leptokurtosis and skewness values of 5.2346 and -0.1996, respectively, for the FTSE, and 9.8177 and -0.4660 for the S & P 500.

In a study to establish the potential for integration of markets in Sub-Saharan Africa, Piesse and Hearn (2005) find that all the markets have return series that demonstrate significant deviations from normality. Using data from January 1993 to January 2000 for market indexes in Botswana, Ghana, Kenya, Mauritius, Nigeria, South Africa and Zimbabwe, they find that the Nigerian, Zimbabwean and South African indexes exhibit negative skewness, while the indexes in Kenya, Mauritius, Botswana and Ghana exhibit positive skewness. All the markets exhibit leptokurtosis, with Zimbabwe's being the least (kurtosis = 5.7107) and Kenya's being the highest (kurtosis = 22.5229).

The markets observed by Gokcan (2000) also show kurtosis values higher than 3, the highest being Argentina's at 13.15. All of these markets are negatively skewed, except Colombia, which has a positive skewness of 1.21. Chortareas et al (2000) also reports a kurtosis value of 16.94 and skewness of 0.52 for the ASE index returns for the whole sample period of 1987 to 1997.

From the above results, it is observed that the share indexes do possess the statistical properties of skewness and excess kurtosis in their return distributions, indicating that returns are not normally distributed.

2.4. REVIEW OF VOLATILITY MEASUREMENT METHODS AND APPLICATIONS

The issue of uncertainty in financial markets has been the subject of ongoing investigations by many authors over time. The increasing potential for financial loss in recent years has motivated active research in more accurate methods of estimating and forecasting volatility in these markets. As a general reference, Poon and Granger (2003) offers a look at various authors' techniques of volatility estimation and forecasting in pricing of derivative securities, portfolio construction, risk management and monetary policy-making. In a review of at least 93 published and working papers, they find that models of volatility estimation and forecasting can be classified broadly into two groups: 1) Time Series volatility models, and 2) Options-based volatility models.

The options-based models are essentially derivations of the Black-Scholes model of option pricing developed by Black and Scholes (1973) and Merton (1973). The model is used to provide forecasts of future volatility based on the prices of options in a financial market. These methods provide a forward-looking estimate of volatility, and do not use historical information. Instead, they require the market price of a traded instrument. These methods are not discussed further; the focus of this review of literature is on the methods that employ historical data to provide volatility estimates.

Time series models produce a type of volatility known as *historical (actual or realized) volatility* because it is dependent on past observations. This form of volatility was identified in Black and Scholes (1973). According to Poon and Granger, time series models can be further divided into the following: 1) Models that predict volatility based on past standard deviations, 2) Autoregressive Conditional Heteroskedasticity (ARCH) Models, and 3) Stochastic Volatility Models. This classification is expanded in the following discussion, by adding another class of volatility estimation methods - the un-weighted volatility estimators - that have been proposed in literature, which were proposed as improvements on the classic method of standard deviation.

2.4.1. Standard deviation models

Traditionally, the standard deviation was the generally accepted estimator of volatility in asset returns. However, Patev and Kanaryan (2004) argue against standard deviation as a measure of volatility since it weighs equally the deviations of the average return, while most investors determine the risk on the basis of small or negative returns. The implication of this is that high positive returns, which the investor may not regard as risk, are treated in the same manner as low returns or negative returns, which the investor does consider as manifestation of risk. A different perspective is found in Engle (2004), that volatility estimation using the standard deviation raises the question of which period is suitable, that is, should we measure the volatility over a period of one week, which would provide a 'noisy' measure, or over a period of one year, which smoothes out any deviations and does not provide relevant measure of today's volatility.

An extension of the conventional standard deviation is the *rolling standard deviation* applied by Officer (1973), where the volatility is computed as the standard deviation of returns over successive periods of time. For example, the volatility of a 30-day period is the standard deviation of the observations recorded on those 30 days. To obtain the next standard deviation, the window is rolled forward in time – day 1 is dropped and day 31 is included in the computation. While relatively simple to compute, this method introduces serial correlation between the computed standard deviations, as adjacent standard deviations have $n-1$ terms in common, where n is equal to 30 (following the example above). This is not necessarily accurate, as the true standard deviation may or may not correlate over time (Eichengreen and Tong, 2003).

2.4.2. Un-weighted methods of volatility estimation

The un-weighted methods were proposed with the intent of improving upon the classic method of standard deviation.

Parkinson (1980) developed the High Low Range Volatility method, also known as the Parkinson number, which suggested the use of the variance of extreme values (the high and low prices) provides a far superior estimate compared to the variance of closing prices. This method estimates the volatility of returns for a random walk using the high and low price in any particular period. Prices are observed on a fixed time interval, say $t = 10$ days or 30 days or 180 days. The high-low return is then calculated is calculated as the natural logarithm of the ratio of a high share's price to low share's price. The Parkinson number, which is the measure of volatility, is obtained as:

$$HL_HV_{daily} = \sqrt{\frac{\sum_{t=1}^n \frac{1}{4 \ln 2} (x_t^{HL})^2}{n}}$$

where x_t^{HL} is the difference between the high and low price.

According to Parkinson, this method of using extreme values is superior to the standard deviation as a measure of volatility, as it is much more sensitive to variations of dispersion. An improvement of Parkinson's method is proposed by Kunitomo (1992). The estimator was found to have an efficiency of about 10 when compared with the traditional standard deviation estimator. It thus improved upon Parkinson's estimator, which had an efficiency of 4.91.

Garman and Klass (1980) proposed a method of volatility measurement using the information commonly found in the financial pages of newspapers. This estimator uses the opening price, high price, low price and closing price of a security to compute the volatility. They compared the efficiency of the estimator to the classic standard deviation, and found it to be 8.4 times more efficient. Other authors that have improved upon Parkinson's original method include Brunetti & Lildholdt (2002).

2.4.3. Conditional methods of estimating volatility

The traditional methods discussed above have one constraint: they assume that the error component in a time series, which constitutes the volatility of the series, varies constantly through time. The works of Mandelbrot (1963) and Fama (1965) suggested that the variance of share returns is not constant over time. This hypothesis has been proved in subsequent empirical studies. It was therefore necessary to obtain a model that could capture the time-varying nature of the error variances, by making current estimates of volatility functions of past volatility.

2.4.3.1. Exponential Weighted Moving Average

The first of the conditional methods of estimating volatility is the Exponentially Weighted Moving Average (EWMA). This approach expands on the simple standard deviation by computing today's value of volatility as a weighted average of the previous day's standard deviation and the return on the previous day. This method has been applied widely in literature including Panetta, et.al. (2006) and also forms the basis of the widely-used Riskmetrics[®] model.

2.4.3.2. The ARCH model

The seminal work of Engle (1982) proposed an alternative measure of volatility in data series through a new class of stochastic processes called Autoregressive Conditional Heteroskedastic (ARCH) processes, which take into account that the level of uncertainty in an asset price changes with time. The ARCH processes also recognized that two types of variances exist for the error term in a time series: the unconditional variance and the conditional variance. The unconditional variance is

a constant computed at a single point in time, without referring to the values of past variances. The conditional variance, on the other hand, is an estimate based on past variances, which means it will vary over time, depending on the range of historical variances included. This phenomenon of a time-varying variance is termed *heteroskedasticity*.

The major contribution of the ARCH processes is they proposed to measure volatility using the conditional variance of a price series, as opposed to the simplistic standard deviation applied in traditional econometric models. The ARCH model thus produced a volatility estimate that is a weighted average of past volatility, where recent volatility evidence is allotted a high weight and volatility in the distant past given small weights. Engle (2004) argues that the standard deviation is logically inconsistent, as it assumes that volatility is constant over time. However, a measure of volatility for one year ending today would rationally be different from a measure of one year volatility ending the previous day.

Several authors have applied the ARCH model to measure volatility, including Engle (1982), Engle (1983) and Engle and Kraft (1983) on United Kingdom inflation data, and Bodurtha and Mark (1991) in analyzing portfolios of monthly NYSE share returns. Attanasio (1991) studies monthly excess returns on the S & P 500 index.

While the ARCH model captured the time-varying nature of series volatility, it also had a complex lag structure that required estimation of too many parameters. This in turn led to violation of the non-negativity constraints imposed by the model itself, such that the volatility estimate produced by the model was a negative value (Bollerslev, 1986; Nelson, 1991). The shortcomings of the ARCH model have led to the development of variant models, the first of which was the GARCH model of Bollerslev (1986). This model is discussed fully in the next section.

2.4.3.3. The GARCH (p, q) model

Bollerslev (1986) extended the arguments of the Engle's ARCH process and constructed the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model with the aim of addressing the shortcomings of the ARCH

model. The GARCH model improves on the ARCH model by incorporating adaptive or learning behaviour.

Another advantage of the GARCH (p, q) model is parsimony: it requires estimation of fewer variables, and thus reduces the probability of errors in the estimation process. The p denotes the number of past observations of returns to be used in estimate, while q represents past conditional volatilities used to estimate the conditional variance. Thus, the process has $[p+q+1]$ parameters which must be fitted to the data.

Consider a time series R_t , which represents the return from an financial asset over time. The GARCH model presented in Bollerslev (1986) models R_t as a dependent variable, explained by a vector of explanatory variables, X_t' and a vector b of unknown parameters, i.e.

$$R_t = X_t' b + \varepsilon_t$$

where ε_t is the residual term representing random innovations in the asset returns. The error term ε_t has the following properties: i) The expected value of ε_t is zero, $E(\varepsilon_t) = 0$ and ii) The variance of ε_t is given as $Var(\varepsilon_t) = \sigma_t^2$. The objective is to estimate the process by which ε_t changes or varies, given that it is a conditionally heteroskedastic process, i.e., it has a time-varying variance, which is dependent on past values. This can be presented in mathematical notation as:

$$\sigma_t^2 = Var(\varepsilon_t | \varepsilon_{t-1}, \varepsilon_{t-2}, \varepsilon_{t-3}, \dots)$$

The GARCH (p, q) regression model then estimates the conditional variance of the error term ε_t as:

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^q \alpha_i \varepsilon_{t-i}^2 + \sum_{i=1}^p \beta_i \sigma_{t-i}^2 \quad \alpha_i \geq 0; \quad \beta_i \geq 0 \quad (2.1)$$

It therefore estimates the next volatility estimate a weighted function of the long-run average variance, the variance predicted for the current period and the new information in this period as captured by the most recent squared residual (Engle, 2001).

α_i and β_i are weights associated with each of these components, and indicate the extent to which the component contributes to the volatility on a particular day. The model includes non-negativity constraints on the weights to ensure that the volatility estimate, which is the conditional variance, cannot be a negative value.

According to Nicholls and Tonuri (1995), the use of such a GARCH models in the study of share returns makes allowances for the features of serial correlation in the returns and in the squares of the returns. This model has also been found to encompass characteristics such as skewness and leptokurtosis commonly found in financial prices. The GARCH model of conditional volatility has been employed to explain the behaviour of various share indexes around the world.

Gokcan (2000) uses the GARCH (1, 1) specification and other models to examine volatility in the index returns of seven countries between 1988 and 1996. The conditional volatility of S & P 500 index returns has been studied extensively in Engle (2004). Franses and van Dijk (1996) employ the same model to study volatility in the weekly observed indexes for share markets in Germany, Netherlands, Spain, Italy and Sweden for the period 1986 to 1994. Similar studies include Nicholls and Tonuri (1995) for the Australian Fifty Leaders Index and Masulis and Ng (1995) for the FTSE-100 in London from 1984 to 1991.

2.4.3.4. The GARCH variants

One shortcoming of the ARCHIGARCH models is that they ignore the direction of returns, either positive or negative, and only consider the magnitude of returns (Engle, 2001). Black (1976) noted that the direction of returns affects the level of volatility; therefore, market declines will cause higher volatility compared to market increases. The argument for this behaviour, known as the *asymmetric volatility effect*, is that a drop in the value of the share (negative return) increases financial leverage, which makes the share riskier and increases its volatility. This theory is supported by evidence from various stock markets in various countries, including the U.S. (Nelson, 1991), Brazil (Tabak and Guerra, 2007; Gokcan, 2000) and Greece (Chortareas et. al, 2002). The inability of ARCHIGARCH models to capture asymmetric volatility led to the development of asymmetric or non-linear GARCH models, which sought to capture additional characteristics of financial time series. Specifically, they were aimed at modelling the tendency of financial time series to be negatively skewed, in addition to the other characteristics already captured by ARCHIGARCH.

One of the more popular variants of the ARCHIGARCH models is the Exponential GARCH (EGARCH) model of Nelson (1991). This model was aimed at improving upon several deficiencies of the GARCH model: 1) The GARCH

models assumed that current returns and future return volatility were positively correlated, while research had shown evidence to the contrary that is a negative correlation between current returns and future returns volatility; 2) the parameter restrictions imposed by GARCH models were often violated by the estimated coefficients. According to Nelson, this would restrict the dynamics of the conditional variance process. The EGARCH model thus improved on the GARCH model by making the conditional variance dependent on both the magnitude and sign (positive or negative) of returns and by eliminating the non-negativity constraints on the parameters to be estimated. Nelson and Cao (1992) support this, by arguing that the non-negativity constraints in the linear GARCH model are too restrictive.

Another variant of the ARCHIGARCH models is the GJR-GARCH model, first used by Glosten, Jagannathan and Runkle (1993). This model allows for seasonal patterns in volatility and asymmetric volatility, such that positive and negative innovations on returns will have different effects on conditional volatility. Further, the model allows nominal interest rates to predict conditional variance. The Threshold GARCH (TARCH) model by Zakoian (1994) is similar to GJR-GARCH; the only difference is that the TARCH model uses the conditional standard deviation instead of conditional variance.

Many more variants of the GARCH model have been developed in literature; however, they are beyond the scope of this study. They include the Quadratic GARCH (Engle and Ng, 1993), Smooth Transition GARCH (Hagerud, 1997 and Gonzalez-Rivera, 1998), Asymmetric Power ARCH (Ding, Granger, and Engle, 1993), Integrated GARCH (Engle and Bollerslev, 1986), Fractionally Integrated GARCH (Baillie, Bollerslev, and Mikkelsen, 1996), Fractionally Integrated Exponential GARCH (Bollerslev and Mikkelsen, 1996) and Hyperbolic GARCH (Davidson, 2001).

Bollerslev, Chou and Kroner (1992), Bera and Higgins (1993) and Bollerslev, Engle and Nelson (1994) provide reviews of works in which the ARCHIGARCH models and/or the variants have been applied.

2.4.4. Stochastic volatility models

The stochastic volatility (SV) models share a lot of properties with the GARCH models. These two classes of volatility models both consider the time-varying nature of volatility. The major difference between the two approaches is that, while GARCH models treat the volatility as a deterministic function of past returns, the stochastic models assume the volatility is an unobserved variable, whose logarithm is modelled as a stochastic process (Moix, 2001). According to Poon and Granger (2003), stochastic modelling of volatility assumes that the volatility in the price of an asset is subject to a source of innovations that may or may not be related to those that drive returns. The volatility may change due to: 1) innovations due to the arrival of information to the market, and 2) random shocks

to the market.

The seminal work of Wiggins (1987) and Hull and White (1987) led to the development of stochastic volatility models, by seeking to generalize the Black-Scholes model of option pricing. Further contributions can be found in Johnson and Shanno (1987), Scott (1989), Stein and Stein (1991) and Heston (1993). Another example of these models is the class of square root stochastic autoregressive volatility (SR-SARV) models, introduced by Andersen (1998) and generalized by Meddahi and Renault (1996).

Because of their dynamic nature, the SV models are primarily used to measure volatility in high-frequency data, and provide an *instantaneous* estimate of volatility. They are most suited to application on tick-by-tick data in high volume markets, to provide volatility estimates for option pricing. Ghysels, Harvey and Renault (1996) provide a survey of stochastic volatility works; however, empirical research in this field evolves rapidly.

2.4.5. Comparison of volatility models

The above classes of volatility models have been applied to measure and forecast the volatility behaviour of various economic and financial time series including inflation rates, share indexes and share prices, foreign exchange rates and the prices of commodity futures. Nicholls and Tonuri (1995) argue that the suitability of a statistical model to a particular time series is determined by its ability to capture and explain the stylized facts most common in that series. The model to be

applied in a particular study is therefore dependent upon what the researcher wants to observe. Malmsten and Terasvirta (2004) identify several ways in which volatility estimation models can be compared, including comparison of likelihood values, Akaike's (1974) Information Criterion (A1C), Schwarz's (1978) Bayesian Information Criterion (BIC) and misspecification tests.

Arguments have been put forth for and against each of the models. While stochastic volatility models are more sophisticated than the GARCH models, and are more representative of the dynamic behaviour of returns in financial markets, they are also more difficult to estimate, and are therefore not as widely applied in industry as the GARCH-models (Aas and Dimakos, 2004, p. 12; Diebold, 2004). These continuous time models provide the ideal framework for an analysis of option pricing; however, discrete time models such as the GARCH class are more suitable for the statistical and descriptive analysis of the patterns of daily price changes. Further, the GARCH class improves upon the deficiencies of earlier volatility estimators, and allow for the time varying nature of volatility.

The GARCH (1,1) specification, in particular, has many supporters and is pegged as a good starting point to describe the volatility dynamics of almost any financial time series. Engle (2004) proposes the use of the GARCH (1,1) model as it is widely applicable in any scenario, regardless of the rules governing a particular stock market. For reasons of relative simplicity and ability to capture the statistical properties of the data, the GARCH (1,1) model is applied in this study.

2.4.6. CONCLUSION

The returns of share indexes (and other financial time series) exhibit certain stylized statistical properties. Studies have found that these returns have high kurtosis levels and are negatively skewed, which indicates that the returns are not necessarily normally distributed. However, there is a divergence on evidence on the unpredictability of share index returns. For the NSE in particular, Jefferis and Smith (2005) and Ogum, Beer and Nouyrigat (2005) found evidence for return predictability, while the earlier research by Dickinson and Muragu (1994) found evidence against return predictability. This study will seek to find support for either predictability or unpredictability of returns.

Many models of volatility estimation have been proposed in literature, from the simplistic standard deviation to the complex stochastic models. In the empirical studies examined, the model chosen to represent the volatility structure of a data series has depended upon what characteristic of the conditional variance the author(s) intend to observe. From the review above, it emerges that the GARCH model is a good representative of most financial time series. This is the model applied in this thesis, as it sufficiently captures the statistical properties that are of interest to this study. The model is used to give a measure of what the volatility of the NSE index has been in past years.

3.0 RESEARCH METHODOLOGY

3.1 Research Design

This is a *non-experimental, time series study*. The overall aim is to study the processes of change in the share index returns without identifying any causal or correlation relationships between variables. The study has only one variable, and that is the daily index return. The evolution of this variable over time will be observed, without manipulation or interference from the researcher, to detect whether specific pre-specified behaviour exists.

Quantitative methods are used to confirm the existence of certain statistical properties and trends in the data. The data will be analyzed using statistical methods and an econometric volatility model fitted to them. The study will then seek to substantiate or negate arguments put forth in previous literature on the behaviour of share returns, based on the results obtained.

3.2 Population of the study

Although the NSE 20-share index was created in 1966, this study is concerned with observing its behaviour in the period 1992 to 2007. The daily share index value computed at close of trading will form the population of the study. Because this is a time series study, no sampling will be carried out.

3.3 Data Collection Methods

The information to be used in the study will be historical data compiled by the Nairobi Stock Exchange, and research articles published by various authors. This aspect of the study raises two important issues: 1) the availability and accessibility of the NSE historical information must be considered. This is because the NSE cut off direct distribution of data to the public in 2007, and now relies upon licensed data vendors to act as middlemen between the Exchange and persons interested in trading information; and 2) the completeness of the historical records. It is recognized that some of the data required may be unavailable.

Sources: Data will be obtained from a licensed data vendor of the Nairobi Stock Exchange, Comet Ventures. The NSE ceased direct distribution of data to the

public in 2007; the exchange provides the data to licensed data vending companies, which then provide it to the public for a fee. The availability of these data is made easier due to the continuous automation of the stock market over the years.

The primary source of published research articles will be online databases. Although preference will be given to articles published in refereed journals, other suitable articles such as those published by academia, universities and recognized world organizations will also be used.

Format: The NSE publishes trading data in Microsoft Excel Spreadsheets. An index value is provided for each date on which trading took place. Further the daily price list published by the Nairobi Stock Exchange will be obtained to be used in the data consistency checks detailed below.

3.4 Data Processing and Analysis

This subsection begins with a discussion of procedures used to verify the proper arrangement of the time series data. The variable of interest - index returns- is then defined, followed by the statistical tests that are carried out on the returns. Lastly, we present the process of determining the volatility structure of the returns.

3.4.1 Data verification

The following checks will be carried out to ensure no anomalies are present in the raw index data:

Validity Check 1: The daily index value is checked for validity of dates that is, an index value is not provided for a date on which share trading was not carried out, including weekends and national or religious holidays.

Validity Check 2: A check is done to find missing index values. If a date is missing, the check confirms whether the date was a public holiday or a weekend. If not, the index value is obtained from the daily price list and inserted into the dataset as appropriate.

Once the validity checks are completed, the daily index return, which is the variable to be observed, is obtained as below.

3.4.2 Statistical Analysis of NSE-20 index returns

This section discusses the procedure of isolating the index returns, and the process of analyzing the statistical properties of the index return data.

3.4.2.1 Definition of index returns

Under the random walk model, the movement of an asset's value or price is assumed to be a series of random increments added to the current value of the asset, such that

$$P_t = P_{t-1} + R_t \quad (3.1)$$

where P_t is the current price and R is a negative or positive increment value. However, this form of modelling is not plausible for equity prices, as it introduces inconsistency in the measurement of relative changes (Adams et al, 2003). For example, a price increment of 10 would be more significant if the asset price were 100, compared to if it were 1000.

In this study, it is assumed that the daily index return follows a geometric Brownian motion, such that we have logarithmic returns. According to Adams et al (2003), this is considered a more accurate representation of real data, for several reasons: 1) Logarithmic returns are found to be more symmetric than arithmetic returns, that is, positive and negative percent returns are equal for logarithmic returns while for arithmetic returns are not; 2) If single period returns have a lognormal distribution, then compounded multi-period returns will also have a lognormal distribution. This is not true for many other distributions; 3) the use of logarithmic returns is preferable to a simple percentage change as it allows for addition of returns over multiple periods, introducing time consistency.

The following assumption is made:

$$I_t = \exp(P_t) \text{ or } \ln(I_t) = P_t, \quad (3.2)$$

$$I_{t-1} = \exp(P_{t-1}) \text{ or } \ln(I_{t-1}) = P_{t-1}$$

where I_t is the index value at time t and is a random variable with a lognormal distribution and P , is the natural logarithm of L .

Restructuring equation (3.1) using the above assumptions, the following equation is found:

$$\ln(I_t) = \ln(I_{t-1}) + R_t \quad (3.2)$$

We make R_t the subject of the equation 3.2. The random variable is the daily index return, R_t , and is computed as the difference between the natural logarithms of two consecutive index values.

$$R_t = \ln(I_t) - \ln(I_{t-1}) \quad (3.3)$$

The process of isolating the series R_t is done in Microsoft Excel. The series is then imported to the analysis software, Minitab 14 and Stata 10. The processes of analyzing the returns are presented below, for each of the research questions identified.

3.4.2.2 Analysis of correlation of returns

3.4.2.2.1 The autocorrelation function

To determine whether the share index returns are predictable, an autocorrelation function will be computed. The autocorrelation function is computed using the sample covariance and the sample variance, that is

$$\text{Sample Covariance at lag } k, Y_k = \frac{1}{n} \sum_{t=1}^n (R_t - \bar{R})(R_{t+k} - \bar{R}) \quad (3.4)$$

$$\text{Sample variance, } Y_0 = \frac{1}{n} \sum_{t=1}^n (R_t - \bar{R})^2 \quad (3.5)$$

where: k is the lag period - time difference in days between R_t and R_{t+k} ; $\bar{R}$ is the daily index return, $\bar{R}$ is the mean return and n is the sample size. The sample autocorrelation function is therefore given by

$$\hat{\rho}_k = \frac{\hat{\gamma}_k}{\hat{\gamma}_0} \quad (3.6)$$

where $-1 \leq \rho_k \leq 1$ and $\hat{\gamma}_0 \neq 0$.

The autocorrelation function will be computed for up to 20 lags, to investigate for evidence of auto correlations in index returns that are up to 20 days apart.

Decision criteria: The value of ρ_k lies between -1 and +1, with -1 indicating a perfect negative association between R_t and R_{t+k} and +1 indicating a perfect

positive association between the two index returns. If the value of $\hat{\rho}_k$ is equal to 0, there is no evidence of correlation between the returns. The sample autocorrelation function will be used to identify the most suitable time series model to represent the mean equation.

3.4.2.2.2 The Ljung-Box test statistic

The Ljung-Box Q-statistic developed by Ljung and Box (1978) will also be used to test for autocorrelation in the return series. This test is a general indicator of the presence of ARCH effects in the data, which can then be modelled using the ARCH or GARCH models of volatility. The Ljung-Box test is a portmanteau test, in that it tests the autocorrelations of the data series as a whole, as opposed to individual data values. It tests for correlation between data values several lags apart, say 20 days apart. It tests the joint hypothesis that all the autocorrelation coefficients r_k are simultaneously equal to zero.

H_0 = Index returns are independently distributed, that is, $\hat{\rho}_k = 0$

H_1 = Index returns are NOT independently distributed, that is, $\hat{\rho}_k \neq 0$

or:

$$H_0 = \hat{\rho}_k = 0 \quad (3.7)$$

$$H_1 = \hat{\rho}_k \neq 0$$

The Ljung-Box test statistic is given by

$$Q = T(T+2) \sum_{k=1}^s \frac{\hat{\rho}_k^2}{(T-k)} \quad (3.8)$$

where: T is the number of observations, s is the number of coefficients to test autocorrelation (the number of lags being tested), $\hat{\rho}_k$ is the autocorrelation coefficient (for lag k) and Q is the test statistic.

Decision criteria: The null hypothesis H_0 is rejected if the value of Q exceeds the critical value of a chi-square distribution with k degrees of freedom, i.e., if

$Q > \chi_{1-\alpha, k}^2$, at a significance level α . A significant value of the Q-statistic at any

lag will indicate that there is evidence for autocorrelation in the share returns series that should be accounted for in the mean equation.

3.4.2.3 Determining the distribution of index returns

3.4.2.3.1 Skewness

Definition: The skewness of the returns R_t with mean μ and variance σ^2 will be computed as

$$S(R_t) = \frac{E[(R_t - \mu)^3]}{\sigma^3} \quad (3.9)$$

A skewness value that is not equal to zero will indicate a non-normal distribution. If the skewness value is negative (positive), the distribution is skewed to the left (right).

3.4.2.3.2 Leptokurtosis

Definition: The kurtosis of the random variable R_t is given by

$$\text{Kurt}(R_t) = \frac{E[(R_t - \mu)^4]}{\sigma^4} \quad (3.10)$$

Since the kurtosis of the normal distribution is 3, any kurtosis value greater than 3 indicates non-normality, and that the return series is more likely to have outlier values. If the kurtosis value is less than 3, the return series is less outlier-prone than the normal distribution.

The joint hypothesis for the distribution of returns is therefore:

H_0 = Index returns are normally distributed

H_1 = Index returns are NOT normally distributed

or:

$H_0: S = 0 \text{ and } K = 3$

$H_1: S \neq 0 \text{ and } K \neq 3 \quad (3.11)$

3.4.2.4 Investigating for the presence of volatility clustering

According to Engle (2004), volatility clustering – periods of high volatility that are followed by periods of more high volatility and periods of low volatility followed by periods of more low volatility – will show up as significant autocorrelations in squared or absolute returns. To find evidence of volatility clustering in the NSE index, the daily returns will be squared, and then tested for serial correlation in the manner outlined in section 3.4.2.2.1. The Ljung-Box

statistic will also be applied to test for the presence of ARCH effects in the series of squared returns.

3.4.3 Investigating the volatility structure of the NSE-20 index returns

In this section, the process of obtaining the residual or random error term from the index return data is described, followed by the estimation of the volatility equation.

3.4.3.1 Estimating the mean equation

Before the variance of the random innovations ε_t is modelled, it is first necessary to obtain the series of random innovations. The raw data series of daily index returns contains two parts: a component that can be explained by a set of explanatory variables, and a component composed of the random innovations; hence the regression model $R_t = \alpha + \beta X_t + \varepsilon_t$ employed by Bollerslev (1986).

However, because a set of explanatory variables X_t has not been observed, the random innovations ε_t cannot be isolated using this generic regression model. The most common approach of estimating the mean equation in the absence of explanatory variables is using the sample autocorrelation function to determine the time series model which provides a best fit to the return data. Therefore, to determine the mean equation, the following will be done:

- i) The results of the autocorrelation and Ljung-Box tests above will indicate whether there is evidence for autocorrelation in the share returns series that should be accounted for in the mean equation. If the evidence is present, then it is known that the model chosen should present the returns R_t as dependent on past values. If no evidence of autocorrelation is present, then R_t will be assumed to be a set of random innovations.
- ii) Based on the sample autocorrelation function, an appropriate time series model is selected. The autocorrelation function for a moving average process of order q , $MA(q)$, exhibits a sharp cut-off after lag q . For an autoregressive process of order p , $AR(p)$, the autocorrelations decay exponentially.
- iii) The appropriate lag structure for the mean equation will then be obtained. This is done by computing the partial autocorrelation function, and checking for the

lags at which significant autocorrelations occur. If the autocorrelation at any lag $k = 1, 2, \dots, 20$ is found to be significant at a given confidence level, then the conclusion is that the current value of R_t is related to the value at R_{t-k} , and the lag is included.

3.4.3.2 The volatility model

Once the mean equation is obtained, the error disturbance terms ε_t will then be isolated, and their volatility structure investigated. The GARCH (1, 1) model is applied to estimate the volatility of the residuals. This is a special case of the GARCH (p, q) model with $p = 1$ and $q = 1$. With the GARCH (1, 1) model, the conditional variance of the random innovations ε_t is estimated by:

$$\text{Var}(\varepsilon_t) = \sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 \sigma_{t-1}^2$$

with the non-negativity constraints:

$$\alpha_0 > 0, \alpha_1 \geq 0, \beta_1 \geq 0, \alpha_1 + \beta_1 < 1 \quad (3.12)$$

The above equation estimates today's variance of returns as a function of the long-run average variance, the new information in the last period that is captured by the most recent squared residual, ε_{t-1}^2 , and the previous period's variance σ_{t-1}^2 . The long-run average variance of the asset returns is equal to $\sqrt{\alpha_0 / (1 - \alpha_1 - \beta_1)}$, where the weights α_1 and β_1 add up to less than 1, that is, $\alpha_1 + \beta_1 < 1$.

The conditional variance of the random innovations will therefore be based on the most recent error term and the most recent estimate of the variance rate (Hull, 2006).

To determine the variance equation, it is necessary to estimate the weights α_0 , α_1 and β_1 . This is done by estimating a GARCH (1,1) model by using the econometric software Stata 10. The parameters determined are plugged into the variance equation (3.12), which will then be applied to estimate volatility.

Results are presented in Chapter 4.

4.0 RESULTS AND DISCUSSION

4.1 Results of data collection and verification

Index data were obtained for the years 1992 to 2007. Further, the daily price list published by the Nairobi Stock Exchange was obtained for the years 1999 to 2007. Daily price lists prior to 1999 were not available.

Validity check 1 was conducted on the data to remove inconsistencies such as index values appearing on national holidays or weekends. This was done using Excel's TEXT function. For example, the notation =TEXT (B2, "dddd") returns the day of the week, from Monday to Sunday, that the date recorded in the cell B2 of a spreadsheet. Where these inconsistencies were found, such as a date reflecting the day 'Sunday', the index data were compared to the daily price list on the respective date to ensure the correct value was quoted. A similar process was carried out for two consecutive dates on which the same index value was provided. The correct index value was then indicated for each date.

Validity check 2 found a total of 56 missing index values. Continuous periods of missing values were found from 28 January 1998 to 25 February 1998, and the period 9 September 1998 to 1 November 1998. Daily price lists could not be obtained for periods earlier than 1999 from the NSE. Various alternative sources were searched in an effort to obtain these data, including other data vending companies and the Reuters Knowledge system. Both were unsuccessful.

Other missing values were found on 21 January 1993, 2 April 1993, 10 September 1997 and 17 August 2000. For these dates, the previous index value was used as a proxy, in lieu of leaving the date blank. The data set therefore has 52 missing values left, all of them falling in the year 1998. This introduces a bias to any measurements carried out for the periods 1997 - 2002.

The next step was analysis of the statistical properties of the data. First, the return series were analyzed for the full period, 1992 to 2007. Second, the statistical properties of each of three sub-periods, specifically 1992 - 1997, 1998 - 2002 and

2003- 2007, then analyzed to determine the changes in the statistical properties as the NSE has continued developing.

4.2 Graphical observation of volatility in index returns

Figure 4.1 (a) and 4.1(b) show the graphical distribution of the NSE-20 index and the index returns, respectively, over time. From this, it is possible to make two observations. 1) There is high volatility in the index returns when the index value is trending upwards or downwards; and 2) The series has a non-constant variance because the amplitude of the returns varies over time, that is, ARCH effects are present.

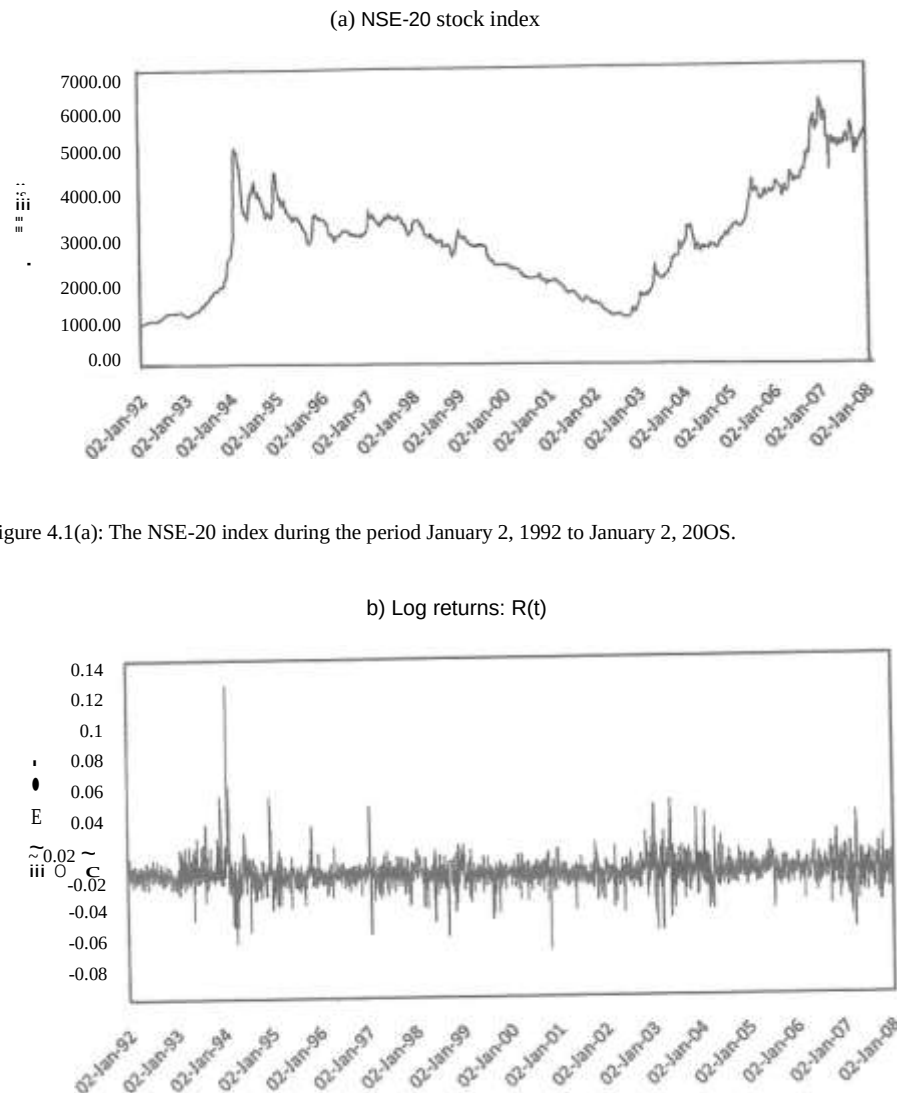


Figure 4.1(a): The NSE-20 index during the period January 2, 1992 to January 2, 2008.

Figure 4.1(b): The NSE-20 index returns for January 2, 1992 to January 2, 2008.

4.3 Descriptive statistics

Table 4.1 provides basic information on a variety of descriptive statistics of the full index return data set, from 1992 to 2007, and for each the three sub-periods.

	Full	1992-1997	1998-2002	2003-2007
Observations	3947	1489	1211	1247
Mean	0.000441	0.000796	-0.000683	0.001111
Standard Deviation	0.008024	0.008667	0.006367	0.008544
Trimmed Mean	0.000299	0.000407	-0.000619	0.001093
Median	0.000142	0.000350	-0.000599	0.000878
Minimum	-0.049493	-0.043989	-0.049493	-0.037845
Maximum	0.123941	0.123941	0.033880	0.046473
Range	0.173434	0.167930	0.083373	0.084318

Table 4.1: Descriptive statistics of the NSE-20index returns

Comparing mean returns across the three sub-periods, it is observed that 2003 to 2007 period offered investors the highest mean return, while it was negative in the 1998 to 2002 period. From the standard deviation, we see that the 1992 - 1997 is the most volatile period and 1998 - 2002 the least volatile. 2003-2007 also shows a high level of volatility in returns. Extreme values had the most impact on the mean return in the period 1992 - 1997, as this period has the largest differential between the mean return and the trimmed mean return.

4.4 Return correlations

In this section, results of auto correlations tests that investigate the presence of predictability of index returns are presented.

4.4.1 Analysis of correlation of returns: 1992 - 2007

The null hypothesis was that index returns are independent, that is, do not show evidence of autocorrelation Table 4.2 shows the result of an autocorrelation test of the index returns for up to 20 lags. The autocorrelations - ACF - are small, ranging from 0.1 to 0.4. They are significant up to lag 12, insignificant at lag 13, significant from lag 14 to lag 17, and then insignificant up to lag 20. The magnitude of the correlation declines as the number of lags increases. Because the autocorrelation values are mostly significant at the 5% significance level, the hypothesis of unpredictable returns is rejected. A relationship exists between index returns in close proximity; the strength of the relationship declines as the number of days between the index returns increases.

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Lag	ACF	LBQ	p-value
1	0.424313	710.98	0
2	0.338001	1162.25	0
3	0.258485	1426.23	0
4	0.192604	1572.84	0
5	0.167611	1683.89	0
6	0.112418	1733.86	0
7	0.109865	1781.60	0
8	0.113657	1832.70	0
9	0.112788	1883.04	0
10	0.064389	1899.45	0
11	0.071136	1919.48	0
12	0.054318	1931.17	0
13	0.048932	1940.65	0
14	0.051324	1951.09	0
15	0.067298	1969.04	0
16	0.055973	1981.46	0
17	0.055300	1993.58	0
18	0.036527	1998.87	0
19	0.023398	2001.04	0
20	0.033197	2005.42	0

Table 4-2: Autocorrelations of index returns, 1992 -2007

Ljung-Box Q-statistic: The LBQ column shows the Q statistic that corresponds to each ACF value. Using the last LBQ value of 2005.42, the p-value of this test at 20 lags is 0, which is less than the significance level of 0.05. This implies that one or more of the autocorrelations up to lag 20 can be judged as significantly different from zero, and is further evidence for the presence of autocorrelations in the data series. The null hypothesis of statistical independence in index returns is therefore rejected.

The autocorrelation function (ACF) shown in Figure 4.2 provides a graphical perspective.

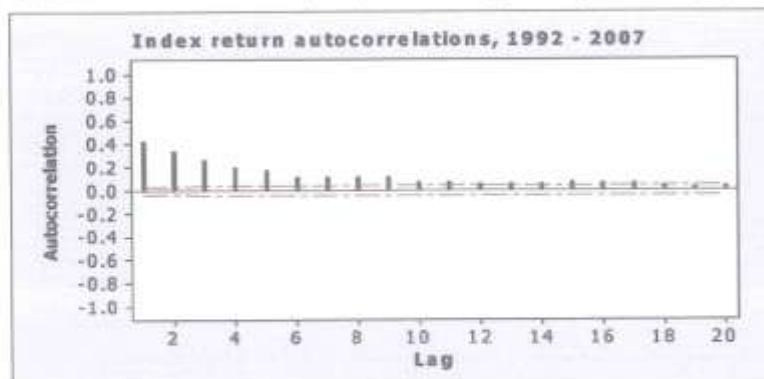


Figure 4.2: NSE-20 index returns autocorrelation function

The red band shows the significance level of 5%. Autocorrelation values that lie above this band are significant. Positive, significant spikes are observed at lags 1 up to lag 5, and smaller spikes up to lag 11. Subsequent positive autocorrelations do not die off after lag 1, as would be expected for a MA (q) process. The decay to zero is gradual, as would be the case in an AR(p) process. The returns of the NSE-20 share index from 1992 to 2007 exhibit evidence for serial correlation over time, and the null hypothesis of independence in index returns is rejected.

4.4.2 Analysis of correlation of returns: the sub-periods

Table 4.3 shows the results of autocorrelation tests for each of the three sub periods.

1992–1997			1998 –2002			2003–2007		
Lag	ACF	LBQ	Lag	ACF	LBQ	Lag	ACF	LBQ
1	0.473393	334.14	1	0.162062	31.885	1	0.485105	294.159
2	0.412354	587.83	2	0.159663	62.858	2	0.307993	412.829
3	0.364182	785.85	3	0.193934	108.593	3	0.124422	432.212
4	0.326017	944.64	4	0.131262	129.562	4	0.025071	432.999
5	0.315198	1093.17	5	0.096361	140.872	5	-0.014467	433.262
6	0.227459	1170.57	6	0.095574	152.007	6	-0.056516	437.270
7	0.235505	1253.60	7	0.077117	159.263	7	-0.060426	441.856
8	0.212165	1321.03	8	0.109627	173.937	8	-0.034771	443.376
9	0.179808	1369.50	9	0.065279	179.145	9	0.020774	443.919
10	0.102843	1385.37	10	0.025585	179.946	10	0.005151	443.953
11	0.113285	1404.63	11	0.026898	180.831	11	0.006008	443.998
12	0.092758	1417.56	12	-0.017908	181.224	12	-0.004335	444.022
13	0.057497	1422.52	13	-0.004527	181.249	13	0.021356	444.598
14	0.065887	1429.05	14	-0.020972	181.789	14	0.032856	445.961
15	0.075937	1437.73	15	0.002106	181.795	15	0.055753	449.891
16	0.059504	1443.07	16	-0.005310	181.829	16	0.054862	453.699
17	0.089017	1455.01	17	-0.003552	181.845	17	0.020790	454.246
18	0.057445	1459.99	18	-0.000025	181.845	18	0.006974	454.308
19	0.042368	1462.70	19	-0.005871	181.887	19	-0.009065	454.412
20	0.065226	1469.12	20	0.014637	182.152	20	-0.025413	455.232

Table 4.3: Autocorrelations of index returns, the sub-periods

There is evidence of autocorrelation for all lags except lag 19 in the first period, 1992 - 1997, with a range from 0.04 to 0.47. The magnitude of correlation declines significantly in the second period, ranging from -0.02 to 0.19. The number of significant correlations that is, those above the significant level 0.05, is also less in this period, going only up to lag 9. This value is even lower for the last sub-period, 2003 -2007. Significant autocorrelations go up to lag 3, but the magnitude is higher than for the second period, with a range of -0.06 to 0.48. Further, we relate the autocorrelation results to the index performance at the time.

It is observed that in the second sub-period, from 1998 and 2002, when the market was in continuous decline, the degree of autocorrelation of returns decreased, but when it was in an upward trend, between 2003 and 2007, the level of autocorrelation increased.

From these results, we can make two inferences: 1) The predictability of index returns several days apart has declined over time, from 19 days apart in the first sub-period, to 3 days apart in the last sub-period; and 2) The predictability of returns declines in a market downturn, and increases in periods of positive market performance.

4.5 Skewness and Leptokurtosis analysis

The null hypothesis was that index returns conform to a normal distribution, with a skewness of 0 and a kurtosis of 3. Table 4.4 shows the measured skewness and kurtosis properties of the index return data.

	Full period: 1992-2007	1992-1997	1998-2002	2003-2007
Skewness	1.46	3.00	-0.69	0.19
Kurtosis	21.27	35.12	7.09	4.78

Table 4.4: Skewness and Kurtosis of NSE-20 index returns

Positive skewness of 1.36 for the full period returns indicate a heavy skewness to the left of the mean. Returns for 1992 - 1997 are extremely skewed to the left of the mean, with a positive skewness of 3.00. Returns for 1998-2002 are negative skewness of -0.69, indicating moderate skewness to the right of the mean. Returns for 2003 - 2007 have positive skewness of 0.19, indicating they are slightly skewed to the left of the mean.

The kurtosis value for the full period is 21.27, which indicates the presence of extreme values, and that the distribution of returns is non-normal. The null hypothesis of a symmetric normal distribution is rejected. This is also true for each of the sub-periods, as none has a kurtosis value of 3. The early period from 1992 - 1997 had both the highest skewness and kurtosis values. The kurtosis

values are seen to decrease with time, from period to period, indicating an increase in symmetry and a decline in the occurrence of extreme values.

4.6 Volatility clustering

The null hypothesis is that the series of squared returns is independent. The autocorrelation results for the squared index returns are shown in Table 4.5. Small but significant auto correlations are detected, ranging from 0.3 at lag 1 to 0.05 at lag 9. Insignificant auto correlations are observed thereafter. The p-values associated with the Ljung-Box statistics shown are all equal to 0, indicating that the likelihood of finding autocorrelation values such as these when the null hypothesis of independence in the squared returns is true is zero.

Lag	ACF2	LBQ2	p-value
1	0.305754	369.17	0
2	0.192723	515.89	0
3	0.165383	623.95	0
4	0.233289	839.03	0
5	0.204319	1004.06	0
6	0.134367	1075.44	0
7	0.124313	1136.56	0
8	0.086368	1166.07	0
9	0.057059	1178.96	0
10	0.025408	1181.51	0
11	0.027598	1184.53	0
12	0.025158	1187.03	0
13	0.015462	1187.98	0
14	0.009076	1188.31	0
15	0.026557	1191.10	0
16	0.008594	1191.39	0
17	0.010453	1191.83	0
18	0.008386	1192.11	0
19	0.012551	1192.73	0
20	0.010840	1193.20	0

Table 4.5: Autocorrelations of squared index returns, 1992 -2007

The index returns therefore exhibits evidence for volatility clustering, and the null hypothesis is rejected. This result provides statistical support for the graph in Section 4.2 above, and the observation that the volatility of returns is time-varying.

4.7 Measurement of volatility of the NSE-20 index returns

Thus far, the results have shown that the index return series displays some degree of predictability in returns shown by the presence of autocorrelation in returns; an asymmetric distribution exhibited by the presence of skewness and leptokurtosis; and evidence for volatility clustering, implied by the presence of autocorrelation

in the squared index return series. The observation of the volatility clustering property indicates that a model from the GARCH class of volatility models would be appropriate to measure the volatility in the data. The first step is fitting a mean equation that takes into account the presence of autocorrelation in the index returns.

4.7.1 Estimating the mean equation

To estimate the mean equation, the data is first fitted to a time series model. The model is then checked for 'fit', that is, how well it reflects the return data. Having established in Section 4.4 that the index return series can be modelled using an autoregressive process, the partial autocorrelation function is used to determine the order p of the AR (P) process. Table 4.6 presents the partial autocorrelation values for the 1992-2007 index return data are presented. The results of the autocorrelation test from Table 4.2 are presented in the third column for comparison purposes.

Lag	PACF	ACF
1	0.424313	0.424313
2	0.192643	0.338001
3	0.077203	0.258485
4	0.024166	0.192604
5	0.037305	0.167611
6	-0.011511	0.112418
7	0.027616	0.109865
8	0.041918	0.113657
9	0.035123	0.112788
10	-0.032761	0.064389
11	0.015605	0.071136
12	-0.001438	0.054318
13	0.004749	0.048932
14	0.014362	0.051324
15	0.037157	0.067298
16	0.000809	0.055973
17	0.006923	0.055300
18	-0.012935	0.036527
19	-0.011499	0.023398
20	0.012780	0.033197

Table 4.6: Partial autocorrelations of index returns, 1992 -2007

The PACF cuts off after lag 3, that is, there are no significant values after lag 3. The mean equation will therefore be an AR (3) process, i.e.:

$$r_t = \beta_0 + \beta_1 R_{t-1} + \beta_2 R_{t-2} + \beta_3 R_{t-3} + \varepsilon_t \quad (4.1)$$

where: β_i are a set of constants. R_j is the return j days ago, for $j = 1, 2, 3$, and ε_t is the residual or random error term we want to isolate. Equation 4.1 estimates today's return is obtained as a linear equation of the reruns from the last three

days, and a random error term. Estimating an AR(3) process for the index return data returns the result in Table 4.7.

Parameter	β_0	β_1	β_2	β_3
Estimate	0.0001926	0.3281	0.1666	0.0771
Standard error	0.0001132	0.0159	0.0165	0.0159
T-statistic	1.70	20.65	10.09	4.85
P-value	0.089	0.000	0.000	0.000

Table 4.7: Coefficients of the Mean Equation

The mean equation then becomes:

$$r_t = 0.0001926 + 0.3281R_{t-1} + 0.1666R_{t-2} + 0.0771R_{t-3} + \varepsilon_t$$

where r_t is the estimated mean return.

The p-values associated with the t-statistics indicate that each of the coefficients is significantly different from zero. Using this equation, the residual series ε_t is determined as the actual return series minus the estimated return series. The autocorrelation and partial autocorrelation functions of the residuals shown in Figure 4.3 (a) and (b) are used as a diagnostic check on the validity of the model.

If the model is a good fit, the ACF and PACF function should have insignificant values for the most part. Residuals represent the random component of the index return, and are therefore are required to be uncorrelated. It is observed that majority of the residual correlations are constrained within the red band demarcating the 5% significant level, indicating insignificance of the autocorrelations of residuals.

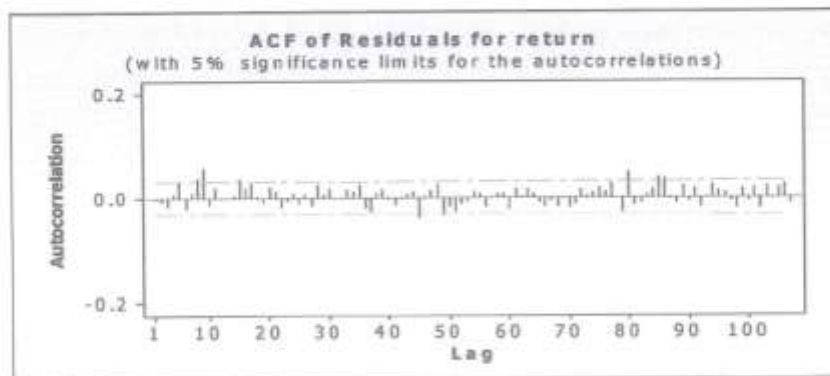


Figure 4.3 (a): Autocorrelation function of the AR(3) mean equation

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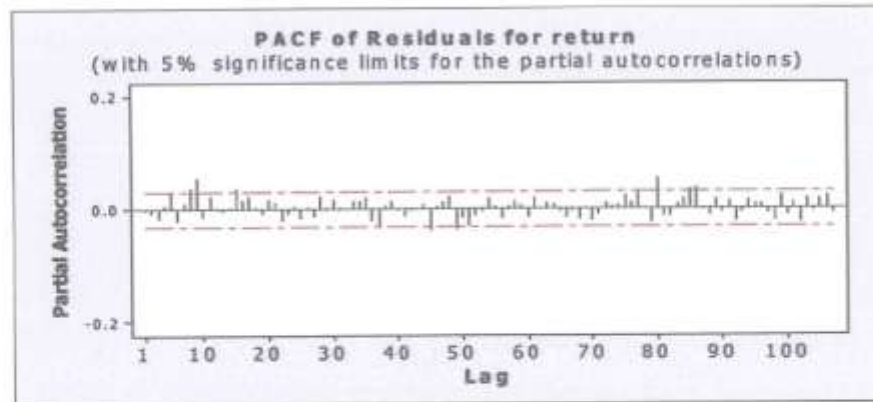


Figure 4.3 (b): Partial Autocorrelation function of the AR(3) mean equation

4.7.2 Volatility measurement

The established random series ε_t is analyzed in Stata 10. The estimate of the GARCH(1,1) model for the residuals series from 1992 to 2007 gives the output presented in Table 4.8. Stata indicates that it took the algorithm 25 iterations to maximize the likelihood function.

Dependent variable: <i>residuals</i>					
Method: GARCH (1,1)					
Period: 8-Jan-92 to 24-Dec-07					
Number of observations = 3944					
Log likelihood = -14208.95; Convergence achieved after 25 iterations					
	Coefficient	Std. Error	z-statistic	P> z	[95% Conf. Interval]
residuals constant	-0.0001078	0.0001001	-1.88	0.061	[-0.0003841, 0.00000846]
Variance equation					
Constant	0.000007420	0.000001070	6.93	0.00	[0.00000532, 0.00000952]
ARCH(1)	0.318138900	0.014606600	21.78	0.00	[0.2895105, 0.3467673]
GARCH(1)	0.563522800	0.028598100	19.70	0.00	[0.5074717, 0.619574]

Table 4-8: GARCH(1,1) estimate of the variance of residuals

The variance equation is of the form:

$$\text{Var}(\varepsilon_t) = \sigma_t^2 = 0.00000742 + 0.3181389\varepsilon_{t-1}^2 + 0.5635228\sigma_{t-1}^2$$

The above equation estimates today's variance of returns as a function of the long-run average variance, the weight of new information in the last period as captured by the most recent squared residual, ε_{t-1}^2 , and the previous period's variance σ_{t-1}^2 . The volatility equation above represents the estimate of how the volatility of

the residuals, and by extension the index return, is expected to behave. It is used to generate a volatility estimate for each date in the period of the study. It is similar to the AR(3) equation for the mean of the index returns presented earlier, but it models the non-constant variance instead.

The weight of new information in the last period is α_1 , represented by the ARCH(1) component, and is approximately equal to 0.32. The weight of the previous variance forecast is β_1 - the GARCH (1) component, and is approximately equal to 0.56. The constant α_0 is 0.00000742, and is a squared product of the long-run average variance and its associated weight $(1 - \alpha_1 - \beta_1) = 0.1183383$, where $\alpha_1 = 0.32$ and $\beta_1 = 0.56$.

The long-run average variance of the index random error term is therefore equal to:

$$\sqrt{\alpha_0 / (1 - \alpha_1 - \beta_1)} = 0.00791843379$$

Therefore, in the long run, the index will have an average random component approximately equal to 0.0079. The long-run average variance has the least weight as daily data is applied in the estimation. For longer periods, it would have a more significant effect (Engle, 2004).

The previous period's variance has the greatest weight and therefore has the most impact on today's volatility. The p-values of the z-statistics are equal to zero, indicating that the null hypothesis that coefficients are insignificant is rejected, that is, the coefficients are significantly different from 0. The last column shows a 95% confidence interval for the coefficient, which indicates how much the value of the coefficient could vary. Figure 4.4 presents the behaviour of index return volatility from 1992 to 2007.

The time-varying nature of volatility can be observed. However, because of differences in the magnitude of volatility over time, it is more meaningful to look at each of the three sub-periods separately, allowing use of different scales. Figure 4.5 (a), (b) and (c) presents the volatility graphs for the three periods.

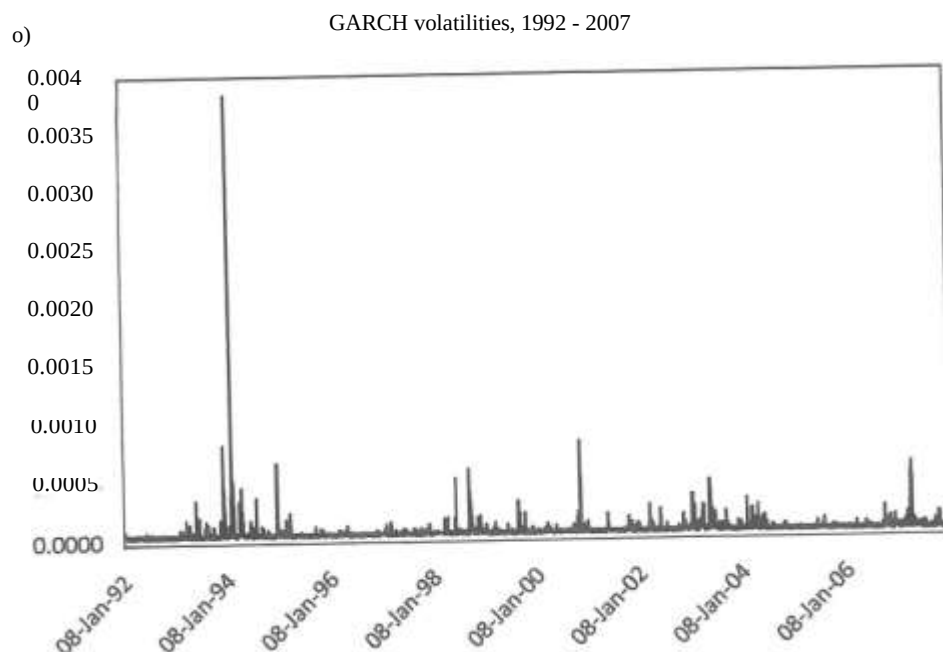


Figure 4.4: GARCH (1,1) conditional variance estimates

Figure 4.5 (a) presents the volatility observed in the first period, 1992 - 1997.

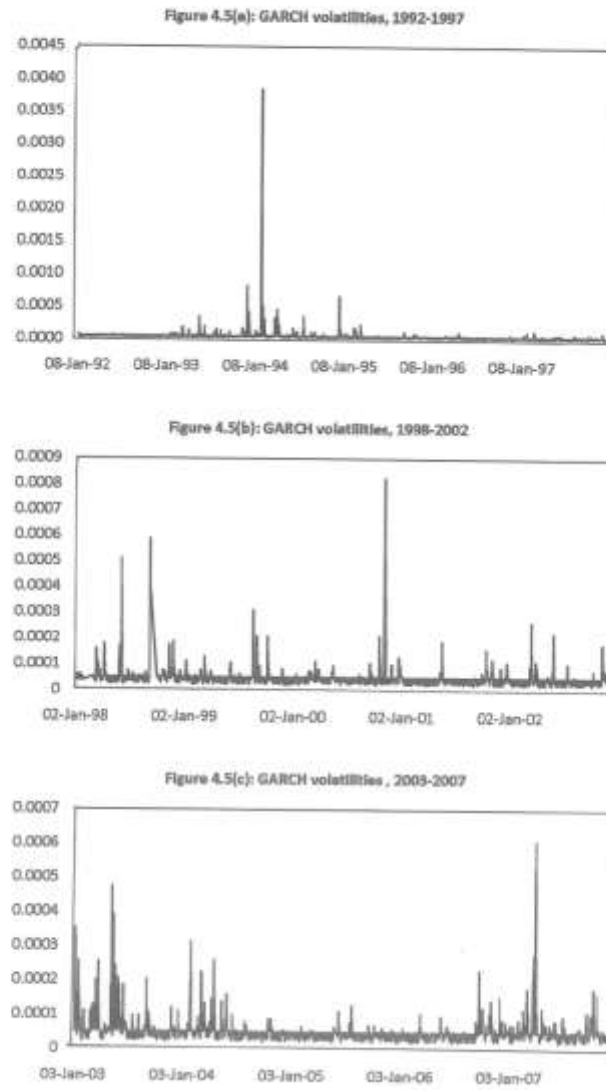
Volatility was low in 1992, but spiked sharply in late 1993 to late 1994, recording an extreme value of 0.0038452, on January 28, 1994. A possible cause of the much higher volatility during this period is the licensing of seven new stockbrokers in June 1994 by the CMA, leading to increased market activity. Less significant blips are visible at irregular intervals during this period, interspersed with low volatility levels bordering on zero. A possible contributory factor to the spike in 1993-1994 is the government's privatization of several state-owned companies, but further research would be required to determine the accuracy of such an inference.

Figure 4.5 (b) representing 1998 to 2002 has a more varied volatility structure, with spikes and dips occurring at a high frequency. Compared to the other periods, this period has a greater number of fluctuations. This period experienced a continuous market downturn due to a weakened economy.

The trend of volatility clustering with alternate contiguous periods of high volatility and low volatility is also observed in Figure 4.5 (c) representing 2003-2007. While the frequency of volatility movements reduces in this period, there is an increase in the length of time over which either high or low volatility presides.

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Figure 4-5: The GARCH (1, 1) volatilities for different sub-periods



There is a unique period in early 2003 to mid-2004, where the longest period of continuous high volatility is observed. This is the period of recovery that saw increased investment in the stock market, spurred by the general election of 2002. This is followed by a continuous period of low volatility from mid-2004 to mid-2006. Thereafter, another period of continuous high volatility is observed until mid-2007, when there was a series of IPOs in the market, and investors sought to make profits through active participation in the market.

5.0 CONCLUSIONS AND RECOMMENDATIONS

This study provides an insight into the statistical properties and volatility structure of the Nairobi Stock Exchange's twenty-share index over a long time. The period of study is from January 1992 through December 2007, and a framework of three sub-periods - 1992 to 1997, 1998 to 2002 and 2003 to 2007. We find evidence that the NSE-20 index returns display some, but not all the stylized characteristics found to occur in most financial time series. In addition, we find that differences exist in these statistical properties with the passage of time. We also find evidence that the process by which returns change is non-constant. Using a GARCH (1,1) model of volatility that takes into account this non-constant variance inherent in the index returns, it is established that each sub-period exhibits occurrences of high volatility followed by low volatility, and periods of low volatility followed by periods of high volatility.

There is a divergence between the expectations of Fama's (1960) Efficient Markets Hypothesis (EMH) and the results of this study. We find evidence of predictability in index returns, as indicated by the presence of auto correlations for the full period and within each of the sub-periods. These findings are in agreement with results of Jefferis and Smith (2005) and Ogum, Beer and Nouyrigat (2005). The evidence for autocorrelation between 1992 and 2007 can also be considered as an extension of the research by Dickinson and Muragu (1994) covering an earlier time period (1979 to 1989), and can thus be inferred to offer proof that the Nairobi Stock Exchange (NSE) has evolved from a period of unpredictable returns to a period of predictable returns. The stylized property of unpredictability or absence of auto correlations in returns is therefore not found for the NSE-20. However, evidence points to decreasing predictability with the development of the exchange, indicating that prices have become less predictable from historical trading information.

Evidence is found for the second stylized property of significant skewness and leptokurtosis in prices and returns. This supports Mandelbrot's (1963) arguments for non-normality in return distributions. The skewness results can be interpreted as an indication of the returns which an investor can expect in particular market environments. In a market decline, for example, the 1998 to

2002 period, there is a greater likelihood of large, infrequent negative returns and small but frequent gains, as indicated by a negative skewness value. In contrast, the positively-skewed returns in the first sub-period and the third sub-period suggest that there was likelihood of large, infrequent positive returns and small, frequent losses for the investor in these sub-periods. This inference supported by the -0.000683 mean return found for the second period, whereas the other periods have a positive mean return. The presence of leptokurtosis in each sub-period of the return data signifies departure from normality, and thus the need for an alternative distribution to describe the data. The assumption of a normal distribution when modelling index return data would be fundamentally wrong, as it will lead to underestimation of the likelihood of extreme losses or gains.

The presence of volatility clustering implied by autocorrelations in the squared return data underlines the appropriateness of using models that recognize this statistical property in estimating volatility, as opposed to simplistic estimators such as standard deviation. Significant ARCH and GARCH coefficients over a longer time frame enhance the findings of Ogum et al (2005) on the autoregressive behaviour of the conditional volatility. Specifically, they show that the variance of index returns is dependent largely on the previous variance recorded and, on a lower level, on the information arriving in the market in the previous time period. Investors would therefore benefit from a continuously measured estimate of volatility, as the volatility is autoregressive.

We have found that there has been an increase in the fluctuation of index returns. High volatility in a market indicates to investors that there is uncertainty and fear in the market. It then becomes very difficult for investors, especially one who has a long-term investment horizon, to make decisions on appropriate investments. However, this volatility is not necessarily a bad thing. Sophisticated investors can use it to make profits in a sharply fluctuating market.

5.1 Areas **for further** research

There are multiple ways in which the results of this study can be extended.

While evidence for autocorrelation in index returns is found, this is not considered a sufficient basis for the rejection of weak-form efficiency. The autocorrelation results presented here are a first step toward the investigation of the efficiency of the market, not conclusive evidence. There is need for more

extensive research using a wider range of tests to categorically find evidence for or against the EMH over a long time frame such as the one used in this study.

This research also shows the application of advanced risk measurement techniques to explain the behaviour of volatility in the Nairobi Stock Exchange. A natural extension of this analysis is an empirical examination of the causes of volatility. These would be informative in explaining the varying levels of volatility observed in this study.

Further, various models of volatility measurement, particularly those from the GARCH class of models can be used to expound on the characteristics of the Nairobi Stock Exchange's 20-share index.

Finally, a comparison between various world markets that have undergone periods of structural changes can be carried out, with the objective of determining whether the statistical properties and volatility structure evolve in the same manner.

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APPENDIX

VALUES OF THE NSE-20 FROM JANUARY 1992 TO DECEMBER 2007

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Date	Index	17-Mar-92	1028.22	8-Jun-92	1083.53	20-Aug-92	1227.79	4-Nov-92	1230.39	27-Jan-93	1144.72
2-Jan-92	954.03	18-Mar-92	1028.82	9-Jun-92	1085.54	21-Aug-92	1223.21	5-Nov-92	1229.90	28-Jan-93	1157.33
3-Jan-92	954.42	19-Mar-92	1034.08	10-Jun-92	1083.82	24-Aug-92	1218.47	6-Nov-92	1236.87	29-Jan-93	1176.74
6-Jan-92	954.51	20-Mar-92	1037.68	11-Jun-92	1086.43	25-Aug-92	1218.90	9-Nov-92	1240.35	1-Feb-93	1175.77
8-Jan-92	965.91	23-Mar-92	1043.61	12-Jun-92	1094.08	26-Aug-92	1224.98	10-Nov-92	1244.08	2-Feb-93	1178.36
9-Jan-92	970.14	24-Mar-92	1046.07	15-Jun-92	1100.97	27-Aug-92	1227.72	11-Nov-92	1249.38	3-Feb-93	1175.18
10-Jan-92	968.55	25-Mar-92	1050.70	16-Jun-92	1106.61	28-Aug-92	1233.13	12-Nov-92	1255.96	4-Feb-93	1175.92
13-Jan-92	974.43	26-Mar-92	1050.26	17-Jun-92	1112.25	31-Aug-92	1235.58	13-Nov-92	1261.70	5-Feb-93	1177.46
14-Jan-92	977.31	27-Mar-92	1047.71	18-Jun-92	1116.38	1-Sep-92	1236.67	16-Nov-92	1267.01	8-Feb-93	1174.87
15-Jan-92	973.58	30-Mar-92	1044.85	19-Jun-92	1121.63	2-Sep-92	1233.14	17-Nov-92	1265.95	9-Feb-93	1174.11
16-Jan-92	971.30	31-Mar-92	1048.07	22-Jun-92	1124.04	3-Sep-92	1231.85	18-Nov-92	1264.20	10-Feb-93	1190.64
17-Jan-92	976.35	1-Apr-92	1054.59	23-Jun-92	1129.61	4-Sep-92	1234.45	19-Nov-92	1261.35	11-Feb-93	1194.12
20-Jan-92	974.14	3-Apr-92	1055.90	24-Jun-92	1130.26	7-Sep-92	1232.72	20-Nov-92	1256.14	12-Feb-93	1185.97
21-Jan-92	977.64	7-Apr-92	1054.16	25-Jun-92	1134.36	8-Sep-92	1232.19	23-Nov-92	1253.08	15-Feb-93	1185.54
22-Jan-92	980.29	8-Apr-92	1056.54	26-Jun-92	1135.69	9-Sep-92	1230.43	24-Nov-92	1256.60	16-Feb-93	1190.31
23-Jan-92	980.53	9-Apr-92	1058.30	29-Jun-92	1137.02	10-Sep-92	1229.90	25-Nov-92	1256.45	17-Feb-93	1196.41
24-Jan-92	985.80	10-Apr-92	1056.38	30-Jun-92	1144.58	11-Sep-92	1239.38	26-Nov-92	1258.21	18-Feb-93	1193.30
27-Jan-92	986.94	13-Apr-92	1047.81	1-Jul-92	1144.84	14-Sep-92	1242.00	27-Nov-92	1256.45	19-Feb-93	1210.18
28-Jan-92	990.45	14-Apr-92	1048.25	2-Jul-92	1146.20	15-Sep-92	1246.87	30-Nov-92	1257.15	22-Feb-93	1204.79
29-Jan-92	994.73	15-Apr-92	1053.58	3-Jul-92	1150.05	16-Sep-92	1240.28	1-Dec-92	1246.65	23-Feb-93	1203.88
30-Jan-92	993.23	16-Apr-92	1048.21	6-Jul-92	1162.32	17-Sep-92	1242.04	2-Dec-92	1240.55	24-Feb-93	1202.16
31-Jan-92	996.56	21-Apr-92	1048.60	7-Jul-92	1157.84	18-Sep-92	1241.34	3-Dec-92	1229.05	25-Feb-93	1207.71
3-Feb-92	1002.49	22-Apr-92	1049.40	8-Jul-92	1157.62	21-Sep-92	1239.59	4-Dec-92	1221.79	26-Feb-93	1220.77
4-Feb-92	1007.17	23-Apr-92	1045.22	9-Jul-92	1157.51	22-Sep-92	1243.09	7-Dec-92	1217.56	1-Mar-93	1216.76
5-Feb-92	1012.70	24-Apr-92	1045.66	10-Jul-92	1164.87	23-Sep-92	1234.52	8-Dec-92	1213.56	2-Mar-93	1227.26
6-Feb-92	1014.84	27-Apr-92	1052.26	13-Jul-92	1168.61	24-Sep-92	1234.79	9-Dec-92	1209.19	3-Mar-93	1228.50
7-Feb-92	1010.36	28-Apr-92	1053.84	14-Jul-92	1172.74	25-Sep-92	1233.18	10-Dec-92	1205.56	4-Mar-93	1232.20
10-Feb-92	1003.05	29-Apr-92	1053.78	15-Jul-92	1177.05	28-Sep-92	1230.79	11-Dec-92	1203.11	5-Mar-93	1237.68
11-Feb-92	998.90	30-Apr-92	1055.52	16-Jul-92	1180.84	29-Sep-92	1228.77	14-Dec-92	1203.61	8-Mar-93	1240.34
12-Feb-92	1004.01	4-May-92	1048.60	17-Jul-92	1188.41	30-Sep-92	1228.43	15-Dec-92	1197.34	9-Mar-93	1228.40
13-Feb-92	1008.38	5-May-92	1049.17	20-Jul-92	1186.95	1-Oct-92	1230.45	16-Dec-92	1194.34	10-Mar-93	1251.29
14-Feb-92	1014.46	6-May-92	1051.59	21-Jul-92	1193.60	2-Oct-92	1234.42	17-Dec-92	1190.00	11-Mar-93	1244.07
17-Feb-92	1021.19	7-May-92	1043.02	22-Jul-92	1190.12	5-Oct-92	1234.74	18-Dec-92	1184.75	12-Mar-93	1246.72
18-Feb-92	1026.17	8-May-92	1042.81	23-Jul-92	1191.39	6-Oct-92	1235.09	21-Dec-92	1181.54	15-Mar-93	1244.07
19-Feb-92	1031.45	11-May-92	1043.13	24-Jul-92	1197.40	7-Oct-92	1231.38	22-Dec-92	1182.37	16-Mar-93	1241.31
20-Feb-92	1038.35	12-May-92	1048.48	27-Jul-92	1200.01	8-Oct-92	1233.16	23-Dec-92	1176.64	17-Mar-93	1253.16
21-Feb-92	1042.45	13-May-92	1048.30	28-Jul-92	1201.28	9-Oct-92	1226.35	24-Dec-92	1167.29	18-Mar-93	1250.17
24-Feb-92	1040.10	14-May-92	1047.85	29-Jul-92	1205.59	12-Oct-92	1219.71	4-Jan-93	1165.31	19-Mar-93	1251.00
25-Feb-92	1041.89	15-May-92	1057.35	30-Jul-92	1207.72	13-Oct-92	1227.95	5-Jan-93	1164.36	22-Mar-93	1242.68
26-Feb-92	1046.46	18-May-92	1063.53	31-Jul-92	1208.52	14-Oct-92	1233.80	6-Jan-93	1163.31	23-Mar-93	1245.71
27-Feb-92	1049.08	19-May-92	1068.89	3-Aug-92	1212.53	15-Oct-92	1237.11	7-Jan-93	1151.80	24-Mar-93	1247.19
28-Feb-92	1046.86	20-May-92	1064.19	4-Aug-92	1212.24	16-Oct-92	1237.77	8-Jan-93	1152.99	26-Mar-93	1242.78
2-Mar-92	1049.73	21-May-92	1069.82	5-Aug-92	1215.27	19-Oct-92	1236.02	11-Jan-93	1149.68	29-Mar-93	1252.32
3-Mar-92	1047.24	22-May-92	1073.28	6-Aug-92	1226.58	21-Oct-92	1235.89	12-Jan-93	1153.64	30-Mar-93	1249.00
4-Mar-92	1041.89	25-May-92	1077.47	7-Aug-92	1228.93	22-Oct-92	1237.62	13-Jan-93	1147.59	31-Mar-93	1252.39
5-Mar-92	1043.20	26-May-92	1075.44	10-Aug-92	1229.96	23-Oct-92	1237.84	14-Jan-93	1150.68	1-Apr-93	1255.84
6-Mar-92	1044.28	27-May-92	1078.08	11-Aug-92	1229.27	26-Oct-92	1240.48	15-Jan-93	1149.75	2-Apr-93	1255.84
9-Mar-92	1040.61	28-May-92	1078.92	12-Aug-92	1230.14	27-Oct-92	1243.74	19-Jan-93	1155.05	5-Apr-93	1279.92
10-Mar-92	1037.26	29-May-92	1082.22	13-Aug-92	1225.41	28-Oct-92	1242.31	20-Jan-93	1158.45	6-Apr-93	1284.58
11-Mar-92	1040.40	2-Jun-92	1087.89	14-Aug-92	1227.43	29-Oct-92	1237.44	21-Jan-93	1158.45	7-Apr-93	1290.04
12-Mar-92	1037.46	3-Jun-92	1078.37	17-Aug-92	1226.78	30-Oct-92	1234.12	22-Jan-93	1150.67	8-Apr-93	1285.00
13-Mar-92	1033.09	4-Jun-92	1080.12	18-Aug-92	1225.69	2-Nov-92	1232.56	25-Jan-93	1135.97	13-Apr-93	1290.05
16-Mar-92	1029.79	5-Jun-92	1083.68	19-Aug-92	1228.08	3-Nov-92	1230.90	26-Jan-93	1143.85	14-Apr-93	1289.55

15-Apr-93	1295.37	1-Jul-93	1501.51	15-Sep-93	1735.27	2-Dec-93	2255.96	18-Feb-94	5037.27	11-May-94	3555.82
16-Apr-93	1296.40	2-Jul-93	1510.02	16-Sep-93	1733.30	3-Dec-93	2288.76	21-Feb-94	5027.39	12-May-94	3508.97
19-Apr-93	1297.25	5-Jul-93	1510.00	17-Sep-93	1743.94	6-Dec-93	2323.56	22-Feb-94	5031.33	13-May-94	3499.02
20-Apr-93	1302.30	6-Jul-93	1514.83	20-Sep-93	1775.88	7-Dec-93	2429.86	23-Feb-94	5029.80	16-May-94	3488.53
21-Apr-93	1305.20	7-Jul-93	1516.11	21-Sep-93	1781.41	8-Dec-93	2440.66	24-Feb-94	5073.39	17-May-94	3478.29
22-Apr-93	1308.05	8-Jul-93	1518.54	22-Sep-93	1788.66	9-Dec-93	2427.57	25-Feb-94	5068.50	18-May-94	3482.82
23-Apr-93	1310.49	9-Jul-93	1520.87	23-Sep-93	1802.93	10-Dec-93	2448.40	28-Feb-94	5030.55	19-May-94	3447.46
26-Apr-93	1302.86	12-Jul-93	1524.96	24-Sep-93	1809.51	14-Dec-93	2474.30	1-Mar-94	5011.47	20-May-94	3449.78
27-Apr-93	1314.58	13-Jul-93	1528.81	27-Sep-93	1808.23	15-Dec-93	2503.12	2-Mar-94	5003.68	23-May-94	3458.09
28-Apr-93	1327.26	14-Jul-93	1542.93	28-Sep-93	1804.22	16-Dec-93	2517.31	3-Mar-94	4999.54	24-May-94	3458.03
29-Apr-93	1328.62	15-Jul-93	1550.80	29-Sep-93	1814.29	17-Dec-93	2517.63	4-Mar-94	5031.09	25-May-94	3467.86
30-Apr-93	1342.20	16-Jul-93	1558.10	30-Sep-93	1810.69	20-Dec-93	2502.22	7-Mar-94	5010.73	26-May-94	3514.58
3-May-93	1337.87	19-Jul-93	1587.65	1-Oct-93	1813.65	21-Dec-93	2508.59	8-Mar-94	5039.43	27-May-94	3554.51
4-May-93	1337.05	20-Jul-93	1594.03	4-Oct-93	1809.07	22-Dec-93	2520.45	9-Mar-94	5009.99	30-May-94	3603.37
5-May-93	1340.48	21-Jul-93	1593.14	5-Oct-93	1816.95	23-Dec-93	2524.56	10-Mar-94	4990.78	31-May-94	3620.24
6-May-93	1345.25	22-Jul-93	1597.56	6-Oct-93	1823.37	24-Dec-93	2524.27	11-Mar-94	4978.25	2-Jun-94	3650.26
7-May-93	1354.18	23-Jul-93	1604.50	7-Oct-93	1824.08	28-Dec-93	2528.46	14-Mar-94	4820.10	3-Jun-94	3751.79
10-May-93	1352.93	26-Jul-93	1607.97	8-Oct-93	1831.23	29-Dec-93	2532.49	16-Mar-94	4809.59	6-Jun-94	3799.83
11-May-93	1359.92	27-Jul-93	1603.67	12-Oct-93	1835.30	30-Dec-93	2517.91	17-Mar-94	4792.93	7-Jun-94	3800.50
12-May-93	1364.26	28-Jul-93	1636.70	13-Oct-93	1834.45	31-Dec-93	2527.07	18-Mar-94	4737.07	8-Jun-94	3895.91
13-May-93	1385.21	29-Jul-93	1641.90	14-Oct-93	1830.14	3-Jan-94	2533.89	21-Mar-94	4747.25	9-Jun-94	3918.93
14-May-93	1404.96	30-Jul-93	1649.93	15-Oct-93	1833.25	4-Jan-94	2560.50	22-Mar-94	4740.02	10-Jun-94	3979.46
17-May-93	1406.14	2-Aug-93	1653.14	18-Oct-93	1836.70	5-Jan-94	2558.25	23-Mar-94	4701.82	13-Jun-94	3965.38
18-May-93	1413.80	3-Aug-93	1647.93	19-Oct-93	1839.43	6-Jan-94	2608.27	24-Mar-94	4546.72	14-Jun-94	4018.52
19-May-93	1373.70	4-Aug-93	1653.96	21-Oct-93	1840.77	7-Jan-94	2618.96	25-Mar-94	4502.02	15-Jun-94	4060.34
20-May-93	1359.45	5-Aug-93	1654.77	22-Oct-93	1832.37	10-Jan-94	2616.65	28-Mar-94	4544.15	16-Jun-94	4067.93
21-May-93	1383.26	6-Aug-93	1655.59	25-Oct-93	1833.32	11-Jan-94	2657.90	29-Mar-94	4546.28	17-Jun-94	4054.86
24-May-93	1382.25	9-Aug-93	1663.82	26-Oct-93	1834.51	12-Jan-94	2663.72	30-Mar-94	4417.69	20-Jun-94	4071.44
25-May-93	1388.52	10-Aug-93	1674.07	27-Oct-93	1835.47	13-Jan-94	2688.06	31-Mar-94	4377.97	21-Jun-94	4068.50
26-May-93	1390.17	11-Aug-93	1678.43	28-Oct-93	1846.20	14-Jan-94	2727.91	5-Apr-94	4189.56	22-Jun-94	4024.11
27-May-93	1394.77	12-Aug-93	1649.85	29-Oct-93	1844.35	17-Jan-94	2781.87	6-Apr-94	4172.30	23-Jun-94	4074.24
28-May-93	1399.55	13-Aug-93	1705.35	1-Nov-93	1859.17	18-Jan-94	2824.58	7-Apr-94	4075.30	24-Jun-94	4083.88
31-May-93	1397.77	16-Aug-93	1708.25	2-Nov-93	1861.98	19-Jan-94	2862.56	8-Apr-94	4015.51	27-Jun-94	4098.30
2-Jun-93	1405.52	17-Aug-93	1718.34	3-Nov-93	1881.05	20-Jan-94	2897.02	11-Apr-94	3902.19	28-Jun-94	4111.58
3-Jun-93	1424.21	18-Aug-93	1734.39	4-Nov-93	1895.66	21-Jan-94	2921.86	12-Apr-94	3773.01	29-Jun-94	4115.95
4-Jun-93	1424.93	19-Aug-93	1728.36	5-Nov-93	1915.87	24-Jan-94	2951.73	13-Apr-94	3746.07	30-Jun-94	4137.22
7-Jun-93	1437.11	20-Aug-93	1739.52	8-Nov-93	1914.37	25-Jan-94	3006.66	14-Apr-94	3738.47	1-Jul-94	4168.49
8-Jun-93	1435.76	23-Aug-93	1738.11	9-Nov-93	1932.97	26-Jan-94	3132.58	15-Apr-94	3727.81	4-Jul-94	4172.50
9-Jun-93	1470.95	24-Aug-93	1734.15	10-Nov-93	1981.47	27-Jan-94	3545.92	18-Apr-94	3724.58	5-Jul-94	4195.13
10-Jun-93	1481.57	25-Aug-93	1732.57	11-Nov-93	1977.65	28-Jan-94	3695.43	19-Apr-94	3740.99	6-Jul-94	4194.34
11-Jun-93	1474.22	26-Aug-93	1731.17	12-Nov-93	1986.01	31-Jan-94	3818.74	20-Apr-94	3715.83	7-Jul-94	4235.29
14-Jun-93	1471.93	27-Aug-93	1716.22	15-Nov-93	1987.72	1-Feb-94	3950.56	21-Apr-94	3713.84	8-Jul-94	4246.59
15-Jun-93	1470.83	30-Aug-93	1718.79	16-Nov-93	2004.00	2-Feb-94	4184.17	22-Apr-94	3654.86	11-Jul-94	4243.18
16-Jun-93	1473.30	31-Aug-93	1724.24	17-Nov-93	2013.10	3-Feb-94	4416.40	25-Apr-94	3605.15	12-Jul-94	4245.86
17-Jun-93	1478.09	1-Sep-93	1726.29	18-Nov-93	2009.25	4-Feb-94	4605.59	26-Apr-94	3593.90	13-Jul-94	4291.51
18-Jun-93	1481.94	2-Sep-93	1748.90	19-Nov-93	2040.13	7-Feb-94	4810.22	27-Apr-94	3574.57	14-Jul-94	4313.17
21-Jun-93	1491.41	3-Sep-93	1745.32	22-Nov-93	2042.87	8-Feb-94	4975.70	28-Apr-94	3569.20	15-Jul-94	4349.47
22-Jun-93	1500.96	6-Sep-93	1734.95	23-Nov-93	2049.52	9-Feb-94	5115.28	29-Apr-94	3558.51	18-Jul-94	4291.61
23-Jun-93	1504.95	7-Sep-93	1730.87	24-Nov-93	2090.76	10-Feb-94	5062.70	3-May-94	3569.20	19-Jul-94	4262.84
24-Jun-93	1510.01	8-Sep-93	1728.15	25-Nov-93	2087.61	11-Feb-94	5137.09	4-May-94	3602.08	20-Jul-94	4226.91
25-Jun-93	1503.02	9-Sep-93	1731.36	26-Nov-93	2086.82	14-Feb-94	5113.27	5-May-94	3608.32	21-Jul-94	4074.56
28-Jun-93	1503.94	10-Sep-93	1735.74	29-Nov-93	2083.04	15-Feb-94	5103.41	6-May-94	3591.76	22-Jul-94	4082.86
29-Jun-93	1509.25	13-Sep-93	1732.25	30-Nov-93	2096.14	16-Feb-94	5110.02	9-May-94	3585.80	25-Jul-94	4083.16
30-Jun-93	1508.02	14-Sep-93	1732.92	1-Dec-93	2207.11	17-Feb-94	5048.89	10-May-94	3586.97	26-Jul-94	4084.22

27-Jul-94	4078.77	12-Oct-94	3553.08	3-Jan-95	4545.51	20-Mar-95	3738.35	8-Jun-95	3430.78	23-Aug-95	3156.80
28-Jul-94	4067.11	13-Oct-94	3503.64	4-Jan-95	4531.89	21-Mar-95	3737.61	9-Jun-95	3434.74	24-Aug-95	3163.00
29-Jul-94	4070.42	14-Oct-94	3499.17	5-Jan-95	4509.24	22-Mar-95	3740.09	12-Jun-95	3450.55	25-Aug-95	3161.77
1-Aug-94	4056.06	17-Oct-94	3475.25	6-Jan-95	4408.95	23-Mar-95	3714.89	13-Jun-95	3455.48	28-Aug-95	3153.48
2-Aug-94	4054.16	18-Oct-94	3482.63	9-Jan-95	4314.54	24-Mar-95	3705.71	14-Jun-95	3456.66	29-Aug-95	3132.68
3-Aug-94	4024.41	19-Oct-94	3494.71	10-Jan-95	4265.84	27-Mar-95	3684.65	15-Jun-95	3460.89	30-Aug-95	3133.24
4-Aug-94	3995.39	21-Oct-94	3526.78	11-Jan-95	4237.09	28-Mar-95	3663.12	16-Jun-95	3471.14	31-Aug-95	3114.60
5-Aug-94	4012.25	24-Oct-94	3549.25	12-Jan-95	4175.40	29-Mar-95	3661.78	19-Jun-95	3471.80	1-Sep-95	3116.38
8-Aug-94	4033.69	25-Oct-94	3552.25	13-Jan-95	4191.50	30-Mar-95	3638.35	20-Jun-95	3474.85	4-Sep-95	3092.08
9-Aug-94	4077.28	26-Oct-94	3557.56	16-Jan-95	4179.15	31-Mar-95	3639.86	21-Jun-95	3495.10	5-Sep-95	3071.02
10-Aug-94	4099.76	27-Oct-94	3558.16	17-Jan-95	4194.49	3-Apr-95	3634.84	22-Jun-95	3501.32	6-Sep-95	3027.81
11-Aug-94	4084.34	28-Oct-94	3588.86	18-Jan-95	4165.16	4-Apr-95	3630.87	23-Jun-95	3506.33	7-Sep-95	3009.93
12-Aug-94	4081.29	31-Oct-94	3585.56	19-Jan-95	4105.62	5-Apr-95	3614.27	26-Jun-95	3495.32	8-Sep-95	2998.57
15-Aug-94	4078.87	1-Nov-94	3595.81	20-Jan-95	4098.59	6-Apr-95	3600.91	27-Jun-95	3497.39	11-Sep-95	2941.26
16-Aug-94	4037.85	2-Nov-94	3602.45	23-Jan-95	4059.31	7-Apr-95	3583.01	28-Jun-95	3487.97	12-Sep-95	2943.41
17-Aug-94	4037.47	3-Nov-94	3596.21	24-Jan-95	4055.73	10-Apr-95	3601.25	29-Jun-95	3460.80	13-Sep-95	2921.92
18-Aug-94	4036.65	4-Nov-94	3606.53	25-Jan-95	4047.17	11-Apr-95	3617.47	30-Jun-95	3464.23	14-Sep-95	2909.03
19-Aug-94	4042.72	7-Nov-94	3614.08	26-Jan-95	4005.68	12-Apr-95	3608.71	3-Jul-95	3467.73	15-Sep-95	2900.39
22-Aug-94	4047.60	8-Nov-94	3599.76	27-Jan-95	3979.47	13-Apr-95	3592.09	4-Jul-95	3448.45	18-Sep-95	2875.17
23-Aug-94	4055.30	9-Nov-94	3600.67	30-Jan-95	3936.92	18-Apr-95	3565.91	5-Jul-95	3432.89	19-Sep-95	2864.03
24-Aug-94	3988.86	10-Nov-94	3581.32	31-Jan-95	3939.68	19-Apr-95	3538.53	6-Jul-95	3404.90	20-Sep-95	2851.94
25-Aug-94	3988.18	11-Nov-94	3566.15	1-Feb-95	3958.56	20-Apr-95	3546.74	7-Jul-95	3412.23	21-Sep-95	2849.13
26-Aug-94	3967.12	14-Nov-94	3557.20	2-Feb-95	3966.29	21-Apr-95	3540.32	10-Jul-95	3400.49	22-Sep-95	2857.92
29-Aug-94	3959.51	15-Nov-94	3565.49	3-Feb-95	3958.21	24-Apr-95	3525.53	11-Jul-95	3388.37	25-Sep-95	2860.51
30-Aug-94	3988.18	16-Nov-94	3554.21	6-Feb-95	3971.17	25-Apr-95	3524.90	12-Jul-95	3393.96	26-Sep-95	2852.97
31-Aug-94	3951.77	17-Nov-94	3557.47	7-Feb-95	3945.89	26-Apr-95	3524.18	13-Jul-95	3394.06	27-Sep-95	2846.83
1-Sep-94	3971.55	18-Nov-94	3507.99	8-Feb-95	3937.93	27-Apr-95	3516.01	14-Jul-95	3404.02	28-Sep-95	2844.90
2-Sep-94	3969.95	21-Nov-94	3499.00	9-Feb-95	3922.28	28-Apr-95	3519.44	17-Jul-95	3419.39	29-Sep-95	2845.43
5-Sep-94	3962.13	22-Nov-94	3471.98	10-Feb-95	3910.26	2-May-95	3510.64	18-Jul-95	3421.02	2-Oct-95	2846.42
6-Sep-94	3901.13	23-Nov-94	3475.73	13-Feb-95	3941.52	3-May-95	3513.05	19-Jul-95	3412.74	3-Oct-95	2863.72
7-Sep-94	3903.77	24-Nov-94	3469.41	14-Feb-95	3867.83	4-May-95	3504.22	20-Jul-95	3382.71	4-Oct-95	2859.48
8-Sep-94	3888.47	25-Nov-94	3477.91	15-Feb-95	3843.72	5-May-95	3506.07	21-Jul-95	3364.52	5-Oct-95	2864.07
9-Sep-94	3893.47	28-Nov-94	3467.37	16-Feb-95	3871.15	8-May-95	3486.82	24-Jul-95	3362.83	6-Oct-95	2876.77
12-Sep-94	3876.24	29-Nov-94	3475.24	17-Feb-95	3863.67	9-May-95	3500.42	25-Jul-95	3330.50	9-Oct-95	2880.64
13-Sep-94	3866.41	30-Nov-94	3483.54	20-Feb-95	3785.08	10-May-95	3475.72	26-Jul-95	3309.01	11-Oct-95	2896.52
14-Sep-94	3854.11	1-Dec-94	3494.35	21-Feb-95	3762.50	11-May-95	3469.69	27-Jul-95	3314.40	12-Oct-95	2905.20
15-Sep-94	3844.77	2-Dec-94	3501.26	22-Feb-95	3764.99	12-May-95	3451.61	28-Jul-95	3317.81	13-Oct-95	2922.81
16-Sep-94	3839.31	5-Dec-94	3502.95	23-Feb-95	3814.22	15-May-95	3416.32	31-Jul-95	3326.11	16-Oct-95	2921.97
19-Sep-94	3825.58	6-Dec-94	3507.42	24-Feb-95	3873.67	16-May-95	3403.93	1-Aug-95	3318.11	17-Oct-95	2941.56
20-Sep-94	3822.04	7-Dec-94	3531.09	27-Feb-95	3884.68	17-May-95	3400.16	2-Aug-95	3317.06	18-Oct-95	2989.81
21-Sep-94	3808.42	8-Dec-94	3556.00	28-Feb-95	3897.42	18-May-95	3385.15	3-Aug-95	3305.50	19-Oct-95	3031.04
22-Sep-94	3773.56	9-Dec-94	3556.29	1-Mar-95	3904.07	19-May-95	3384.47	4-Aug-95	3267.58	23-Oct-95	3033.17
23-Sep-94	3760.65	13-Dec-94	3590.75	2-Mar-95	3889.54	22-May-95	3398.07	7-Aug-95	3265.52	24-Oct-95	3058.22
26-Sep-94	3754.84	14-Dec-94	3648.96	3-Mar-95	3879.27	23-May-95	3419.36	8-Aug-95	3247.70	25-Oct-95	3064.73
27-Sep-94	3751.30	15-Dec-94	3838.20	6-Mar-95	3889.49	24-May-95	3420.59	9-Aug-95	3238.98	26-Oct-95	3115.62
28-Sep-94	3759.48	16-Dec-94	4017.45	7-Mar-95	3861.73	25-May-95	3431.59	10-Aug-95	3227.28	27-Oct-95	3174.89
29-Sep-94	3723.13	19-Dec-94	4123.94	8-Mar-95	3841.28	26-May-95	3448.59	11-Aug-95	3246.94	30-Oct-95	3236.91
30-Sep-94	3715.39	20-Dec-94	4295.15	9-Mar-95	3845.33	29-May-95	3488.84	14-Aug-95	3234.96	31-Oct-95	3307.08
3-Oct-94	3690.25	21-Dec-94	4426.32	10-Mar-95	3860.43	30-May-95	3478.65	15-Aug-95	3224.77	1-Nov-95	3376.98
4-Oct-94	3667.93	22-Dec-94	4513.83	13-Mar-95	3907.66	31-May-95	3405.49	16-Aug-95	3214.24	2-Nov-95	3396.50
5-Oct-94	3659.59	23-Dec-94	4512.53	14-Mar-95	3833.91	2-Jun-95	3414.50	17-Aug-95	3213.54	3-Nov-95	3505.58
6-Oct-94	3653.06	28-Dec-94	4509.04	15-Mar-95	3780.90	5-Jun-95	3427.09	18-Aug-95	3189.88	6-Nov-95	3539.17
7-Oct-94	3640.86	29-Dec-94	4531.84	16-Mar-95	3723.61	6-Jun-95	3422.30	21-Aug-95	3183.89	7-Nov-95	3540.90
11-Oct-94	3587.87	30-Dec-94	4559.40	17-Mar-95	3751.33	7-Jun-95	3423.23	22-Aug-95	3161.92	8-Nov-95	3536.77

9-Nov-95	3523.36	30-Jan-96	3403.71	18-Apr-96	2904.22	4-Jul-96	3142.21	18-Sep-96	3023.34	17-Dec-96	3091.71
10-Nov-95	3498.32	31-Jan-96	3405.40	19-Apr-96	2907.12	5-Jul-96	3161.80	19-Sep-96	3031.58	18-Dec-96	3083.57
13-Nov-95	3500.18	1-Feb-96	3392.75	22-Apr-96	2913.21	8-Jul-96	3169.40	20-Sep-96	3047.55	19-Dec-96	3105.56
14-Nov-95	3503.44	2-Feb-96	3392.75	23-Apr-96	2964.66	9-Jul-96	3169.12	23-Sep-96	3058.54	20-Dec-96	3111.56
15-Nov-95	3502.54	5-Feb-96	3373.59	24-Apr-96	2995.94	10-Jul-96	3140.91	24-Sep-96	3057.66	23-Dec-96	3102.79
16-Nov-95	3518.57	6-Feb-96	3366.24	25-Apr-96	3030.20	11-Jul-96	3142.91	25-Sep-96	3071.19	24-Dec-96	3112.04
17-Nov-95	3535.19	7-Feb-96	3360.30	26-Apr-96	3027.17	12-Jul-96	3154.68	26-Sep-96	3059.06	30-Dec-96	3102.40
20-Nov-95	3532.24	8-Feb-96	3354.52	29-Apr-96	3020.74	15-Jul-96	3139.99	27-Sep-96	3072.76	31-Dec-96	3114.11
21-Nov-95	3550.96	9-Feb-96	3355.11	30-Apr-96	3019.20	16-Jul-96	3137.64	30-Sep-96	3089.83	2-Jan-97	3115.82
22-Nov-95	3532.38	12-Feb-96	3334.71	2-May-96	3021.36	17-Jul-96	3134.25	1-Oct-96	3078.05	3-Jan-97	3124.14
23-Nov-95	3517.12	13-Feb-96	3318.82	3-May-96	3024.56	18-Jul-96	3144.39	2-Oct-96	3053.12	6-Jan-97	3153.21
24-Nov-95	3501.90	14-Feb-96	3313.99	6-May-96	3018.31	19-Jul-96	3149.07	3-Oct-96	3036.94	7-Jan-97	3164.01
27-Nov-95	3483.54	15-Feb-96	3314.05	7-May-96	3018.26	22-Jul-96	3132.09	4-Oct-96	3044.14	8-Jan-97	3198.07
28-Nov-95	3494.22	16-Feb-96	3294.11	8-May-96	3021.41	23-Jul-96	3136.08	7-Oct-96	3051.68	9-Jan-97	3198.07
29-Nov-95	3482.50	19-Feb-96	3300.90	9-May-96	3010.92	24-Jul-96	3143.51	8-Oct-96	3045.56	10-Jan-97	3233.75
30-Nov-95	3495.92	20-Feb-96	3303.90	10-May-96	3004.45	25-Jul-96	3144.55	9-Oct-96	3027.12	13-Jan-97	3261.05
1-Dec-95	3498.41	22-Feb-96	3310.51	13-May-96	3027.91	26-Jul-96	3134.99	11-Oct-96	3035.33	14-Jan-97	3279.51
4-Dec-95	3504.75	23-Feb-96	3316.54	14-May-96	3022.99	29-Jul-96	3140.47	14-Oct-96	3020.39	15-Jan-97	3336.01
5-Dec-95	3475.30	26-Feb-96	3309.33	15-May-96	3025.86	30-Jul-96	3142.38	15-Oct-96	3022.40	16-Jan-97	3395.60
6-Dec-95	3490.07	27-Feb-96	3276.36	16-May-96	3019.08	31-Jul-96	3150.08	16-Oct-96	3028.15	17-Jan-97	3550.27
7-Dec-95	3487.72	28-Feb-96	3275.23	17-May-96	3025.69	1-Aug-96	3159.93	17-Oct-96	3022.87	20-Jan-97	3628.98
8-Dec-95	3474.13	29-Feb-96	3230.08	20-May-96	3040.77	2-Aug-96	3154.70	18-Oct-96	3039.89	21-Jan-97	3671.63
11-Dec-95	3472.15	1-Mar-96	3207.57	21-May-96	3032.26	5-Aug-96	3130.66	22-Oct-96	3038.75	22-Jan-97	3675.44
13-Dec-95	3468.47	4-Mar-96	3180.99	22-May-96	3037.88	6-Aug-96	3125.82	23-Oct-96	3034.01	23-Jan-97	3675.44
14-Dec-95	3455.13	5-Mar-96	3143.28	23-May-96	3036.35	7-Aug-96	3122.15	24-Oct-96	3029.64	24-Jan-97	3535.00
15-Dec-95	3450.07	6-Mar-96	3143.03	24-May-96	3030.28	8-Aug-96	3134.14	25-Oct-96	3042.74	27-Jan-97	3548.31
18-Dec-95	3427.96	7-Mar-96	3153.21	27-May-96	3038.68	9-Aug-96	3120.15	28-Oct-96	3049.16	28-Jan-97	3548.31
19-Dec-95	3416.20	8-Mar-96	3117.49	28-May-96	3028.90	12-Aug-96	3117.32	29-Oct-96	3036.72	29-Jan-97	3520.28
20-Dec-95	3404.34	11-Mar-96	3094.22	29-May-96	3029.42	13-Aug-96	3125.66	30-Oct-96	3034.80	30-Jan-97	3522.86
21-Dec-95	3409.51	12-Mar-96	3070.71	30-May-96	3028.68	14-Aug-96	3129.78	31-Oct-96	3055.97	31-Jan-97	3476.67
22-Dec-95	3458.27	13-Mar-96	3059.94	31-May-96	3031.02	15-Aug-96	3141.93	1-Nov-96	3046.55	3-Feb-97	3469.92
27-Dec-95	3455.53	14-Mar-96	3065.06	3-Jun-96	3021.80	16-Aug-96	3138.64	5-Nov-96	3061.57	4-Feb-97	3449.08
28-Dec-95	3468.09	15-Mar-96	3074.44	4-Jun-96	3039.28	19-Aug-96	3121.27	6-Nov-96	3058.52	5-Feb-97	3448.69
29-Dec-95	3468.88	18-Mar-96	3085.15	5-Jun-96	3051.61	20-Aug-96	3121.27	7-Nov-96	3049.77	6-Feb-97	3444.44
2-Jan-96	3449.66	19-Mar-96	3066.63	6-Jun-96	3058.54	21-Aug-96	3087.41	8-Nov-96	3044.46	7-Feb-97	3456.92
3-Jan-96	3439.07	20-Mar-96	3075.67	7-Jun-96	3061.74	22-Aug-96	3064.88	19-Nov-96	3037.95	11-Feb-97	3466.33
4-Jan-96	3434.77	21-Mar-96	3075.61	10-Jun-96	3065.26	23-Aug-96	3069.29	20-Nov-96	2997.44	12-Feb-97	3472.03
5-Jan-96	3423.57	22-Mar-96	3098.37	11-Jun-96	3068.69	26-Aug-96	3053.00	21-Nov-96	3002.64	13-Feb-97	3499.37
8-Jan-96	3419.28	25-Mar-96	3075.24	12-Jun-96	3087.41	27-Aug-96	3064.03	22-Nov-96	2998.96	14-Feb-97	3492.24
9-Jan-96	3422.39	26-Mar-96	3056.45	13-Jun-96	3088.67	28-Aug-96	3076.27	25-Nov-96	3006.98	17-Feb-97	3510.07
10-Jan-96	3417.92	27-Mar-96	3055.69	14-Jun-96	3100.51	29-Aug-96	3065.41	26-Nov-96	3012.67	18-Feb-97	3529.21
11-Jan-96	3431.10	28-Mar-96	3053.16	17-Jun-96	3081.81	30-Aug-96	3073.88	27-Nov-96	3024.40	19-Feb-97	3516.57
12-Jan-96	3437.29	29-Mar-96	3041.79	18-Jun-96	3088.04	2-Sep-96	3089.85	28-Nov-96	3032.62	20-Feb-97	3522.82
15-Jan-96	3434.17	1-Apr-96	3025.46	19-Jun-96	3110.14	3-Sep-96	3091.59	29-Nov-96	3042.06	21-Feb-97	3536.17
16-Jan-96	3430.65	2-Apr-96	3007.03	20-Jun-96	3106.16	4-Sep-96	3072.47	2-Dec-96	3042.10	24-Feb-97	3477.07
17-Jan-96	3420.96	3-Apr-96	3011.05	21-Jun-96	3115.21	5-Sep-96	3073.44	3-Dec-96	3052.68	25-Feb-97	3450.84
18-Jan-96	3432.41	4-Apr-96	3007.39	24-Jun-96	3115.31	6-Sep-96	3060.88	4-Dec-96	3056.85	26-Feb-97	3473.45
19-Jan-96	3428.06	9-Apr-96	3001.13	25-Jun-96	3139.00	9-Sep-96	3054.40	5-Dec-96	3052.69	27-Feb-97	3514.48
22-Jan-96	3422.49	10-Apr-96	2979.24	26-Jun-96	3136.09	10-Sep-96	3064.21	6-Dec-96	3056.40	28-Feb-97	3473.99
23-Jan-96	3416.87	11-Apr-96	2980.23	27-Jun-96	3142.44	11-Sep-96	3074.83	9-Dec-96	3063.90	3-Mar-97	3476.45
24-Jan-96	3420.72	12-Apr-96	2963.07	28-Jun-96	3144.33	12-Sep-96	3066.97	10-Dec-96	3074.03	4-Mar-97	3469.38
25-Jan-96	3428.40	15-Apr-96	2918.98	1-Jul-96	3148.15	13-Sep-96	3049.84	11-Dec-96	3073.35	5-Mar-97	3465.78
26-Jan-96	3434.52	16-Apr-96	2897.75	2-Jul-96	3148.15	16-Sep-96	3048.61	13-Dec-96	3055.12	6-Mar-97	3472.59
29-Jan-96	3411.48	17-Apr-96	2897.43	3-Jul-96	3146.35	17-Sep-96	3041.62	16-Dec-96	3071.04	7-Mar-97	3461.21

10-Mar-97	3447.30	29-May-97	3470.53	14-Aug-97	3429.64	31-Oct-97	3314.85	27-Feb-98	3362.23	19-May-98	2984.14
11-Mar-97	3433.86	30-May-97	3460.55	15-Aug-97	3425.22	3-Nov-97	3290.20	2-Mar-98	3343.52	20-May-98	2973.17
12-Mar-97	3402.21	3-Jun-97	3474.93	18-Aug-97	3420.02	4-Nov-97	3308.34	3-Mar-98	3353.26	21-May-98	2988.06
13-Mar-97	3392.25	4-Jun-97	3439.15	19-Aug-97	3419.36	5-Nov-97	3290.64	4-Mar-98	3335.81	22-May-98	3009.69
17-Mar-97	3381.21	5-Jun-97	3449.62	20-Aug-97	3403.92	6-Nov-97	3278.10	5-Mar-98	3344.91	25-May-98	3009.30
18-Mar-97	3373.72	6-Jun-97	3445.50	21-Aug-97	3403.92	7-Nov-97	3275.19	6-Mar-98	3329.74	26-May-98	3018.07
19-Mar-97	3392.10	9-Jun-97	3446.74	22-Aug-97	3411.90	10-Nov-97	3256.00	9-Mar-98	3340.27	27-May-98	2969.78
20-Mar-97	3388.79	10-Jun-97	3459.39	25-Aug-97	3401.28	11-Nov-97	3215.92	10-Mar-98	3335.93	28-May-98	3007.20
21-Mar-97	3380.42	11-Jun-97	3439.08	26-Aug-97	3426.08	12-Nov-97	3218.80	11-Mar-98	3325.94	29-May-98	3016.44
24-Mar-97	3377.67	12-Jun-97	3391.24	27-Aug-97	3400.80	13-Nov-97	3210.78	12-Mar-98	3254.27	2-Jun-98	3063.11
25-Mar-97	3373.57	13-Jun-97	3417.11	28-Aug-97	3394.88	14-Nov-97	3208.79	13-Mar-98	3277.59	3-Jun-98	2968.83
26-Mar-97	3374.22	16-Jun-97	3427.83	29-Aug-97	3403.22	17-Nov-97	3185.83	16-Mar-98	3311.48	4-Jun-98	3000.06
27-Mar-97	3354.72	17-Jun-97	3447.04	1-Sep-97	3398.06	18-Nov-97	3189.23	17-Mar-98	3279.40	5-Jun-98	2999.21
1-Apr-97	3311.75	18-Jun-97	3474.38	2-Sep-97	3388.11	19-Nov-97	3159.32	18-Mar-98	3275.64	8-Jun-98	3002.63
2-Apr-97	3310.92	19-Jun-97	3468.10	3-Sep-97	3388.36	20-Nov-97	3151.58	19-Mar-98	3271.35	9-Jun-98	2997.57
3-Apr-97	3327.35	20-Jun-97	3462.42	4-Sep-97	3409.42	21-Nov-97	3088.93	20-Mar-98	3289.38	10-Jun-98	2991.62
4-Apr-97	3345.14	23-Jun-97	3461.59	5-Sep-97	3420.46	24-Nov-97	3091.67	23-Mar-98	3257.00	11-Jun-98	2992.41
7-Apr-97	3350.86	24-Jun-97	3490.82	8-Sep-97	3412.35	25-Nov-97	3086.69	24-Mar-98	3252.98	12-Jun-98	2990.02
8-Apr-97	3347.45	25-Jun-97	3512.99	9-Sep-97	3449.19	26-Nov-97	3029.00	25-Mar-98	3236.59	15-Jun-98	2994.81
9-Apr-97	3349.62	26-Jun-97	3512.99	10-Sep-97	3449.19	27-Nov-97	3044.73	26-Mar-98	3222.27	16-Jun-98	2984.43
10-Apr-97	3350.72	27-Jun-97	3527.73	11-Sep-97	3469.82	28-Nov-97	3046.50	27-Mar-98	3224.64	17-Jun-98	2969.57
11-Apr-97	3298.95	30-Jun-97	3530.43	12-Sep-97	3495.85	1-Dec-97	3046.54	30-Mar-98	3202.97	18-Jun-98	2979.78
14-Apr-97	3286.69	1-Jul-97	3544.10	15-Sep-97	3503.53	2-Dec-97	3041.46	31-Mar-98	3213.30	19-Jun-98	2960.34
15-Apr-97	3296.68	2-Jul-97	3534.42	16-Sep-97	3500.10	3-Dec-97	3049.11	1-Apr-98	3191.99	22-Jun-98	2945.64
16-Apr-97	3280.31	3-Jul-97	3519.28	17-Sep-97	3482.10	4-Dec-97	3045.50	2-Apr-98	3190.67	23-Jun-98	2954.19
17-Apr-97	3289.10	4-Jul-97	3508.68	18-Sep-97	3473.54	5-Dec-97	3068.72	3-Apr-98	3185.61	24-Jun-98	2941.29
18-Apr-97	3265.32	7-Jul-97	3521.14	19-Sep-97	3474.36	8-Dec-97	3077.50	6-Apr-98	3115.05	25-Jun-98	2900.78
21-Apr-97	3253.36	8-Jul-97	3527.92	22-Sep-97	3463.40	9-Dec-97	3078.97	7-Apr-98	3087.82	26-Jun-98	2885.61
22-Apr-97	3274.15	9-Jul-97	3505.72	23-Sep-97	3461.72	10-Dec-97	3077.97	8-Apr-98	3072.30	29-Jun-98	2900.27
23-Apr-97	3279.88	10-Jul-97	3506.43	24-Sep-97	3456.52	11-Dec-97	3063.05	9-Apr-98	3057.19	30-Jun-98	2907.55
24-Apr-97	3298.87	11-Jul-97	3502.76	25-Sep-97	3447.08	15-Dec-97	3073.97	14-Apr-98	3052.21	1-Jul-98	2890.66
25-Apr-97	3294.61	14-Jul-97	3496.74	26-Sep-97	3435.12	16-Dec-97	3066.67	15-Apr-98	3056.78	2-Jul-98	2890.22
28-Apr-97	3312.57	15-Jul-97	3464.69	29-Sep-97	3411.31	17-Dec-97	3069.46	16-Apr-98	3041.76	3-Jul-98	2926.07
29-Apr-97	3331.73	16-Jul-97	3450.59	30-Sep-97	3447.41	18-Dec-97	3078.42	17-Apr-98	3038.38	6-Jul-98	2918.98
30-Apr-97	3288.84	17-Jul-97	3448.92	1-Oct-97	3420.56	19-Dec-97	3088.69	20-Apr-98	3033.85	7-Jul-98	2907.48
2-May-97	3303.89	18-Jul-97	3466.54	2-Oct-97	3425.05	22-Dec-97	3110.85	21-Apr-98	3038.81	8-Jul-98	2895.32
5-May-97	3307.67	21-Jul-97	3471.21	3-Oct-97	3416.61	23-Dec-97	3113.12	22-Apr-98	3046.97	9-Jul-98	2902.59
6-May-97	3305.01	22-Jul-97	3457.88	6-Oct-97	3403.84	24-Dec-97	3117.47	23-Apr-98	3036.90	10-Jul-98	2900.08
7-May-97	3332.94	23-Jul-97	3458.38	7-Oct-97	3415.60	2-Jan-98	3118.78	24-Apr-98	3034.65	13-Jul-98	2872.65
8-May-97	3338.80	24-Jul-97	3466.18	8-Oct-97	3411.79	5-Jan-98	3128.01	27-Apr-98	3022.68	14-Jul-98	2857.56
9-May-97	3379.54	25-Jul-97	3455.58	9-Oct-97	3425.80	6-Jan-98	3148.45	28-Apr-98	3016.40	15-Jul-98	2856.08
12-May-97	3363.39	28-Jul-97	3447.90	13-Oct-97	3396.15	7-Jan-98	3188.54	29-Apr-98	3012.29	16-Jul-98	2849.57
13-May-97	3379.31	29-Jul-97	3443.61	14-Oct-97	3381.09	8-Jan-98	3221.56	30-Apr-98	3015.01	17-Jul-98	2854.34
14-May-97	3374.15	30-Jul-97	3457.92	15-Oct-97	3358.44	9-Jan-98	3273.16	4-May-98	3005.69	20-Jul-98	2846.04
15-May-97	3366.68	31-Jul-97	3466.92	16-Oct-97	3314.74	12-Jan-98	3301.67	5-May-98	2991.00	21-Jul-98	2831.91
16-May-97	3380.57	1-Aug-97	3466.92	17-Oct-97	3321.49	13-Jan-98	3307.07	6-May-98	2974.30	22-Jul-98	2847.78
19-May-97	3374.30	4-Aug-97	3428.22	21-Oct-97	3322.70	14-Jan-98	3353.26	7-May-98	2971.40	23-Jul-98	2846.06
20-May-97	3386.83	5-Aug-97	3408.75	22-Oct-97	3312.58	15-Jan-98	3344.21	8-May-98	2967.23	24-Jul-98	2829.80
21-May-97	3389.41	6-Aug-97	3426.65	23-Oct-97	3309.45	16-Jan-98	3335.18	11-May-98	2957.03	27-Jul-98	2835.79
22-May-97	3401.92	7-Aug-97	3421.16	24-Oct-97	3298.63	19-Jan-98	3341.56	12-May-98	2973.12	28-Jul-98	2844.17
23-May-97	3401.12	8-Aug-97	3423.87	27-Oct-97	3300.81	20-Jan-98	3338.09	13-May-98	2984.11	29-Jul-98	2840.43
26-May-97	3418.90	11-Aug-97	3406.57	28-Oct-97	3284.18	26-Jan-98	3338.49	14-May-98	2984.45	30-Jul-98	2853.07
27-May-97	3468.01	12-Aug-97	3395.34	29-Oct-97	3317.53	27-Jan-98	3377.34	15-May-98	2971.55	31-Jul-98	2868.22
28-May-97	3479.28	13-Aug-97	3434.55	30-Oct-97	3302.13	26-Feb-98	3369.65	18-May-98	2976.12	3-Aug-98	2852.01

4-Aug-98	2868.43	11-Nov-98	2636.32	29-Jan-99	2983.48	19-Apr-99	2794.50	5-Jul-99	2794.19	24-Sep-99	2397.50
5-Aug-98	2863.39	12-Nov-98	2617.95	1-Feb-99	2966.02	20-Apr-99	2787.49	6-Jul-99	2793.38	27-Sep-99	2404.78
6-Aug-98	2875.37	13-Nov-98	2568.86	2-Feb-99	2949.36	21-Apr-99	2793.28	7-Jul-99	2793.18	28-Sep-99	2414.28
10-Aug-98	2866.78	16-Nov-98	2541.58	3-Feb-99	2946.80	22-Apr-99	2782.22	8-Jul-99	2799.34	29-Sep-99	2418.36
11-Aug-98	2876.10	17-Nov-98	2554.57	4-Feb-99	2947.44	23-Apr-99	2778.47	9-Jul-99	2776.71	30-Sep-99	2428.09
12-Aug-98	2891.81	18-Nov-98	2539.84	5-Feb-99	2967.36	26-Apr-99	2777.27	12-Jul-99	2777.89	1-Oct-99	2423.64
13-Aug-98	2925.49	19-Nov-98	2520.11	8-Feb-99	2949.09	27-Apr-99	2777.80	13-Jul-99	2782.49	4-Oct-99	2418.96
14-Aug-98	2902.36	20-Nov-98	2533.84	9-Feb-99	2942.68	28-Apr-99	2758.88	14-Jul-99	2776.35	5-Oct-99	2414.88
17-Aug-98	2888.61	23-Nov-98	2510.77	10-Feb-99	2942.78	29-Apr-99	2753.67	15-Jul-99	2767.77	6-Oct-99	2354.45
18-Aug-98	2889.41	24-Nov-98	2558.54	11-Feb-99	2939.49	30-Apr-99	2767.89	16-Jul-99	2774.49	7-Oct-99	2352.22
19-Aug-98	2887.88	25-Nov-98	2587.50	12-Feb-99	2932.33	3-May-99	2763.26	19-Jul-99	2774.30	8-Oct-99	2370.57
20-Aug-98	2897.98	26-Nov-98	2575.67	15-Feb-99	2949.27	4-May-99	2767.33	20-Jul-99	2772.76	12-Oct-99	2347.43
21-Aug-98	2895.61	27-Nov-98	2580.11	16-Feb-99	2949.91	5-May-99	2775.60	21-Jul-99	2769.97	13-Oct-99	2350.96
24-Aug-98	2866.90	30-Nov-98	2583.73	17-Feb-99	2973.81	6-May-99	2768.16	22-Jul-99	2756.67	14-Oct-99	2357.92
25-Aug-98	2869.97	1-Dec-98	2582.57	18-Feb-99	2977.60	7-May-99	2759.11	23-Jul-99	2758.98	15-Oct-99	2370.10
26-Aug-98	2873.27	2-Dec-98	2567.27	19-Feb-99	2930.56	10-May-99	2754.13	26-Jul-99	2771.18	18-Oct-99	2374.14
27-Aug-98	2869.35	3-Dec-98	2588.11	22-Feb-99	2940.94	11-May-99	2740.32	27-Jul-99	2758.36	19-Oct-99	2367.01
28-Aug-98	2866.98	4-Dec-98	2595.36	23-Feb-99	2970.13	12-May-99	2738.26	28-Jul-99	2772.57	21-Oct-99	2358.89
31-Aug-98	2862.66	7-Dec-98	2610.24	24-Feb-99	2970.81	13-May-99	2742.96	29-Jul-99	2762.20	22-Oct-99	2352.09
1-Sep-98	2855.50	8-Dec-98	2621.38	25-Feb-99	2944.32	14-May-99	2750.54	30-Jul-99	2744.55	25-Oct-99	2346.34
2-Sep-98	2840.16	9-Dec-98	2624.48	26-Feb-99	2988.88	17-May-99	2752.66	2-Aug-99	2754.45	26-Oct-99	2339.11
3-Sep-98	2834.17	10-Dec-98	2649.19	1-Mar-99	2986.81	18-May-99	2756.01	3-Aug-99	2754.41	27-Oct-99	2324.74
4-Sep-98	2848.89	11-Dec-98	2660.34	2-Mar-99	2975.87	19-May-99	2758.44	4-Aug-99	2757.10	28-Oct-99	2322.43
7-Sep-98	2735.19	14-Dec-98	2664.84	3-Mar-99	2974.51	20-May-99	2753.92	5-Aug-99	2762.93	29-Oct-99	2309.33
8-Sep-98	2736.78	15-Dec-98	2677.33	4-Mar-99	2974.85	21-May-99	2745.42	6-Aug-99	2750.87	1-Nov-99	2312.13
9-Sep-98	2756.58	16-Dec-98	2690.86	5-Mar-99	2963.83	24-May-99	2743.84	9-Aug-99	2746.40	2-Nov-99	2294.90
1-Oct-98	2779.90	17-Dec-98	2732.30	8-Mar-99	2964.10	25-May-99	2752.50	10-Aug-99	2753.88	3-Nov-99	2286.10
2-Oct-98	2782.41	18-Dec-98	2762.62	9-Mar-99	2909.30	26-May-99	2749.37	18-Aug-99	2675.59	4-Nov-99	2287.56
5-Oct-98	2774.34	21-Dec-98	2789.34	10-Mar-99	2915.28	27-May-99	2765.74	19-Aug-99	2597.29	5-Nov-99	2283.04
6-Oct-98	2755.59	22-Dec-98	2825.33	11-Mar-99	2891.81	28-May-99	2762.85	20-Aug-99	2588.75	8-Nov-99	2274.94
7-Oct-98	2768.51	23-Dec-98	2859.45	12-Mar-99	2891.47	31-May-99	2760.05	23-Aug-99	2593.28	9-Nov-99	2285.52
8-Oct-98	2766.08	24-Dec-98	2894.19	15-Mar-99	2872.80	2-Jun-99	2724.97	24-Aug-99	2581.97	10-Nov-99	2281.96
9-Oct-98	2761.73	28-Dec-98	2922.54	16-Mar-99	2862.09	3-Jun-99	2748.16	25-Aug-99	2575.30	11-Nov-99	2280.01
12-Oct-98	2765.16	29-Dec-98	2954.66	17-Mar-99	2863.21	4-Jun-99	2778.41	26-Aug-99	2569.51	12-Nov-99	2283.79
13-Oct-98	2765.75	30-Dec-98	2953.64	18-Mar-99	2847.06	7-Jun-99	2784.95	27-Aug-99	2561.27	15-Nov-99	2276.07
14-Oct-98	2781.47	31-Dec-98	2962.06	19-Mar-99	2834.99	8-Jun-99	2802.09	30-Aug-99	2557.29	16-Nov-99	2283.52
15-Oct-98	2764.27	4-Jan-99	2965.85	22-Mar-99	2839.19	9-Jun-99	2795.43	31-Aug-99	2493.50	17-Nov-99	2282.46
16-Oct-98	2776.88	5-Jan-99	3003.83	23-Mar-99	2836.04	10-Jun-99	2780.62	1-Sep-99	2490.94	18-Nov-99	2288.01
19-Oct-98	2763.96	6-Jan-99	3061.49	24-Mar-99	2840.06	11-Jun-99	2771.65	2-Sep-99	2479.27	19-Nov-99	2296.73
21-Oct-98	2792.33	7-Jan-99	3080.74	25-Mar-99	2859.01	14-Jun-99	2780.22	3-Sep-99	2477.33	22-Nov-99	2290.02
22-Oct-98	2790.03	8-Jan-99	3119.89	26-Mar-99	2853.24	15-Jun-99	2777.07	6-Sep-99	2493.05	23-Nov-99	2299.95
23-Oct-98	2766.59	11-Jan-99	3123.87	29-Mar-99	2848.79	16-Jun-99	2783.96	7-Sep-99	2499.13	24-Nov-99	2314.21
26-Oct-98	2771.80	12-Jan-99	3126.58	30-Mar-99	2814.26	17-Jun-99	2768.35	8-Sep-99	2501.36	25-Nov-99	2289.41
27-Oct-98	2737.89	13-Jan-99	3121.01	31-Mar-99	2815.29	18-Jun-99	2773.97	9-Sep-99	2466.88	26-Nov-99	2293.08
28-Oct-98	2739.69	14-Jan-99	3087.89	1-Apr-99	2806.95	21-Jun-99	2751.83	10-Sep-99	2436.90	29-Nov-99	2296.66
29-Oct-98	2734.40	15-Jan-99	3058.99	6-Apr-99	2809.40	22-Jun-99	2753.37	13-Sep-99	2434.24	30-Nov-99	2294.12
30-Oct-98	2733.68	18-Jan-99	3037.82	7-Apr-99	2811.52	23-Jun-99	2761.15	14-Sep-99	2415.76	1-Dec-99	2296.74
2-Nov-98	2739.78	19-Jan-99	3028.34	8-Apr-99	2812.04	24-Jun-99	2756.85	15-Sep-99	2403.18	2-Dec-99	2294.41
3-Nov-98	2731.04	21-Jan-99	3030.51	9-Apr-99	2806.23	25-Jun-99	2760.39	16-Sep-99	2405.00	3-Dec-99	2297.22
4-Nov-98	2713.63	22-Jan-99	3014.37	12-Apr-99	2813.47	28-Jun-99	2766.02	17-Sep-99	2413.38	6-Dec-99	2300.14
5-Nov-98	2708.91	25-Jan-99	3000.63	13-Apr-99	2802.11	29-Jun-99	2761.70	20-Sep-99	2403.39	7-Dec-99	2301.88
6-Nov-98	2642.69	26-Jan-99	2998.78	14-Apr-99	2785.70	30-Jun-99	2756.43	21-Sep-99	2392.23	8-Dec-99	2298.60
9-Nov-98	2639.17	27-Jan-99	2991.32	15-Apr-99	2793.95	1-Jul-99	2757.08	22-Sep-99	2399.49	9-Dec-99	2297.94
10-Nov-98	2601.20	28-Jan-99	2988.00	16-Apr-99	2786.45	2-Jul-99	2765.57	23-Sep-99	2408.55	10-Dec-99	2298.08

14-Dec-99	2298.38	3-Mar-00	2248.79	23-May-00	2095.58	8-Aug-00	1962.35	25-Oct-00	2033.21	15-Jan-01	1886.13
15-Dec-99	2294.56	6-Mar-00	2255.48	24-May-00	2100.98	9-Aug-00	1971.99	26-Oct-00	2038.27	16-Jan-01	1888.77
16-Dec-99	2288.14	7-Mar-00	2263.92	25-May-00	2091.31	10-Aug-00	1953.71	27-Oct-00	2035.14	17-Jan-01	1891.92
17-Dec-99	2296.62	8-Mar-00	2248.95	26-May-00	2075.08	11-Aug-00	1964.78	30-Oct-00	2041.48	18-Jan-01	1889.78
20-Dec-99	2294.71	9-Mar-00	2234.62	29-May-00	2058.64	14-Aug-00	1970.16	31-Oct-00	2043.47	19-Jan-01	1879.71
21-Dec-99	2294.93	10-Mar-00	2220.54	30-May-00	2057.75	15-Aug-00	1961.22	1-Nov-00	1944.79	22-Jan-01	1885.01
22-Dec-99	2291.53	13-Mar-00	2214.22	31-May-00	2052.90	16-Aug-00	1961.11	2-Nov-00	1937.50	23-Jan-01	1891.95
23-Dec-99	2291.96	14-Mar-00	2218.35	2-Jun-00	2048.38	17-Aug-00	1964.29	3-Nov-00	1937.56	24-Jan-01	1888.20
24-Dec-99	2295.36	15-Mar-00	2181.01	5-Jun-00	2042.59	18-Aug-00	1971.45	6-Nov-00	1934.68	25-Jan-01	1888.42
28-Dec-99	2293.93	16-Mar-00	2183.61	6-Jun-00	2047.98	21-Aug-00	1960.00	7-Nov-00	1920.21	26-Jan-01	1892.66
29-Dec-99	2299.15	17-Mar-00	2181.96	7-Jun-00	2049.42	22-Aug-00	1963.47	8-Nov-00	1920.05	29-Jan-01	1887.85
30-Dec-99	2303.18	20-Mar-00	2180.51	8-Jun-00	2050.21	23-Aug-00	1977.30	9-Nov-00	1919.45	30-Jan-01	1893.21
4-Jan-00	2300.92	21-Mar-00	2207.90	9-Jun-00	2055.51	24-Aug-00	1966.47	10-Nov-00	1913.95	31-Jan-01	1897.46
5-Jan-00	2301.09	22-Mar-00	2210.38	12-Jun-00	2044.44	25-Aug-00	1962.61	13-Nov-00	1912.02	1-Feb-01	1900.73
6-Jan-00	2309.82	23-Mar-00	2211.56	13-Jun-00	2035.79	28-Aug-00	1963.78	14-Nov-00	1917.56	2-Feb-01	1902.52
7-Jan-00	2312.41	24-Mar-00	2202.87	14-Jun-00	2013.66	29-Aug-00	1957.19	15-Nov-00	1910.53	5-Feb-01	1903.75
11-Jan-00	2293.54	27-Mar-00	2194.18	15-Jun-00	1990.30	30-Aug-00	1962.48	16-Nov-00	1916.69	6-Feb-01	1915.60
12-Jan-00	2302.04	28-Mar-00	2218.09	16-Jun-00	1992.69	31-Aug-00	1958.96	17-Nov-00	1915.96	7-Feb-01	1907.52
13-Jan-00	2308.55	29-Mar-00	2209.76	19-Jun-00	1994.33	1-Sep-00	1967.18	20-Nov-00	1910.82	8-Feb-01	1907.16
14-Jan-00	2301.92	30-Mar-00	2220.78	20-Jun-00	2001.88	4-Sep-00	1968.99	21-Nov-00	1911.96	9-Feb-01	1916.84
17-Jan-00	2300.29	31-Mar-00	2233.18	21-Jun-00	1992.82	5-Sep-00	1960.42	22-Nov-00	1923.77	12-Feb-01	1918.17
18-Jan-00	2298.94	3-Apr-00	2230.39	22-Jun-00	2002.27	6-Sep-00	1964.24	23-Nov-00	1918.79	13-Feb-01	1904.78
19-Jan-00	2298.81	4-Apr-00	2244.62	23-Jun-00	2002.43	7-Sep-00	1979.09	24-Nov-00	1934.28	14-Feb-01	1914.29
20-Jan-00	2291.18	5-Apr-00	2240.55	26-Jun-00	1999.07	8-Sep-00	1976.71	27-Nov-00	1911.50	15-Feb-01	1921.03
21-Jan-00	2290.28	6-Apr-00	2225.11	27-Jun-00	1989.40	11-Sep-00	1977.40	28-Nov-00	1919.54	16-Feb-01	1916.79
24-Jan-00	2288.47	7-Apr-00	2213.57	28-Jun-00	1997.54	12-Sep-00	1977.90	29-Nov-00	1922.44	19-Feb-01	1905.62
25-Jan-00	2306.61	10-Apr-00	2204.09	29-Jun-00	1999.30	13-Sep-00	1993.52	30-Nov-00	1929.65	20-Feb-01	1909.27
26-Jan-00	2313.75	11-Apr-00	2195.85	30-Jun-00	2003.10	14-Sep-00	1967.96	1-Dec-00	1927.91	21-Feb-01	1908.13
27-Jan-00	2308.23	12-Apr-00	2206.20	3-Jul-00	1993.17	15-Sep-00	1965.51	4-Dec-00	1928.52	22-Feb-01	1921.02
28-Jan-00	2308.43	13-Apr-00	2192.31	4-Jul-00	1996.65	18-Sep-00	1981.28	5-Dec-00	1925.62	23-Feb-01	1919.87
31-Jan-00	2301.07	14-Apr-00	2195.50	5-Jul-00	2000.18	19-Sep-00	1974.96	6-Dec-00	1914.88	26-Feb-01	1931.16
1-Feb-00	2279.50	17-Apr-00	2190.24	6-Jul-00	1995.15	20-Sep-00	1980.79	7-Dec-00	1920.11	27-Feb-01	1927.67
2-Feb-00	2280.13	18-Apr-00	2193.07	7-Jul-00	2002.43	21-Sep-00	1978.88	8-Dec-00	1912.23	28-Feb-01	1932.85
3-Feb-00	2287.57	19-Apr-00	2206.23	10-Jul-00	1994.48	22-Sep-00	1972.88	11-Dec-00	1900.94	1-Mar-01	1936.11
4-Feb-00	2277.19	20-Apr-00	2197.00	11-Jul-00	1989.40	25-Sep-00	1985.45	13-Dec-00	1882.58	2-Mar-01	1933.88
7-Feb-00	2273.15	25-Apr-00	2190.23	12-Jul-00	1984.95	26-Sep-00	1978.04	14-Dec-00	1861.98	5-Mar-01	1925.19
8-Feb-00	2270.45	26-Apr-00	2181.65	13-Jul-00	1998.69	27-Sep-00	1995.33	15-Dec-00	1853.96	6-Mar-01	1917.44
9-Feb-00	2261.13	27-Apr-00	2175.89	14-Jul-00	1993.43	28-Sep-00	2004.02	18-Dec-00	1841.21	7-Mar-01	1907.50
10-Feb-00	2265.57	28-Apr-00	2162.20	17-Jul-00	1997.92	29-Sep-00	2001.32	19-Dec-00	1832.50	8-Mar-01	1889.92
11-Feb-00	2265.41	2-May-00	2157.85	18-Jul-00	1995.60	2-Oct-00	2001.33	20-Dec-00	1860.75	9-Mar-01	1889.09
14-Feb-00	2248.77	3-May-00	2164.78	19-Jul-00	2011.69	3-Oct-00	2001.58	21-Dec-00	1877.37	12-Mar-01	1883.50
15-Feb-00	2244.39	4-May-00	2161.01	20-Jul-00	2001.16	4-Oct-00	2003.13	22-Dec-00	1872.76	13-Mar-01	1871.21
16-Feb-00	2250.45	5-May-00	2164.44	21-Jul-00	1997.18	5-Oct-00	2000.87	27-Dec-00	1902.54	14-Mar-01	1864.73
17-Feb-00	2246.16	8-May-00	2180.13	24-Jul-00	1987.42	6-Oct-00	1997.73	28-Dec-00	1902.54	15-Mar-01	1867.43
18-Feb-00	2247.09	9-May-00	2163.10	25-Jul-00	1979.77	9-Oct-00	2021.90	29-Dec-00	1913.35	16-Mar-01	1864.30
21-Feb-00	2253.12	10-May-00	2144.55	26-Jul-00	1963.13	11-Oct-00	2037.51	2-Jan-01	1905.86	19-Mar-01	1864.98
22-Feb-00	2247.52	11-May-00	2144.33	27-Jul-00	1963.95	12-Oct-00	2045.61	3-Jan-01	1919.18	20-Mar-01	1859.15
23-Feb-00	2275.17	12-May-00	2106.59	28-Jul-00	1959.17	13-Oct-00	2047.91	4-Jan-01	1917.85	21-Mar-01	1857.94
24-Feb-00	2269.10	15-May-00	2122.36	31-Jul-00	1966.52	16-Oct-00	2010.53	5-Jan-01	1910.27	22-Mar-01	1853.17
25-Feb-00	2282.44	16-May-00	2106.05	1-Aug-00	1966.22	17-Oct-00	2037.94	8-Jan-01	1902.33	23-Mar-01	1837.37
28-Feb-00	2276.54	17-May-00	2104.62	2-Aug-00	1954.39	18-Oct-00	2054.56	9-Jan-01	1898.07	26-Mar-01	1831.05
29-Feb-00	2294.96	18-May-00	2109.66	3-Aug-00	1962.75	19-Oct-00	2052.45	10-Jan-01	1886.73	27-Mar-01	1827.83
1-Mar-00	2277.89	19-May-00	2099.91	4-Aug-00	1961.58	23-Oct-00	2043.32	11-Jan-01	1886.67	28-Mar-01	1829.45
2-Mar-00	2254.84	22-May-00	2088.67	7-Aug-00	1958.12	24-Oct-00	2037.55	12-Jan-01	1887.58	29-Mar-01	1830.23

30-Mar-01	1830.53	20-Jun-01	1614.77	4-Sep-01	1502.07	20-Nov-01	1461.98	8-Feb-02	1336.81	29-Apr-02	1129.29
2-Apr-01	1823.77	21-Jun-01	1616.20	5-Sep-01	1499.49	21-Nov-01	1461.52	11-Feb-02	1329.75	30-Apr-02	1129.33
3-Apr-01	1814.92	22-Jun-01	1620.42	6-Sep-01	1488.21	22-Nov-01	1450.17	12-Feb-02	1329.61	2-May-02	1124.04
4-Apr-01	1814.16	25-Jun-01	1625.88	7-Sep-01	1478.94	23-Nov-01	1451.59	13-Feb-02	1329.42	3-May-02	1124.54
5-Apr-01	1815.67	26-Jun-01	1628.66	10-Sep-01	1468.42	26-Nov-01	1452.62	14-Feb-02	1327.44	6-May-02	1133.90
6-Apr-01	1815.85	27-Jun-01	1637.86	11-Sep-01	1465.24	27-Nov-01	1451.79	15-Feb-02	1332.54	7-May-02	1133.31
9-Apr-01	1812.90	28-Jun-01	1654.24	12-Sep-01	1457.39	28-Nov-01	1452.26	18-Feb-02	1332.80	8-May-02	1131.90
10-Apr-01	1819.00	29-Jun-01	1657.14	13-Sep-01	1449.81	29-Nov-01	1431.08	19-Feb-02	1337.72	9-May-02	1125.65
11-Apr-01	1815.99	2-Jul-01	1651.61	14-Sep-01	1446.25	30-Nov-01	1420.45	20-Feb-02	1335.06	10-May-02	1124.82
12-Apr-01	1814.33	3-Jul-01	1657.13	17-Sep-01	1447.27	3-Dec-01	1420.90	21-Feb-02	1333.59	13-May-02	1124.52
17-Apr-01	1806.18	4-Jul-01	1655.51	18-Sep-01	1435.42	4-Dec-01	1414.74	22-Feb-02	1335.52	14-May-02	1123.98
18-Apr-01	1806.03	5-Jul-01	1643.82	19-Sep-01	1428.30	5-Dec-01	1414.91	25-Feb-02	1332.23	15-May-02	1120.47
19-Apr-01	1807.95	6-Jul-01	1645.75	20-Sep-01	1428.26	6-Dec-01	1417.29	26-Feb-02	1330.39	16-May-02	1119.04
20-Apr-01	1797.10	9-Jul-01	1641.57	21-Sep-01	1428.47	7-Dec-01	1418.86	27-Feb-02	1325.08	17-May-02	1122.64
23-Apr-01	1791.97	10-Jul-01	1638.00	24-Sep-01	1419.84	10-Dec-01	1416.79	28-Feb-02	1313.57	20-May-02	1111.44
24-Apr-01	1791.09	11-Jul-01	1641.56	25-Sep-01	1417.06	11-Dec-01	1408.90	1-Mar-02	1317.78	21-May-02	1109.66
25-Apr-01	1781.58	12-Jul-01	1636.60	26-Sep-01	1427.62	13-Dec-01	1396.94	4-Mar-02	1309.89	22-May-02	1080.64
26-Apr-01	1774.82	13-Jul-01	1631.13	27-Sep-01	1415.69	14-Dec-01	1396.70	5-Mar-02	1311.63	23-May-02	1080.06
27-Apr-01	1762.76	16-Jul-01	1638.03	28-Sep-01	1400.87	17-Dec-01	1396.70	6-Mar-02	1310.14	24-May-02	1064.24
30-Apr-01	1767.89	17-Jul-01	1631.03	1-Oct-01	1403.20	18-Dec-01	1381.02	7-Mar-02	1289.81	27-May-02	1055.41
2-May-01	1758.78	18-Jul-01	1634.01	2-Oct-01	1401.57	19-Dec-01	1380.59	8-Mar-02	1260.90	28-May-02	1057.34
3-May-01	1759.98	19-Jul-01	1624.66	3-Oct-01	1392.14	20-Dec-01	1356.47	11-Mar-02	1282.36	29-May-02	1060.40
4-May-01	1767.60	20-Jul-01	1624.34	4-Oct-01	1384.94	21-Dec-01	1344.26	12-Mar-02	1265.83	30-May-02	1061.77
7-May-01	1758.37	23-Jul-01	1627.88	5-Oct-01	1385.59	24-Dec-01	1344.26	13-Mar-02	1252.32	31-May-02	1071.07
8-May-01	1745.33	24-Jul-01	1627.41	8-Oct-01	1390.17	27-Dec-01	1344.26	14-Mar-02	1243.98	3-Jun-02	1072.52
9-May-01	1727.18	25-Jul-01	1621.68	9-Oct-01	1386.40	28-Dec-01	1355.05	15-Mar-02	1232.87	4-Jun-02	1069.49
10-May-01	1738.03	26-Jul-01	1617.92	11-Oct-01	1413.77	31-Dec-01	1355.51	18-Mar-02	1230.07	5-Jun-02	1068.94
11-May-01	1735.56	27-Jul-01	1618.13	12-Oct-01	1423.80	2-Jan-02	1356.80	19-Mar-02	1220.64	6-Jun-02	1071.52
14-May-01	1719.14	30-Jul-01	1622.85	15-Oct-01	1423.94	3-Jan-02	1360.00	20-Mar-02	1223.50	7-Jun-02	1071.45
15-May-01	1719.15	31-Jul-01	1620.70	16-Oct-01	1445.83	4-Jan-02	1364.62	21-Mar-02	1218.09	10-Jun-02	1072.18
16-May-01	1678.33	1-Aug-01	1607.68	17-Oct-01	1456.26	7-Jan-02	1369.20	22-Mar-02	1214.54	11-Jun-02	1074.73
17-May-01	1668.58	2-Aug-01	1607.55	18-Oct-01	1455.63	8-Jan-02	1374.88	25-Mar-02	1208.23	12-Jun-02	1083.32
18-May-01	1656.55	3-Aug-01	1606.23	19-Oct-01	1460.83	9-Jan-02	1377.71	26-Mar-02	1185.72	13-Jun-02	1083.47
21-May-01	1649.62	6-Aug-01	1606.48	22-Oct-01	1473.79	10-Jan-02	1375.58	27-Mar-02	1187.04	14-Jun-02	1079.20
22-May-01	1655.74	7-Aug-01	1601.59	23-Oct-01	1479.24	11-Jan-02	1382.77	28-Mar-02	1183.10	17-Jun-02	1080.24
23-May-01	1652.72	8-Aug-01	1588.01	24-Oct-01	1487.90	14-Jan-02	1377.53	2-Apr-02	1179.81	18-Jun-02	1079.11
24-May-01	1644.61	9-Aug-01	1582.92	25-Oct-01	1504.86	15-Jan-02	1379.02	3-Apr-02	1180.13	19-Jun-02	1077.96
25-May-01	1634.94	10-Aug-01	1581.45	26-Oct-01	1516.81	16-Jan-02	1379.08	4-Apr-02	1179.26	20-Jun-02	1080.80
28-May-01	1637.44	13-Aug-01	1579.67	29-Oct-01	1507.84	17-Jan-02	1368.32	5-Apr-02	1177.81	21-Jun-02	1075.77
29-May-01	1630.88	14-Aug-01	1567.51	30-Oct-01	1500.06	18-Jan-02	1365.44	8-Apr-02	1170.60	24-Jun-02	1074.73
30-May-01	1629.82	15-Aug-01	1564.04	31-Oct-01	1472.91	21-Jan-02	1364.70	9-Apr-02	1170.20	25-Jun-02	1080.60
31-May-01	1636.47	16-Aug-01	1558.99	1-Nov-01	1478.33	22-Jan-02	1357.89	10-Apr-02	1168.86	26-Jun-02	1079.90
4-Jun-01	1628.60	17-Aug-01	1555.70	2-Nov-01	1478.71	23-Jan-02	1352.89	11-Apr-02	1168.15	27-Jun-02	1080.95
5-Jun-01	1632.03	20-Aug-01	1548.11	5-Nov-01	1475.69	24-Jan-02	1343.51	12-Apr-02	1168.88	28-Jun-02	1086.62
6-Jun-01	1623.70	21-Aug-01	1547.27	6-Nov-01	1478.26	25-Jan-02	1343.82	15-Apr-02	1164.58	1-Jul-02	1089.51
7-Jun-01	1612.61	22-Aug-01	1536.29	7-Nov-01	1480.09	28-Jan-02	1347.91	16-Apr-02	1160.72	2-Jul-02	1090.68
8-Jun-01	1611.36	23-Aug-01	1530.11	8-Nov-01	1465.51	29-Jan-02	1349.60	17-Apr-02	1160.03	3-Jul-02	1090.15
11-Jun-01	1605.64	24-Aug-01	1525.07	9-Nov-01	1466.48	30-Jan-02	1345.45	18-Apr-02	1149.80	4-Jul-02	1087.05
12-Jun-01	1611.83	27-Aug-01	1519.43	12-Nov-01	1461.35	31-Jan-02	1343.41	19-Apr-02	1139.32	5-Jul-02	1079.27
13-Jun-01	1600.95	28-Aug-01	1519.21	13-Nov-01	1463.28	1-Feb-02	1340.31	22-Apr-02	1136.87	8-Jul-02	1075.41
14-Jun-01	1600.60	29-Aug-01	1516.17	14-Nov-01	1466.83	4-Feb-02	1337.21	23-Apr-02	1136.47	9-Jul-02	1089.82
15-Jun-01	1602.71	30-Aug-01	1513.11	15-Nov-01	1468.47	5-Feb-02	1329.85	24-Apr-02	1135.69	10-Jul-02	1088.07
18-Jun-01	1602.64	31-Aug-01	1505.50	16-Nov-01	1470.31	6-Feb-02	1328.15	25-Apr-02	1137.41	11-Jul-02	1091.66
19-Jun-01	1604.94	3-Sep-01	1512.71	19-Nov-01	1465.07	7-Feb-02	1332.87	26-Apr-02	1129.01	12-Jul-02	1094.86

15-Jul-02	1099.50	27-Sep-02	1043.08	18-Dec-02	1270.95	11-Mar-03	1600.76	29-May-03	2049.89	14-Aug-03	2048.42
16-Jul-02	1110.61	30-Sep-02	1043.40	19-Dec-02	1270.67	12-Mar-03	1601.57	30-May-03	2074.67	15-Aug-03	2048.81
17-Jul-02	1110.69	1-Oct-02	1032.29	20-Dec-02	1279.09	13-Mar-03	1601.25	3-Jun-03	2041.60	18-Aug-03	2045.36
18-Jul-02	1112.35	2-Oct-02	1031.10	23-Dec-02	1298.50	14-Mar-03	1542.73	4-Jun-03	2018.84	19-Aug-03	2043.03
19-Jul-02	1111.50	3-Oct-02	1028.07	24-Dec-02	1298.86	17-Mar-03	1559.28	5-Jun-03	2015.22	20-Aug-03	2049.35
22-Jul-02	1111.91	4-Oct-02	1025.61	30-Dec-02	1317.45	18-Mar-03	1560.29	6-Jun-03	2016.87	21-Aug-03	2041.12
23-Jul-02	1114.43	7-Oct-02	1030.23	31-Dec-02	1362.85	19-Mar-03	1566.96	9-Jun-03	2027.48	22-Aug-03	2047.58
24-Jul-02	1111.46	8-Oct-02	1032.92	3-Jan-03	1384.98	20-Mar-03	1565.47	10-Jun-03	2021.82	25-Aug-03	2056.73
25-Jul-02	1104.67	9-Oct-02	1031.69	6-Jan-03	1446.75	21-Mar-03	1564.20	11-Jun-03	2003.38	26-Aug-03	2066.74
26-Jul-02	1103.44	11-Oct-02	1032.75	7-Jan-03	1504.20	24-Mar-03	1605.82	12-Jun-03	2024.05	27-Aug-03	2094.63
29-Jul-02	1103.51	14-Oct-02	1039.82	8-Jan-03	1538.12	25-Mar-03	1614.42	13-Jun-03	2015.34	28-Aug-03	2124.39
30-Jul-02	1096.82	15-Oct-02	1041.76	9-Jan-03	1565.84	26-Mar-03	1607.09	16-Jun-03	2007.51	29-Aug-03	2107.43
31-Jul-02	1097.73	16-Oct-02	1047.53	10-Jan-03	1572.12	27-Mar-03	1600.46	17-Jun-03	1961.03	1-Sep-03	2070.66
1-Aug-02	1086.18	17-Oct-02	1053.14	13-Jan-03	1578.21	28-Mar-03	1598.81	18-Jun-03	1961.37	2-Sep-03	2098.20
2-Aug-02	1080.12	18-Oct-02	1053.78	14-Jan-03	1551.06	31-Mar-03	1608.34	19-Jun-03	1953.15	3-Sep-03	2102.29
5-Aug-02	1079.15	22-Oct-02	1053.51	15-Jan-03	1550.88	1-Apr-03	1618.44	20-Jun-03	1959.60	4-Sep-03	2115.32
6-Aug-02	1080.51	23-Oct-02	1056.80	16-Jan-03	1509.43	2-Apr-03	1617.27	23-Jun-03	1979.18	5-Sep-03	2139.70
7-Aug-02	1079.89	24-Oct-02	1061.07	17-Jan-03	1488.59	3-Apr-03	1620.71	24-Jun-03	1976.48	8-Sep-03	2144.05
8-Aug-02	1074.69	25-Oct-02	1064.86	20-Jan-03	1507.11	4-Apr-03	1617.35	25-Jun-03	1956.79	9-Sep-03	2161.06
9-Aug-02	1070.38	28-Oct-02	1072.34	21-Jan-03	1518.92	7-Apr-03	1623.01	26-Jun-03	1966.38	10-Sep-03	2181.90
12-Aug-02	1067.12	29-Oct-02	1075.66	22-Jan-03	1546.19	8-Apr-03	1624.99	27-Jun-03	1948.73	11-Sep-03	2157.97
13-Aug-02	1062.98	30-Oct-02	1087.50	23-Jan-03	1551.63	9-Apr-03	1626.42	30-Jun-03	1934.96	12-Sep-03	2169.17
14-Aug-02	1062.03	31-Oct-02	1116.36	24-Jan-03	1554.07	10-Apr-03	1635.08	1-Jul-03	1929.44	15-Sep-03	2187.23
15-Aug-02	1065.56	1-Nov-02	1118.44	27-Jan-03	1560.51	11-Apr-03	1653.66	2-Jul-03	1934.46	16-Sep-03	2185.03
16-Aug-02	1066.08	4-Nov-02	1134.49	28-Jan-03	1559.79	14-Apr-03	1656.39	3-Jul-03	1930.77	17-Sep-03	2182.10
19-Aug-02	1065.03	5-Nov-02	1149.46	29-Jan-03	1565.07	15-Apr-03	1680.14	4-Jul-03	1920.52	18-Sep-03	2192.25
20-Aug-02	1062.14	6-Nov-02	1171.12	30-Jan-03	1568.62	16-Apr-03	1692.09	7-Jul-03	1917.10	19-Sep-03	2218.03
21-Aug-02	1059.93	7-Nov-02	1180.15	31-Jan-03	1510.63	17-Apr-03	1705.13	8-Jul-03	1928.51	22-Sep-03	2247.45
22-Aug-02	1054.68	8-Nov-02	1197.86	3-Feb-03	1511.59	22-Apr-03	1727.73	9-Jul-03	1934.15	23-Sep-03	2268.08
23-Aug-02	1047.87	11-Nov-02	1220.79	4-Feb-03	1522.99	23-Apr-03	1751.39	10-Jul-03	1940.57	24-Sep-03	2289.73
26-Aug-02	1047.08	12-Nov-02	1230.73	5-Feb-03	1530.93	24-Apr-03	1763.43	11-Jul-03	1938.22	25-Sep-03	2293.56
27-Aug-02	1044.16	13-Nov-02	1234.60	6-Feb-03	1528.68	25-Apr-03	1766.48	14-Jul-03	1933.66	26-Sep-03	2328.05
28-Aug-02	1043.82	14-Nov-02	1249.25	7-Feb-03	1536.75	28-Apr-03	1787.21	15-Jul-03	1929.42	29-Sep-03	2363.74
29-Aug-02	1036.88	15-Nov-02	1239.36	10-Feb-03	1535.51	29-Apr-03	1808.14	16-Jul-03	1957.04	30-Sep-03	2379.91
30-Aug-02	1043.38	18-Nov-02	1219.38	11-Feb-03	1537.67	30-Apr-03	1846.63	17-Jul-03	1944.44	1-Oct-03	2396.79
2-Sep-02	1047.41	19-Nov-02	1199.45	12-Feb-03	1527.96	2-May-03	1886.36	18-Jul-03	1934.14	2-Oct-03	2387.46
3-Sep-02	1043.27	20-Nov-02	1187.46	13-Feb-03	1519.94	5-May-03	1917.72	21-Jul-03	1939.60	3-Oct-03	2398.22
4-Sep-02	1045.82	21-Nov-02	1175.19	14-Feb-03	1520.16	6-May-03	1980.96	22-Jul-03	1938.14	6-Oct-03	2405.32
5-Sep-02	1042.38	22-Nov-02	1166.01	17-Feb-03	1519.69	7-May-03	2005.74	23-Jul-03	1936.85	7-Oct-03	2413.38
6-Sep-02	1036.74	25-Nov-02	1153.61	18-Feb-03	1518.86	8-May-03	2101.16	24-Jul-03	1948.48	8-Oct-03	2415.35
9-Sep-02	1033.00	26-Nov-02	1149.67	19-Feb-03	1510.95	9-May-03	2187.48	25-Jul-03	1963.21	9-Oct-03	2384.38
10-Sep-02	1026.49	27-Nov-02	1141.62	20-Feb-03	1510.07	12-May-03	2240.29	28-Jul-03	1978.87	13-Oct-03	2392.74
11-Sep-02	1017.27	28-Nov-02	1148.33	21-Feb-03	1507.96	13-May-03	2270.95	29-Jul-03	1981.67	14-Oct-03	2392.38
12-Sep-02	1018.91	29-Nov-02	1161.12	24-Feb-03	1515.94	14-May-03	2243.41	30-Jul-03	1982.71	15-Oct-03	2404.07
13-Sep-02	1008.79	2-Dec-02	1156.59	25-Feb-03	1510.85	15-May-03	2179.16	31-Jul-03	2005.08	16-Oct-03	2416.65
16-Sep-02	1010.69	3-Dec-02	1159.71	26-Feb-03	1534.46	16-May-03	2119.13	1-Aug-03	2000.98	17-Oct-03	2445.39
17-Sep-02	1010.77	4-Dec-02	1162.93	27-Feb-03	1537.42	19-May-03	2057.61	4-Aug-03	1998.46	21-Oct-03	2451.73
18-Sep-02	1004.70	5-Dec-02	1167.18	28-Feb-03	1557.74	20-May-03	2039.73	5-Aug-03	2003.36	22-Oct-03	2451.09
19-Sep-02	1010.17	9-Dec-02	1165.92	3-Mar-03	1540.84	21-May-03	2069.29	6-Aug-03	2009.05	23-Oct-03	2461.94
20-Sep-02	1021.95	10-Dec-02	1178.70	4-Mar-03	1538.27	22-May-03	2093.51	7-Aug-03	2043.09	24-Oct-03	2470.67
23-Sep-02	1021.98	11-Dec-02	1199.87	5-Mar-03	1550.80	23-May-03	2083.21	8-Aug-03	2027.54	27-Oct-03	2469.60
24-Sep-02	1027.79	13-Dec-02	1225.95	6-Mar-03	1546.73	26-May-03	2056.39	11-Aug-03	2019.42	28-Oct-03	2476.16
25-Sep-02	1031.50	16-Dec-02	1242.98	7-Mar-03	1549.68	27-May-03	2040.83	12-Aug-03	2029.14	29-Oct-03	2471.24
26-Sep-02	1034.60	17-Dec-02	1256.53	10-Mar-03	1569.03	28-May-03	2016.08	13-Aug-03	2036.97	30-Oct-03	2454.13

31-Oct-03	2457.21	22-Jan-04	2860.23	7-Apr-04	2576.23	25-Jun-04	2669.34	9-Sep-04	2708.22	29-Nov-04	2910.28
3-Nov-03	2450.45	23-Jan-04	2893.12	8-Apr-04	2581.46	28-Jun-04	2647.27	10-Sep-04	2704.15	30-Nov-04	2918.34
4-Nov-03	2445.15	26-Jan-04	2957.45	13-Apr-04	2595.04	29-Jun-04	2639.95	13-Sep-04	2689.60	1-Dec-04	2948.01
5-Nov-03	2447.94	27-Jan-04	3040.33	14-Apr-04	2668.22	30-Jun-04	2639.75	14-Sep-04	2671.89	2-Dec-04	2967.46
6-Nov-03	2446.45	28-Jan-04	3159.28	15-Apr-04	2693.88	1-Jul-04	2633.88	15-Sep-04	2652.05	3-Dec-04	2954.09
7-Nov-03	2455.39	29-Jan-04	3183.10	16-Apr-04	2727.73	2-Jul-04	2634.67	16-Sep-04	2652.05	6-Dec-04	2978.30
10-Nov-03	2451.87	30-Jan-04	3157.88	19-Apr-04	2734.68	5-Jul-04	2632.14	17-Sep-04	2652.64	7-Dec-04	2983.29
11-Nov-03	2464.32	2-Feb-04	3136.14	20-Apr-04	2742.33	6-Jul-04	2631.63	20-Sep-04	2645.73	8-Dec-04	2984.60
12-Nov-03	2462.53	3-Feb-04	3107.34	21-Apr-04	2758.22	7-Jul-04	2638.97	21-Sep-04	2648.11	9-Dec-04	2986.98
13-Nov-03	2452.54	4-Feb-04	3090.29	22-Apr-04	2755.23	8-Jul-04	2648.90	22-Sep-04	2643.76	10-Dec-04	2999.54
14-Nov-03	2458.21	5-Feb-04	3100.67	23-Apr-04	2747.52	9-Jul-04	2657.75	23-Sep-04	2641.31	14-Dec-04	3017.87
17-Nov-03	2459.85	6-Feb-04	3138.37	26-Apr-04	2735.18	12-Jul-04	2676.62	24-Sep-04	2650.20	15-Dec-04	3027.77
18-Nov-03	2462.30	9-Feb-04	3145.82	27-Apr-04	2725.34	13-Jul-04	2680.08	27-Sep-04	2652.27	16-Dec-04	3006.68
19-Nov-03	2457.96	10-Feb-04	3149.03	28-Apr-04	2720.76	14-Jul-04	2689.32	28-Sep-04	2642.68	17-Dec-04	2979.13
20-Nov-03	2481.74	11-Feb-04	3166.09	29-Apr-04	2704.81	15-Jul-04	2686.14	29-Sep-04	2660.19	20-Dec-04	2962.24
21-Nov-03	2502.97	12-Feb-04	3144.65	30-Apr-04	2707.60	16-Jul-04	2674.56	30-Sep-04	2670.69	21-Dec-04	2944.48
24-Nov-03	2554.89	13-Feb-04	3175.80	3-May-04	2695.24	19-Jul-04	2670.32	1-Oct-04	2648.71	22-Dec-04	2942.06
25-Nov-03	2661.19	16-Feb-04	3177.83	4-May-04	2682.44	20-Jul-04	2655.60	4-Oct-04	2647.39	23-Dec-04	2920.79
27-Nov-03	2731.05	17-Feb-04	3153.42	5-May-04	2665.40	21-Jul-04	2657.41	5-Oct-04	2650.07	24-Dec-04	2923.86
28-Nov-03	2736.98	18-Feb-04	3162.81	6-May-04	2650.67	22-Jul-04	2640.84	6-Oct-04	2664.60	28-Dec-04	2923.81
1-Dec-03	2743.03	19-Feb-04	3131.70	7-May-04	2626.12	23-Jul-04	2614.95	7-Oct-04	2671.33	29-Dec-04	2907.45
2-Dec-03	2756.64	20-Feb-04	3125.57	10-May-04	2629.89	26-Jul-04	2635.06	8-Oct-04	2673.54	30-Dec-04	2928.35
3-Dec-03	2788.83	23-Feb-04	3161.81	11-May-04	2674.23	27-Jul-04	2636.35	12-Oct-04	2683.94	31-Dec-04	2945.58
4-Dec-03	2777.30	24-Feb-04	3157.10	12-May-04	2679.62	28-Jul-04	2658.53	13-Oct-04	2683.91	3-Jan-05	2955.99
5-Dec-03	2733.53	25-Feb-04	3157.64	13-May-04	2666.10	29-Jul-04	2671.30	14-Oct-04	2724.13	4-Jan-05	2980.48
8-Dec-03	2718.08	26-Feb-04	3152.06	14-May-04	2644.80	30-Jul-04	2708.03	15-Oct-04	2745.83	5-Jan-05	2991.32
9-Dec-03	2707.03	27-Feb-04	3175.36	17-May-04	2637.69	2-Aug-04	2697.14	18-Oct-04	2740.16	6-Jan-05	2981.10
10-Dec-03	2673.52	1-Mar-04	3173.90	18-May-04	2638.86	3-Aug-04	2720.09	19-Oct-04	2731.07	7-Jan-05	3007.94
11-Dec-03	2635.03	2-Mar-04	3178.82	19-May-04	2621.22	4-Aug-04	2733.17	21-Oct-04	2764.10	10-Jan-05	3018.55
15-Dec-03	2601.27	3-Mar-04	3102.65	20-May-04	2593.99	5-Aug-04	2749.48	22-Oct-04	2778.29	11-Jan-05	3049.92
16-Dec-03	2619.81	4-Mar-04	3129.18	21-May-04	2567.69	6-Aug-04	2757.28	25-Oct-04	2792.80	12-Jan-05	3065.05
17-Dec-03	2649.90	5-Mar-04	3155.45	24-May-04	2585.98	9-Aug-04	2754.39	26-Oct-04	2804.89	13-Jan-05	3082.52
18-Dec-03	2661.95	8-Mar-04	3183.95	25-May-04	2586.29	10-Aug-04	2746.29	27-Oct-04	2802.37	14-Jan-05	3102.16
19-Dec-03	2674.20	9-Mar-04	3153.47	26-May-04	2607.80	11-Aug-04	2735.62	28-Oct-04	2834.62	17-Jan-05	3092.89
22-Dec-03	2674.99	10-Mar-04	3134.90	27-May-04	2667.73	12-Aug-04	2734.02	29-Oct-04	2829.65	18-Jan-05	3083.38
23-Dec-03	2675.13	11-Mar-04	3089.89	28-May-04	2680.75	13-Aug-04	2713.77	1-Nov-04	2847.64	19-Jan-05	3073.82
24-Dec-03	2705.46	12-Mar-04	3074.07	31-May-04	2689.14	16-Aug-04	2707.53	2-Nov-04	2853.70	20-Jan-05	3085.56
29-Dec-03	2735.24	15-Mar-04	3006.47	2-Jun-04	2689.12	17-Aug-04	2703.17	3-Nov-04	2848.06	21-Jan-05	3078.93
30-Dec-03	2742.30	16-Mar-04	2987.05	3-Jun-04	2681.15	18-Aug-04	2724.16	4-Nov-04	2837.70	24-Jan-05	3091.35
31-Dec-03	2737.59	17-Mar-04	2982.90	4-Jun-04	2662.49	19-Aug-04	2715.45	5-Nov-04	2832.30	25-Jan-05	3091.19
2-Jan-04	2753.33	18-Mar-04	2944.21	7-Jun-04	2647.13	20-Aug-04	2700.15	8-Nov-04	2827.00	26-Jan-05	3092.82
5-Jan-04	2739.46	19-Mar-04	2939.31	8-Jun-04	2653.02	23-Aug-04	2682.03	9-Nov-04	2841.61	27-Jan-05	3098.74
6-Jan-04	2745.73	22-Mar-04	2937.16	9-Jun-04	2649.06	24-Aug-04	2678.45	10-Nov-04	2849.72	28-Jan-05	3092.24
7-Jan-04	2743.87	23-Mar-04	2923.34	10-Jun-04	2648.76	25-Aug-04	2688.51	11-Nov-04	2852.89	31-Jan-05	3094.38
8-Jan-04	2762.47	24-Mar-04	2887.58	11-Jun-04	2639.83	26-Aug-04	2668.85	12-Nov-04	2868.26	1-Feb-05	3128.60
9-Jan-04	2788.98	25-Mar-04	2865.81	14-Jun-04	2648.18	27-Aug-04	2712.65	16-Nov-04	2883.09	2-Feb-05	3132.43
12-Jan-04	2802.82	26-Mar-04	2849.55	15-Jun-04	2688.83	30-Aug-04	2711.53	17-Nov-04	2881.76	3-Feb-05	3137.04
13-Jan-04	2797.77	29-Mar-04	2820.05	16-Jun-04	2693.18	31-Aug-04	2708.86	18-Nov-04	2881.00	4-Feb-05	3167.79
14-Jan-04	2803.74	30-Mar-04	2793.20	17-Jun-04	2686.50	1-Sep-04	2717.51	19-Nov-04	2885.16	7-Feb-05	3181.29
15-Jan-04	2818.29	31-Mar-04	2770.60	18-Jun-04	2686.99	2-Sep-04	2710.78	22-Nov-04	2887.35	8-Feb-05	3194.21
16-Jan-04	2834.60	1-Apr-04	2721.33	21-Jun-04	2693.71	3-Sep-04	2710.73	23-Nov-04	2885.96	9-Feb-05	3184.99
19-Jan-04	2873.43	2-Apr-04	2673.84	22-Jun-04	2682.83	6-Sep-04	2713.44	24-Nov-04	2892.33	10-Feb-05	3198.23
20-Jan-04	2877.93	5-Apr-04	2664.30	23-Jun-04	2676.91	7-Sep-04	2697.70	25-Nov-04	2900.82	11-Feb-05	3198.06
21-Jan-04	2857.59	6-Apr-04	2600.26	24-Jun-04	2667.40	8-Sep-04	2711.72	26-Nov-04	2921.53	14-Feb-05	3211.76

15-Feb-05	3209.01	5-May-05	3253.17	21-Jul-05	3985.44	5-Oct-05	3842.16	29-Dec-05	3969.40	16-Mar-06	3924.75
16-Feb-05	3210.45	6-May-05	3242.89	22-Jul-05	3987.04	6-Oct-05	3840.40	30-Dec-05	3973.04	17-Mar-06	3955.42
17-Feb-05	3203.19	9-May-05	3253.02	25-Jul-05	3964.78	7-Oct-05	3843.49	3-Jan-06	3991.18	20-Mar-06	3973.11
18-Feb-05	3191.78	10-May-05	3258.08	26-Jul-05	3953.92	11-Oct-05	3846.16	4-Jan-06	4011.80	21-Mar-06	3973.75
21-Feb-05	3187.01	11-May-05	3266.55	27-Jul-05	3964.50	12-Oct-05	3879.72	5-Jan-06	4014.89	22-Mar-06	4005.35
22-Feb-05	3207.73	12-May-05	3271.01	28-Jul-05	3989.74	13-Oct-05	3908.63	6-Jan-06	4030.97	23-Mar-06	4038.55
23-Feb-05	3203.34	13-May-05	3292.75	29-Jul-05	3982.00	14-Oct-05	3921.40	9-Jan-06	4074.71	24-Mar-06	4067.41
24-Feb-05	3213.28	16-May-05	3291.93	1-Aug-05	3986.10	17-Oct-05	3957.38	10-Jan-06	4072.46	27-Mar-06	4085.61
25-Feb-05	3219.37	17-May-05	3314.17	2-Aug-05	4016.74	18-Oct-05	3979.95	11-Jan-06	4101.76	28-Mar-06	4102.61
28-Feb-05	3212.81	18-May-05	3320.71	3-Aug-05	4030.68	19-Oct-05	4001.76	12-Jan-06	4125.40	29-Mar-06	4115.90
1-Mar-05	3209.70	19-May-05	3322.99	4-Aug-05	4034.22	21-Oct-05	4008.76	13-Jan-06	4140.66	30-Mar-06	4115.30
2-Mar-05	3185.68	20-May-05	3353.51	5-Aug-05	4049.95	24-Oct-05	4006.61	16-Jan-06	4177.24	31-Mar-06	4101.64
3-Mar-05	3204.64	23-May-05	3346.64	8-Aug-05	4059.94	25-Oct-05	4000.86	17-Jan-06	4205.72	3-Apr-06	4092.48
4-Mar-05	3208.66	24-May-05	3383.76	9-Aug-05	4057.52	26-Oct-05	3987.52	18-Jan-06	4217.37	4-Apr-06	4086.27
7-Mar-05	3186.81	25-May-05	3418.16	10-Aug-05	4028.45	27-Oct-05	3964.10	19-Jan-06	4204.68	5-Apr-06	4056.65
8-Mar-05	3187.83	26-May-05	3460.17	11-Aug-05	4035.46	28-Oct-05	3976.62	20-Jan-06	4198.31	6-Apr-06	4048.36
9-Mar-05	3206.67	27-May-05	3492.58	12-Aug-05	4012.42	31-Oct-05	3939.45	23-Jan-06	4194.02	7-Apr-06	4025.30
10-Mar-05	3224.00	30-May-05	3492.96	15-Aug-05	4016.36	1-Nov-05	3906.04	24-Jan-06	4183.91	10-Apr-06	4000.41
11-Mar-05	3212.65	31-May-05	3505.39	16-Aug-05	4035.72	2-Nov-05	3893.23	25-Jan-06	4196.48	11-Apr-06	3984.82
14-Mar-05	3189.83	2-Jun-05	3500.04	17-Aug-05	4048.13	3-Nov-05	3880.88	26-Jan-06	4159.16	12-Apr-06	3976.32
15-Mar-05	3183.82	3-Jun-05	3506.05	18-Aug-05	4045.20	7-Nov-05	3898.89	27-Jan-06	4173.50	13-Apr-06	3973.79
16-Mar-05	3179.20	6-Jun-05	3532.14	19-Aug-05	4047.26	8-Nov-05	3915.42	30-Jan-06	4169.99	18-Apr-06	3995.83
17-Mar-05	3168.10	7-Jun-05	3544.68	22-Aug-05	4034.37	9-Nov-05	3917.04	31-Jan-06	4171.80	19-Apr-06	3974.64
18-Mar-05	3170.25	8-Jun-05	3612.02	23-Aug-05	4025.14	10-Nov-05	3912.15	1-Feb-06	4167.14	20-Apr-06	3960.19
21-Mar-05	3154.25	9-Jun-05	3657.94	24-Aug-05	4017.89	11-Nov-05	3928.96	2-Feb-06	4159.17	24-Apr-06	3968.63
22-Mar-05	3149.34	10-Jun-05	3716.90	25-Aug-05	3992.57	14-Nov-05	3930.18	3-Feb-06	4163.64	25-Apr-06	3986.74
23-Mar-05	3148.87	13-Jun-05	3731.45	26-Aug-05	3980.37	15-Nov-05	3938.06	6-Feb-06	4156.36	26-Apr-06	3991.26
24-Mar-05	3155.01	14-Jun-05	3744.57	29-Aug-05	3949.74	16-Nov-05	3928.79	7-Feb-06	4137.82	27-Apr-06	4004.48
29-Mar-05	3137.85	15-Jun-05	3751.18	30-Aug-05	3939.66	17-Nov-05	3946.41	8-Feb-06	4131.78	28-Apr-06	4025.21
30-Mar-05	3128.40	16-Jun-05	3759.72	31-Aug-05	3938.70	18-Nov-05	3951.59	9-Feb-06	4119.25	2-May-06	4040.05
31-Mar-05	3126.07	17-Jun-05	3780.08	1-Sep-05	3924.11	23-Nov-05	3964.28	10-Feb-06	4100.22	3-May-06	4076.97
1-Apr-05	3139.54	20-Jun-05	3789.13	2-Sep-05	3884.63	24-Nov-05	3969.76	13-Feb-06	4101.26	4-May-06	4114.41
4-Apr-05	3148.50	21-Jun-05	3828.90	5-Sep-05	3885.88	25-Nov-05	3955.38	14-Feb-06	4089.44	5-May-06	4149.14
5-Apr-05	3141.19	22-Jun-05	3831.69	6-Sep-05	3875.43	28-Nov-05	3954.72	15-Feb-06	4088.26	8-May-06	4190.32
6-Apr-05	3150.81	23-Jun-05	3858.11	7-Sep-05	3845.93	29-Nov-05	3968.33	16-Feb-06	4092.07	9-May-06	4220.52
7-Apr-05	3163.26	24-Jun-05	3860.83	8-Sep-05	3845.97	30-Nov-05	3974.12	17-Feb-06	4071.00	10-May-06	4278.55
8-Apr-05	3163.95	27-Jun-05	3881.94	9-Sep-05	3847.17	1-Dec-05	3997.56	20-Feb-06	4093.45	11-May-06	4292.36
11-Apr-05	3159.03	28-Jun-05	3911.20	12-Sep-05	3833.60	2-Dec-05	4022.02	21-Feb-06	4068.81	12-May-06	4316.72
12-Apr-05	3137.24	29-Jun-05	3937.03	13-Sep-05	3806.32	5-Dec-05	4001.44	22-Feb-06	4068.29	15-May-06	4393.17
13-Apr-05	3145.80	30-Jun-05	3972.15	14-Sep-05	3786.10	6-Dec-05	3989.73	23-Feb-06	4069.16	16-May-06	4451.41
14-Apr-05	3138.64	1-Jul-05	4006.27	15-Sep-05	3819.56	7-Dec-05	3986.27	24-Feb-06	4062.56	17-May-06	4447.99
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18-Apr-05	3137.01	5-Jul-05	4071.66	19-Sep-05	3791.59	9-Dec-05	3972.82	28-Feb-06	4056.63	19-May-06	4411.81
19-Apr-05	3138.94	6-Jul-05	4117.22	20-Sep-05	3781.75	13-Dec-05	3961.41	1-Mar-06	4045.13	22-May-06	4389.69
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21-Apr-05	3164.35	8-Jul-05	4203.51	22-Sep-05	3797.74	15-Dec-05	3944.50	3-Mar-06	4055.78	24-May-06	4363.97
22-Apr-05	3165.19	11-Jul-05	4208.99	23-Sep-05	3791.57	16-Dec-05	3963.26	6-Mar-06	4023.34	25-May-06	4322.91
25-Apr-05	3178.67	12-Jul-05	4253.32	26-Sep-05	3801.74	19-Dec-05	3963.63	7-Mar-06	3989.76	26-May-06	4338.42
26-Apr-05	3204.47	13-Jul-05	4282.55	27-Sep-05	3816.37	20-Dec-05	3958.01	8-Mar-06	3916.55	29-May-06	4358.75
27-Apr-05	3206.43	14-Jul-05	4246.36	28-Sep-05	3820.48	21-Dec-05	3957.08	9-Mar-06	3878.88	30-May-06	4365.90
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3-May-05	3228.14	19-Jul-05	4073.09	3-Oct-05	3831.01	27-Dec-05	3968.97	14-Mar-06	3887.59	5-Jun-06	4294.44
4-May-05	3233.70	20-Jul-05	4068.23	4-Oct-05	3868.87	28-Dec-05	3979.61	15-Mar-06	3916.25	6-Jun-06	4280.96

7-Jun-06	4221.57	22-Aug-06	4442.50	9-Nov-06	5656.18	30-Jan-07	5870.58	18-Apr-07	5085.89	5-Jul-07	5165.06
8-Jun-06	4204.34	23-Aug-06	4467.36	10-Nov-06	5654.46	31-Jan-07	5774.27	19-Apr-07	5092.07	6-Jul-07	5160.89
9-Jun-06	4189.66	24-Aug-06	4488.56	13-Nov-06	5808.25	1-Feb-07	5739.05	20-Apr-07	5099.00	9-Jul-07	5136.53
12-Jun-06	4194.59	25-Aug-06	4469.60	14-Nov-06	5585.81	2-Feb-07	5663.65	23-Apr-07	5105.41	10-Jul-07	5120.40
13-Jun-06	4214.38	28-Aug-06	4476.07	15-Nov-06	5603.03	5-Feb-07	5633.61	24-Apr-07	5178.07	11-Jul-07	5112.62
14-Jun-06	4216.79	29-Aug-06	4489.60	16-Nov-06	5602.40	6-Feb-07	5628.88	25-Apr-07	5173.33	12-Jul-07	5095.68
15-Jun-06	4264.53	30-Aug-06	4507.15	17-Nov-06	5642.04	7-Feb-07	5649.99	26-Apr-07	5211.27	13-Jul-07	5117.37
16-Jun-06	4272.43	31-Aug-06	4486.07	20-Nov-06	5676.05	8-Feb-07	5710.21	27-Apr-07	5148.07	16-Jul-07	5121.08
19-Jun-06	4288.31	1-Sep-06	4490.84	21-Nov-06	5667.30	9-Feb-07	5817.04	30-Apr-07	5199.44	17-Jul-07	5104.13
20-Jun-06	4284.19	4-Sep-06	4481.70	22-Nov-06	5665.07	12-Feb-07	5895.18	2-May-07	5151.46	18-Jul-07	5123.23
21-Jun-06	4285.23	5-Sep-06	4496.47	23-Nov-06	5676.52	13-Feb-07	5884.25	3-May-07	5169.53	19-Jul-07	5131.99
22-Jun-06	4286.30	6-Sep-06	4507.99	24-Nov-06	5752.57	14-Feb-07	5867.03	4-May-07	5116.02	20-Jul-07	5137.51
23-Jun-06	4246.80	7-Sep-06	4508.02	27-Nov-06	5791.00	15-Feb-07	5773.29	7-May-07	5091.12	23-Jul-07	5154.42
26-Jun-06	4227.16	8-Sep-06	4523.80	28-Nov-06	5762.20	16-Feb-07	5798.73	8-May-07	5101.43	24-Jul-07	5193.14
27-Jun-06	4218.10	11-Sep-06	4585.94	29-Nov-06	5656.67	19-Feb-07	5766.46	9-May-07	5067.74	25-Jul-07	5230.04
28-Jun-06	4250.70	12-Sep-06	4601.22	30-Nov-06	5615.20	20-Feb-07	5771.39	10-May-07	5071.33	26-Jul-07	5296.22
29-Jun-06	4239.96	13-Sep-06	4645.56	1-Dec-06	5553.08	21-Feb-07	5816.77	11-May-07	5114.17	27-Jul-07	5317.73
30-Jun-06	4260.49	14-Sep-06	4684.57	4-Dec-06	5490.20	22-Feb-07	5763.85	14-May-07	5181.77	30-Jul-07	5329.56
3-Jul-06	4273.17	15-Sep-06	4750.80	5-Dec-06	5417.50	23-Feb-07	5732.67	15-May-07	5169.28	31-Jul-07	5340.08
4-Jul-06	4263.59	18-Sep-06	4839.24	6-Dec-06	5429.02	26-Feb-07	5665.79	16-May-07	5179.21	1-Aug-07	5334.51
5-Jul-06	4274.25	19-Sep-06	4871.76	7-Dec-06	5481.28	27-Feb-07	5534.20	17-May-07	5175.11	2-Aug-07	5310.05
6-Jul-06	4246.38	20-Sep-06	4876.13	8-Dec-06	5477.86	28-Feb-07	5387.28	18-May-07	5167.34	3-Aug-07	5320.42
7-Jul-06	4271.72	21-Sep-06	4769.13	11-Dec-06	5516.98	1-Mar-07	5237.68	21-May-07	5191.53	6-Aug-07	5277.38
10-Jul-06	4271.99	22-Sep-06	4778.35	13-Dec-06	5525.38	2-Mar-07	5245.62	22-May-07	5154.41	7-Aug-07	5263.46
11-Jul-06	4278.18	25-Sep-06	4728.12	14-Dec-06	5582.42	5-Mar-07	5292.14	23-May-07	5108.69	8-Aug-07	5256.44
12-Jul-06	4271.10	26-Sep-06	4781.37	15-Dec-06	5589.64	6-Mar-07	5252.46	24-May-07	5132.74	9-Aug-07	5246.57
13-Jul-06	4276.43	27-Sep-06	4829.04	18-Dec-06	5624.84	7-Mar-07	5254.52	25-May-07	5134.54	10-Aug-07	5240.83
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17-Jul-06	4271.37	29-Sep-06	4879.86	20-Dec-06	5525.40	9-Mar-07	5268.99	29-May-07	5048.23	14-Aug-07	5227.08
18-Jul-06	4246.38	2-Oct-06	4843.23	21-Dec-06	5509.97	12-Mar-07	5239.01	30-May-07	5051.21	15-Aug-07	5184.29
19-Jul-06	4246.44	3-Oct-06	4910.61	22-Dec-06	5487.73	13-Mar-07	5250.04	31-May-07	5001.77	16-Aug-07	5120.53
20-Jul-06	4242.51	4-Oct-06	4937.20	27-Dec-06	5522.81	14-Mar-07	5241.25	4-Jun-07	5043.35	17-Aug-07	5171.30
21-Jul-06	4244.16	5-Oct-06	4946.12	28-Dec-06	5560.44	15-Mar-07	5200.75	5-Jun-07	5063.98	20-Aug-07	5126.68
24-Jul-06	4245.29	6-Oct-06	4903.90	29-Dec-06	5645.91	16-Mar-07	5171.13	6-Jun-07	5065.62	21-Aug-07	5156.33
25-Jul-06	4251.37	9-Oct-06	4889.68	2-Jan-07	5679.57	19-Mar-07	5103.83	7-Jun-07	5054.35	22-Aug-07	5165.41
26-Jul-06	4268.00	11-Oct-06	4893.03	3-Jan-07	5714.18	20-Mar-07	4961.89	8-Jun-07	5068.68	23-Aug-07	5181.75
27-Jul-06	4260.64	12-Oct-06	4882.14	4-Jan-07	5811.58	21-Mar-07	4809.72	11-Jun-07	5064.57	24-Aug-07	5234.70
28-Jul-06	4271.68	13-Oct-06	4906.48	5-Jan-07	5895.68	22-Mar-07	4637.31	12-Jun-07	5074.06	27-Aug-07	5274.53
31-Jul-06	4258.54	16-Oct-06	4857.58	8-Jan-07	5962.46	23-Mar-07	4463.09	13-Jun-07	5089.22	28-Aug-07	5290.38
1-Aug-06	4242.50	17-Oct-06	4851.97	9-Jan-07	6026.51	26-Mar-07	4489.76	14-Jun-07	5096.68	29-Aug-07	5334.03
2-Aug-06	4277.30	18-Oct-06	4875.58	10-Jan-07	6085.59	27-Mar-07	4614.40	15-Jun-07	5137.45	30-Aug-07	5341.16
3-Aug-06	4314.44	19-Oct-06	4864.02	11-Jan-07	6117.35	28-Mar-07	4791.22	18-Jun-07	5163.47	31-Aug-07	5371.72
4-Aug-06	4340.88	23-Oct-06	4910.60	12-Jan-07	6161.46	29-Mar-07	4978.93	19-Jun-07	5141.52	3-Sep-07	5387.76
7-Aug-06	4384.35	25-Oct-06	4963.22	15-Jan-07	6125.28	30-Mar-07	5133.67	20-Jun-07	5147.85	4-Sep-07	5403.17
8-Aug-06	4390.95	26-Oct-06	5061.77	16-Jan-07	6066.66	2-Apr-07	5154.76	21-Jun-07	5144.93	5-Sep-07	5419.63
9-Aug-06	4396.09	27-Oct-06	5106.65	17-Jan-07	6041.42	3-Apr-07	5183.11	22-Jun-07	5124.14	6-Sep-07	5458.40
10-Aug-06	4396.61	30-Oct-06	5177.90	18-Jan-07	6030.83	4-Apr-07	5216.68	25-Jun-07	5052.08	7-Sep-07	5560.23
11-Aug-06	4407.54	31-Oct-06	5314.36	19-Jan-07	6025.41	5-Apr-07	5215.20	26-Jun-07	5080.55	10-Sep-07	5582.38
14-Aug-06	4414.88	1-Nov-06	5403.96	22-Jan-07	6027.17	10-Apr-07	5227.81	27-Jun-07	5093.51	11-Sep-07	5611.05
15-Aug-06	4429.49	2-Nov-06	5529.50	23-Jan-07	6060.21	11-Apr-07	5218.64	28-Jun-07	5163.88	12-Sep-07	5556.32
16-Aug-06	4423.60	3-Nov-06	5515.34	24-Jan-07	6016.47	12-Apr-07	5228.75	29-Jun-07	5146.73	13-Sep-07	5470.14
17-Aug-06	4424.17	6-Nov-06	5555.23	25-Jan-07	6010.17	13-Apr-07	5242.88	2-Jul-07	5144.20	14-Sep-07	5484.63
18-Aug-06	4451.08	7-Nov-06	5604.48	26-Jan-07	5961.61	16-Apr-07	5228.88	3-Jul-07	5127.16	17-Sep-07	5507.30
21-Aug-06	4467.40	8-Nov-06	5638.00	29-Jan-07	5949.71	17-Apr-07	5185.67	4-Jul-07	5181.07	18-Sep-07	5490.99

19-Sep-07	5488.20	7-Nov-07	5075.85
20-Sep-07	5519.74	8-Nov-07	5080.63
21-Sep-07	5493.27	9-Nov-07	5124.31
24-Sep-07	5448.33	12-Nov-07	5125.94
25-Sep-07	5384.46	13-Nov-07	5106.23
26-Sep-07	5282.77	14-Nov-07	5087.22
27-Sep-07	5176.88	15-Nov-07	5095.47
28-Sep-07	5146.46	16-Nov-07	5147.62
1-Oct-07	5163.11	19-Nov-07	5156.90
2-Oct-07	5200.32	20-Nov-07	5153.84
3-Oct-07	5181.63	21-Nov-07	5181.29
4-Oct-07	5076.04	22-Nov-07	5217.68
5-Oct-07	5005.89	23-Nov-07	5198.23
8-Oct-07	4979.98	26-Nov-07	5231.77
9-Oct-07	4900.89	27-Nov-07	5222.12
11-Oct-07	4835.16	28-Nov-07	5162.41
12-Oct-07	4884.75	29-Nov-07	5215.36
15-Oct-07	4953.31	30-Nov-07	5234.54
16-Oct-07	5069.50	3-Dec-07	5205.06
17-Oct-07	5127.40	4-Dec-07	5221.97
18-Oct-07	5162.14	5-Dec-07	5246.16
19-Oct-07	5175.80	6-Dec-07	5266.78
22-Oct-07	5164.78	7-Dec-07	5265.15
23-Oct-07	5115.51	10-Dec-07	5269.08
24-Oct-07	5087.14	11-Dec-07	5332.03
25-Oct-07	5034.46	13-Dec-07	5342.96
26-Oct-07	5034.55	14-Dec-07	5339.80
29-Oct-07	5005.14	17-Dec-07	5278.73
30-Oct-07	4989.02	18-Dec-07	5291.69
31-Oct-07	4971.04	20-Dec-07	5287.93
1-Nov-07	5003.99	21-Dec-07	5339.75
2-Nov-07	4980.49	24-Dec-07	5444.83
5-Nov-07	5009.87	2-Jan-08	5167.18
6-Nov-07	5063.06	3-Jan-08	5133.48