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STUDY ON PRICE VOLATILITY OF SELECTED SCRIPTS LISTED IN COMMODITY MARKETS

by

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Under the guidance of

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A PROJECT REPORT
submitted

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

of

MASTER OF BUSINESS ADMINISTRATION

Department of Management Studies
Kumaraguru College of Technology
(An autonomous institution affiliated to Anna University, Coimbatore)
Coimbatore - 641 049

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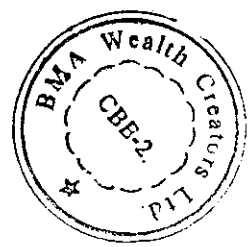
CERTIFICATE

To Whom So Ever It May Concern

This is to certify that **N.JAYAKRISHNAN** (Reg No.1020400022) student of MBA studying at **KCT Business School, Coimbatore** has undergone the project training work and has completed project titled as **"A Study on Price Volatility of Selected Scripts Listed in Commodity Markets"** at **BMA Wealth Creators Ltd, Coimbatore** for period February to April 2012 in our company under the guidance of **Mr.Karthik R,** Branch Manager, Coimbatore.

We wish to express our appreciation for his excellent work done and wish him all the success in his new endeavour.

Organisational Guide



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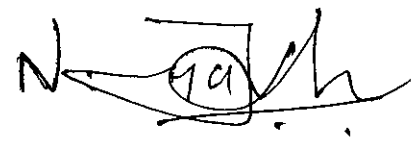
DECLARATION

I affirm that the project work titled "**A STUDY ON PRICE VOLATILITY OF SELECTED SCRIPTS LISTED IN COMMODITY MARKETS**" Being submitted in partial fulfillment for the award of master of business administration is the original work carried out by me. It has not found the party other project work submitted For award of any degree or diploma, either in this or any other university.



Signature of the Candidate

N. JAYAKRISHNAN

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I certify that the declaration made above by the candidate is true.

Signature of the Guide

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FACULTY OF KCT BUSINESS SCHOOL

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ABSTRACT

Commodities are raw or primary products and the exchanges where these goods are traded are known as Commodity Markets.

Different markets trade different commodities. For example, the Winnipeg Commodity Exchange is Canada's only agricultural futures and options exchange. Here, you will find investors trading in canola, wheat, barley and other agricultural products. Other commodities can be found in either the Toronto Stock Exchange, the Canadian Venture Exchange or the Montreal Exchange, depending on the type of commodity and the size of the company managing it. Internationally, commodities are available on almost every exchange.

When investing in any commodity, it is important to understand the unit that it is being traded in. For example, one unit of gold is one troy ounce; therefore, the price per unit is the price per ounce. Nickel, while still a metal, is bought and sold by the metric ton, as are most other industrial metals. Fuels such as crude oil, diesel and gasoline may be traded by the barrel or by the metric ton. Food items such as maize, wheat and soybeans may be sold by the pound, bushel, short ton, kilogram, short hundredweight, or even a set multiple of any of \ these units. Without understanding the unit price, an investor cannot comprehend the p ricethey are actually paying for any given commodity.

Oil is the most traded commodity in the world, with coffee coming in second place. Because many commodities are mined or produced in various countries, more and more companies are seeking the Fair Trade designation. This allows an investor to choose to invest in commodities that are produced using fair wages for labours, regulated working

CHAPTER-1

INTRODUCTION

1.1 INTRODUCTION OF THE STUDY

The history of organized commodity derivatives in India goes back to the nineteenth Century when Cotton Trade Association started future trading in 1875, about decade after they started in Chicago. Over the time datives market developed in several commodities in India. Following Cotton, derivatives trading started in oil seed in Bombay (1900), raw jute and jute goods in Calcutta (1912), Wheat in Hapur (1913) and Bullion in Bombay (1920).

However many feared that derivatives fuelled unnecessary speculation and were detrimental to the healthy functioning of the market for the underlying commodities, resulting in to banning of commodity options trading and cash settlement of commodities futures after independence in 1952.

The parliament passed the Forward Contracts (Regulation) Act, 1952,Which regulated contracts in Commodities all over the India. The act Prohibited options trading in Goods along with cash settlement of forward trades, rendering a crushing blow to the commodity derivatives market. Under the act only those associations/exchanges, which are granted reorganization from the Government, are allowed to organize forward trading in regulated commodities. The act envisages three tire regulations: (i) Exchange which organizes forward trading in commodities can regulate trading on day-to-day basis; (ii) Forward Markets Commission provides regulatory oversight under the powers delegated to it by the central Government. (iii) The Central Government- Department of Consumer Affairs, Ministry of Consumer Affairs, Food and Public Distribution- is the ultimate regulatory authority.

The commodities future market remained dismantled and Remained Dormant for about four decades until the new millennium when the Government, in a complete change in a policy, started actively encouraging Commodity market. After Liberalization and Globalization in 1990, the Government set up a committee (1993) to examine the role of futures trading.

The Committee (headed by Prof. K.N. Kabra) recommended Allowing futures trading in 17 commodity groups. It also recommended strengthening Forward Markets Commission, and certain amendments to Forward Contracts (Regulation) Act 1952, particularly allowing option trading in goods and registration of brokers with Forward Markets Commission.

The Government accepted most of these recommendations and futures' trading was permitted in all recommended commodities. It in timely decision since internationally the commodity cycle is on upswing and the next decade being touched as the decade of Commodities. Commodity exchange in India plays an important role where the prices of any commodity are not fixed, in an organized way. Earlier only the buyer of produce and its seller in the market judged upon the prices. Others never had a say.

Today, commodity exchanges are purely speculative in nature. Before discovering the price, they reach to the producers, end-users, and even the retail investors, at a grass roots level. It brings a price transparency and risk management in the vital market. A big difference between a typical auction, where a single auctioneer announces the bids and the Exchange is that people are not only competing to buy but also to sell. By Exchange rules and by law, no one can bid under a higher bid, and no one can offer to sell higher than some one else's lower offer. That keeps the market as efficient as possible, and keeps thetraders on their toes to make sure no one gets the purchase or sale before they do.

Since 2002, the commodities future market in India has Experienced an Un expected boom in terms of modern exchanges, number Of commodities allowed for derivatives trading as well as the value of futures trading in commodities, which crossed $ 1 trillion mark in 2006. Since 1952 till 2002 commodity datives market was virtually non-existent, except some negligible activities on OTC basis.

In 2002-03, Prime Minister, Shri .A. B. Vajpayee, in his Independence Dayaddress to the nation on 15th August 2002, demonstrated its commitment to revive the Indian agriculture sector and commodity futures markets. The GOI in that very year took two steps that gave a fillip to the commodity markets. The first one was setting up of nation wide multi commodity exchanges and the second one was expansion of list of commodities permitted for trading under (FC(R) A).

In India there are 25 recognized future exchanges, of which there are three national level multi-commodity exchanges. After a gap of almost three decades, Government of India has allowed forward transactions in commodities through Online Commodity Exchanges, a modification of traditional business known as Adhat and Vayda Vyapar to facilitate better risk coverage and delivery of commodities. The three exchanges are: National Commodity & Derivatives Exchange Limited (NCDEX) Mumbai, Multi Commodity Exchange of India Limited (MCX) Mumbai.

TECHNICAL TOOLS FOR ANALYSIS:

To analyze the objectives, that is "To analyze the Historical price volatility in commodity trading " the following process is carried out:

$TP = (Tt / Pn) * 262$

TP is the total number of trading periods per year.

Tt is the total trading times in a day.

262 is the number of weekdays per year.

The formula calculates the historical volatility for a given period over a specified time span

$$\mathbf{HV} = \sqrt{\mathbf{SSD} / \mathbf{n} - \mathbf{1}} * \sqrt{\mathbf{TP}}$$

SSD is the sum of the squared differences.

n is the number of periods for the specified time span.

TP is the total number of trading periods for the year.

To sum the squares of the differences between the individual Logarithms for each period and the average logarithm. The formula is:

$$\mathbf{SSD} = \sum_{i=1}^{n} (\mathbf{LOGSi} - \mathbf{ALOGS})^2$$

SSD is the sum of the squared differences.

S indicates to total the squares of all n differences.

LOGSi is the logarithm of the price change for periods i.

ALOGS is the average of the logarithms.

To calculate the total of the logarithm, the formula is:

$$\mathbf{Tlogs} = \sum_{i=1}^{n} (\mathbf{LOGSi})$$

Tlogs is the total of the logarithm price ratio for the time span.

S indicates to sum all n logarithms.

LOGSi is the logarithm of the price changes for period i.

n is the number of periods for the specified time span.

To calculate the average of the logs by dividing the total logarithm by the number of periods

ALOGS = Tlogs / n

ALOGS is the average of the logarithm.

Tlogs is the total of the logarithm for the time span.

N is the number of periods for the specified time span.

The logarithm of the price changes for each price in the specified time span of n periods. The formula is:

$$\mathbf{LOGSi = LOG\ (Pi\ /\ Pi\text{-}1)}$$

LOG is the logarithm function.

Pi is the current price

Pi-1 is the previous price

To analyze the correlation the following process is carried out:

$$r = \frac{\sum(X - \bar{X})(Y - \bar{Y})}{\sqrt{\sum(X - \bar{X})^2 (Y - \bar{Y})^2}}$$

- X and Y are the variables
- X= sample mean average
- Y =sample mean average
- R=correlation coefficient.

1.2 ABOUT THE INDUSTRY

Indian Stock Markets are one of the oldest in Asia. Its history dates back to nearly 200 years ago. The earliest records of security dealings in India are meager and obscure. By 1830's business on corporate stocks and shares in Bank and Cotton presses took place in Bombay. Though the trading list was broader in 1839, there were only half a dozen brokers recognized by banks and merchants during 1840 and 1850. The 1850's witnessed a rapid development of commercial enterprise and brokerage business attracted many men into the field and by 1860 the number of brokers increased into 60.In 1860-61 the American Civil War broke out and cotton supply from United States of Europe Was stopped; thus, the 'Share Mania' in India begun. The number of Brokers increased to about 200 to 250. However, at the end of the American Civil War, in1865, a disastrous slump began (for example, Bank of Bombay Share which had touched Rs 2850 could only be sold at Rs. 87). At the end of the American Civil War, the brokers who thrived out of Civil War in 1874,found a place in a street (now appropriately called as Dalal Street) where they would conveniently assemble and transact business. In 1887, they formally established in Bombay, the "Native Share and Stock Brokers' Association". In 1895, the Stock Exchange acquired a premise in the same street and it was inaugurated in1899.Thus, the Stock Exchange at Bombay was consolidated. Thus in the same way, gradually with the passage of time number of exchanges were increased and at currently it reached to the figure of 24 stock exchanges.

1.2.1 DEVELOPMENT

An important early event in the development of the stock market in India was The formation of the Native Share and Stock Brokers' Association at Bombay in 1875,the precursor of the present-day Bombay Stock Exchange. This was followed by the formation of associations /exchanges in Ahmedabad (1894),Calcutta (1908), and Madras (1937). IN addition, a large number of ephemeral exchanges emerged mainly in buoyant periods to recede into oblivion during depressing times subsequently. In order to check such aberrations and promote a more orderly development of the stock market, the central government

legislation, it is mandatory on the part of a stock exchanges to seek Government recognition. As of January 2002 there were 23 stock exchanges recognized by the central Government. They are located at Ahemdabad, Bangalore, Baroda, Bhubaneshwar, Calcutta, Chenni,(the Madras stockExchanges), Cochin, Coimbatore, Delhi Guwahati, Hyderbad, Indore,Jaipur, Kanpur, Ludhiana, Mangalore, Mumbai(the National Stock Exchange orNSE),Mumbai (The Stock Exchange), papularly called the Bombay Stock Exchange Mumbai (OTC Exchange of India), Mumbai (The Inter-connected Stock Exchange of India), Patna, Pune, and Rajkot. Of course, the principle bourses are the National Stock Exchange and The Bombay Stock Exchange ,accounting for the bulk of the business done on the Indian stock market. While the recognized stock exchanges have been accorded a privileged position, theyare subject to governmental supervision and control. The rules of a recognized stock exchanges relating to the managerial powers of the governing body, admission, suspension, expulsion, and re-admission of its members, appointment of authorized representatives and clerks, so on and so forth have to be approved by the government. These rules can be amended, varied or rescinded only with the prior approval of the government.

1.2.2 BSE (BOMBAY STOCK EXCHANGE)

The Stock Exchange, Mumbai, popularly known as "BSE" was established in 1875 as "The Native Share and Stock Brokers Association". It is the oldest one In Asia, even older than the Tokyo Stock Exchange, which was established in1878. It is a voluntary non-profit making Association of Persons (AOP) and is Currently engaged in the process of converting itself into demutualised and corporate entity. It has evolved over the years into its present status as the premier Stock Exchange in the country. It is the first Stock Exchange in the Country to have obtained permanent recognition in 1956 from the Govt. of India under the Securities Contracts(Regulation) Act, 1956.The Exchange, while providing an efficient and transparent market for trading insecurities, debt and derivatives upholds the interests of the investors and ensures redressal of their grievances whether against the companies or its own member-brokers. It also strives to educate and enlighten the investors by conducting

Governing Board having 20 directors is the apex body, which decides the policies and regulates the affairs of the Exchange. The Governing Board consists of 9 elected directors, who are from the broking community (one third of them retire ever year by rotation), three SEBI nominees, six public representatives and an Executive Director & Chief Executive Officer and a Chief Operating Officer.

1.2.3 NSE (NATIONAL STOCK EXCHANGE)

NSE was incorporated in 1992 and was given recognition as a stock exchange In April 1993. It started operations in June 1994, with trading on the Wholesale Debt Market Segment. Subsequently it launched the Capital Market Segment In November 1994 as a trading platform for equities and the Futures and Options Segment in June 2000 for various derivative instruments.NSE has been able to take the stock market to the doorsteps of the investors. The technology has been harnessed to deliver the services to the investors across the country at the cheapest possible cost. It provides a nation-wide, screen-based, automated trading system, with a high degree of transparency and equal access to investors irrespective of geographical location. The high level of information dissemination through on-line system has helped in integrating retail investors on a nation-wide basis. The standards set by the exchange in terms of market practices, Products , technology and service standards have become industry bench marks and are being replicated by other market participants. Within a very short span of time, NSE has been able to achieve all the objectives for which it was set up. It has been playing a leading role as a change agent in transforming the Indian Capital Markets to its present form. The Indian Capital Markets are a far cry from what they used to be a decade ago in terms of market practices, infrastructure, technology, risk management, clearing and settlement and investor service.

1.2.4 NCDEX (NATIONAL COMMODITIES AND DERIVATIVES EXCHANGE)

NCDEX started working on 15thDecember, 2003. This exchange provides facilities to their trading and clearing member at different 130 centers for contract. In commodity market themain participants are speculators, hedgers and arbitrageurs. Promoters of NCDEX are

- National Stock Exchange(NSE)
- ICICI bank
- Life Insurance Corporation(LIC)
- National Bank for Agricultural and Rural Development (NABARD)
- IFFICO
- Punjab National Bank (PNB)
- CRISIL

ABOUT NCDEX

- NCDEX is nationalized screen based system which is providing transparent, private and easy services.

- NCDEX is one of the traditional media which gives online information
- NCDEX is one of the Indian commodity exchange, constructed on the basis of the current national institutes the exchange has been established with the coloration of leading institutes like NABARD, LIC, NSI etc....
- In India NCDEX has maximum settlement guarantee fund.
- NCDEX has appointed two exports for checking quality at the time of Delivery.

FACILITIES PROVIDED BY NCDEX

- NCDEX has developed facility for checking of commodity and also provides a wear house facility.
- By collaborating with industrial partners, industrial companies, news Agencies ,banks and developers of kiosk network NCDEX is able to provide current rates and contracts rate.
- To prepare guidelines related to special products of securitization
- NCDEX works with bank.
- To avail farmers from risk of fluctuation in prices NCDEX provides special services

- NCDEX is working with tax officer to make clear different types of sales and service

- NCDEX is providing attractive products like "weather derivatives"

1.2.5 MCX (MULTI COMMODITY EXCHANGE)

'MULTI COMMODITY EXCHANGE' of India limited is a new order exchange with am an date for setting up a nationwide, online multi-commodity market place offering unlimited growth opportunities to commodities market participants. As a true neutral market, MCX has taken several initiatives for users In a new generation commodities futures market in the process, become the country's premier exchange. MCX, an independent and a de-mutualized exchange since inception, is all set up to introduce a state of the art, online digital exchange for commodities futures trading in the country and has accordingly initiated several steps to translate this vision in to reality.

1.3 ABOUT THE COMPANY

1.3.1 ABOUT BMA WEALTH CREATORS :

A premier financial services organization providing individual and corporate With customized financial solutions. They work towards understanding your Financial goals and risk profile. Our expertise combined with thorough Understanding of the financial markets results in appropriate investment Solutions for you. At Wealth Creators were alize your dreams, needs, Aspirations, concerns and resources are unique. This is reflected in every move we make with and for you. They have deep appreciation for.Their financial services corporate entities are represented by

1.3.2 BMA WEALTH CREATORS LTD.

which holds corporate membership in National Stock Exchange Ltd, Bombay Stock Exchange Ltd. and Central Depositories Securities Ltd.

1.3.3 BMA COMMODITIES PVT.LTD.

Which holds corporate membership in commodities exchange of NCDEX and MCX. It is also is SEBI approved AMFI registered Mutual Fund advisory and intermediary. They in her it the legacy of BMA group which has been one of the dominant entities in Ferrous and Ferro Alloy industry in India.The BMA Group has created its niche in by promoting successful ventures in the fields of coal mining, refractory, steel and Ferroalloy. The strive to achieve excellence and dynamic growth has been possible through, alliances, high quality standards and proactive business culture.

MISSION

To be a premier financial supermarket providing integrated investment services.

VISION

To provide integrated financial services building investor wealth and confidence.

Product and Services

- Equities & Equity Derivatives (NSE, BSE)
- Commodity Futures (MCX, NCDEX)
- Currency Futures (MCX – SX)
- Depository Services (NSDL, CDSL)
- Mutual Funds (AMFI)
- Insurance – Life and Non Life / Group Insurance (IRDA)
- IPO, Bonds and fixed Deposits.

Equity Broking

BMAWC, as a member of the National Stock Exchange and the Bombay Stock Exchange, offers you equity trading through a network of various offices across the country. It is our objective to offer you a range of services to suit your trading needs. Therefore, apart from investment activity, you can undertake day trading at both the above exchanges.

Seamless execution:

BMAWC provides unmatched flexibility and the power of choice to the clients for executing trades through multiple channels, viz., through our main office or branches, at any of our franchise centers or over telephone. A client may use any of these secured channels to communicate his/her orders, and he/she would be identified by his/her account code. They have endeavored to design all our processes and systems with a client-centric

focus to provide a client the convenience of transacting with us through the mode and channel of his / her preference.

Technical Analysis

BMAWC has its own Equity Research team with rich experience in Identifying and analyzing attractive investment opportunities with fundamental Long - term growth potential. The team also has a division specializing in Technical Analysis, which offers technical tips for short term and day trading.

Daily Analysis

Outlines the day's market outlook, latest domestic and international Market developments their call on the upcoming economic and market Environment and highlights the stocks which they expect to outperform over the months ahead.

Derivatives Trading

BMAWC provides trading facilities in Equity Derivatives at National Stock Exchange(NSE) since 200 and over the years, been able to generate substantial revenues with risingvolumes from wide scale participation of retail investors in this segment.

Depository Services

BMAWC is a depository participant with CDSL and NSDL. BMAWC offers a range of services including :

- Account opening facilities
- Dematerialization of physical shares
- Re-materialization
- Pledging.

1.3.4 FINANCIAL PRODUCTS DISTRIBUTION :

Product Basket

Their Financial Products Distribution (FPD) desk handles all types of primary Market investments you may require. Be it a Mutual Fund, Life Insurance, General Insurance, Bonds,Fixed Deposits of blue chip corporates or IPO's of Equities. A strong distribution channel across the country providing easy access to our clients is dispersed over severalstates.

Mutual funds:

Their team tracks the performance of Mutual Funds across the gamut of investor options and advises investors. In addition to tracking the key performing funds and analyzing the portfolios and maturity profiles of different funds, our FPD team is geared to advice investors on the available options / NFOs to best suit their investment needs.

Insurance

BMAWC is a leading intermediary in the LIFE and General Insurance market licensed by Insurance Regulatory and Development Authority of India. At BMAWC, they analyze the client's requirement and capacity to understand their risk exposure and then evaluate their insurance portfolio in terms of its adequacy to protect the same. Their focus is to develop cost effective and near fool proof insurance package for our clients. In the event of a claim, theirteam facilitates the process to ensure speedy seemens.

BMAWC has professional relationships with major Life and non-life insurance companies in the country and is well poised to provide its clients a comprehensive risk management strategy (Reliance Life Insurance, Birla Sun Life Insurance, Apollo DKV Health Insurance, National Insurance Company and Reliance General Insurance are our Key Partners).

Bonds

For investors who prefer risk-free returns without the tension of Volatile markets, the Best option is the Gold Savings Bond. These bonds have sovereign Guarantee and thus give safe returns.

Corporate Fixed Deposits

BMA WC takes the help of its own Research Desk in order to choose and cater Fixed Deposits of blue chip corporates.

IPO's

In case of IPOs of Equities, PSL markets almost all the major issues that hit the Indian Capital Market.

Customised Services

And if you are interested in any of the above investments, they would be privileged to be of assistance to you to invest your money safely. All they have to do is to call your nearest BMAWC Office and any of their team members will get in touch with you.

Competitive Strength

- Regional management (regional hub and spoke topology) for retail operation.
- Large and diverse distribution network.
- Strong track record of high growth and profitability.
- Strong risk management system.

- Well established brand.

- Existing Business Networks:

BMA WEALTH CREATORS LTD has 25 strategically located own offices in India, with its Head quarters in Salt Lake and 700 plus business outlets in all prime locations of India.

Eastern Region	Southern Region
Kolkata	Chennai
Siliguri	Salem
Burdwan	Bangalore
Durgapur	Hyderabad
Cuttack	Coimbatore
Bhubhaneshwar	
Jamshedpur	
Tamluk	

Western Region	Northern Region
Baroda	Delhi
Mumbai	Noida
Pune	Kanpur
	Varanasi
	Lucknow

CHAPTER-2

MAIN THEME OF THE PROJECT

2.1.1 OBJECTIVES OF STUDY:

PRIMARY OBJECTIVE:

To study on price volatility of selected scripts listed in commodity markets.

SECONDARY OBJECTIVE

- To analyze the historic price- volatility of selected scripts.
- To analyze the correlation between selected scripts

SELECTED SECTORS :

Natural gas, crude oil, copper, aluminium, cotton, cardamom are taken for the study

2.1.2 SCOPE OF THE STUDY:

This study would deals with trading in Indian commodity markets. The futures Closing price of three month is collected from (JANUARY2012-MARCH2012).

2.1.3 METHODOLOGY

TYPE OF STUDY:

It is an analytical type of study. The study identifies the price volatility in natural gas, crude oil, copper, aluminum, cotton, cardamom. This research study would deal with trading in Indian commodity markets.

PERIOD OF STUDY:

To analyze the objectives, 3 months data are collected, (JANUARY 2012-MARCH 2012).

METHOD OF DATA COLLECTION:

The study is based on secondary data. The data required for the study is collected from the MCX (MULTI COMMODITY EXCHANGE).

TOOLS USED:

- Historical volatility
- Standard deviation
- correlation

2.4 REVIEW OF LITERATURE

James S. Doran and Ehud I. Ronn[1] states that the need for a negative market price of volatility risk to recover the difference between Black-Scholes (1973)/Black (1976) implied volatility and realized term volatility. Initially, using quasi-Monte Carlo simulation, they demonstrate numerically that a negative market price of volatility risk is the key risk premium in explaining the disparity between risk-neutral and statistical volatility in both equity and commodity-energy markets. This is robust to multiple specifications that also incorporate jumps.

Next, using futures and options data from natural gas, heating oil and crude oil contracts over a ten year period, we estimate the volatility risk premium and demonstrate that the premium is negative and significant for all three commodities. Additionally, there appear distinct seasonality patterns for natural gas and heating oil, where winter/withdrawal months have higher volatility risk premiums. Computing such a negative market price of volatility risk highlights the importance of volatility risk in understanding priced volatility in these financial markets.

Daniel Giamouridis[2] states that the relationship between stock market returns and volatilities has been extensively investigated in the academic literature. The relationship between Commodity Returns and volatility is investigated for the first time. The feeling that the relationship between return and volatility in the commodity markets is the inverse of that observed in the stock markets. If that hypothesis proves to be true and if commodity markets returns are negatively correlated with the returns of traditional financial assets, the introduction of commodities in investment portfolios would result in the diversification of the volatility exposure. This will allow Fund Managers to hedge investment portfolios with commodities, thus avoiding the use of more complicated instruments, such as options.They carry out the exploratory tests of Black [1976], to test the hypothesis with the unconditional

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[1] James S. Doran and Ehud I. Ronn article Computing the Market Price of Volatility Risk in the Energy Commodity Markets Vol. 32 (pp. 2541-2552) December 2008.

2 Daniel Giamouridis in The Relation between Return and Volatility in the Commodity

variance, as well as the tests of Nelson [1991], Zakoian [1990] and Glosten, Jagannathan, and Runkle [1993], to test the hypothesis on the conditional variance. The estimation of the models yields statistically significant asymmetric terms only for the conditional variance and the initial hypothesis that the conditional variance responds asymmetrically to past information is not rejected.

Fardous Alom, Bert D Ward and Baiding Hu[[3]] states that Understanding the nature of volatility in commodity priceswarrants adequate attention because such volatility is likely to lead to increased production,search and opportunity costs, as well as accelerate uncertainty and risk, contributing to a slowdown of economic activities. over the full sample period of 1995–2010, all future price returns show persistent and asymmetric effects of shocks to the volatility but the level of persistence and degree of asymmetry differ product to product; over the subsample 1995–2001, persistency and asymmetry are evident for all series with the exception of gasoline future price returns; the recent subsample of 2002–2010shows mixed evidence and all series show persistent effects of shocks to the volatility while asymmetry is supported in crude oil and propane only; the study also concludes that based on forecasting performance, no single model can be recommended but different models should be used based on the time periods involved and the nature of petroleum products. These findings also imply that in the presence of asymmetric and persistent volatility, policy measures should be taken to accommodate long lasting effects of shocks to the volatility. And since negative effects of shocks are not fully compensated by positive shocks, counter-cyclical policies should be taken to counter the pessimistic and optimistic overreactions of businesses to ensure a stable business environment.

Roland Füss[[4]] states that the various value-at-risk (VAR) approaches for commodity futures investments: conventional VAR, the Cornish-Fisher (CF) VAR, GARCH-type VAR models, and semi-parametric conditional autoregressive value-at-risk (CAVAR) models, which do not depend on the assumption of normally distributed error terms. A model comparison reveals that determining the best VAR model depends strongly on the underlying return series. Our

[3] Fardous Alom, Bert D Ward and Baiding Hu in Modelling Petroleum Future Price VolatilityVol. 36, Issue 1, pp. 1-24, 2012

results suggest that the CAVAR and GARCH-type models generally outperform the other VARs. These models can incorporate time-varying volatility adequately and are sensitive to changes in the return-generating process. This has important implications for the risk management of portfolios involving passive long-only commodity futures positions with heavy-tailed data-generating processes.

Chaker Alouil[5] states that Using two alternative approaches, volatility spillovers between crude oil markets and major stock markets. The first approach is based on the two-step technique suggested by Cheung and Ng (1996), and the second approach is founded on a multivariate generalized autoregressive conditional heteroskedasticity (GARCH)-type process. Theempirical investigations were focused on West Texas Intermediate (WTI) and Brent crude oil cash prices and six major stock indexes, covering daily frequency data for the period 1989-2007. The findings indicate that oil price volatility has, in general, a negative impact on stock market behavior. Also, some asymmetry and persistence on oil price volatility have been detected. These results are consistent with those of previous empirical studies and have many practical implications for managing international portfolios and hedging risk on internationaequity and crude oil markets.

David J. Ramberg [6] states that Several recent studies establish that crude oil and natural gas prices are Co integrated. Yet at times in the past, and very powerfully in the last two years, many voices have noted that the two prices series appear to have "decoupled". They explore the apparent contradiction between these two views. We find that recognition of the statistical fact of cointegration needs to be tempered with two additional points. First, there is an enormous amount of unexplained volatility in natural gas prices at short horizons. Hence, any simple formulaic relationship between the prices will leave a large portion of the price of natural gas unexplained. Second, the co integrating relationship does not appear to be stable through time. The prices may be tied, but the relationship can shift dramatically over time. Therefore, although the two price series are co integrated, the confidence intervals for both short and long time horizons are large.

Takashi Kanamura[7] states that a new volatility model for energy prices explicitly characterized by the supply-demand relationship, which they call a Supply and Demand based Volatility (SDV) model. They show that the supply curve shape of energy in the SDV model produces the characteristics of the volatility in energy prices. Especially, it is found that the inverse Box-Cox transformation supply curve reflecting energy markets appropriately causes the inverseleverage effect often seen in the markets. The SDV model is also used to show that an existing (G)ARCH-M model has foundation on the supply-demand relationship.

Chia - Lin Chang and Michael McAleer [8] states that Crude oil price volatility has been analyzed extensively for organized spot, forward and futures markets for well over a decade,and is crucial for forecasting volatility and Value-at-Risk (VaR). There are four major benchmarks in the international oil market, namely West Texas Intermediate (USA), Brent (North Sea), Dubai/Oman (Middle East), and Tapis (Asia-Pacific), which are likely to be highly correlated. The volatility spillover effects across and within the four markets, using

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6 David J. Ramberg in the Weak Tie Between Natural Gas and Oil Prices November 9, 2010

7 Takashi Kanamura in A Supply and Demand Based Volatility Model for Energy Prices September 17 2006.

three multivariate GARCH models, namely the CCC, VARMA-GARCH and VARMA-AGARCH models. A rolling window approach is used to forecast the 1-dayahead conditional correlations. The forecasted conditional correlations between pairs of crude oil returns have both positive and negative trends.

CHAPTER-3

ANALYSIS AND INTERPRETATION

HISTORICAL VOLATILITY OF CRUDE OIL

The price volatility of crude oil is calculated using the formula given in the process of analysis of data. The tabulated analysis for the period JAN2012-MAR2012 is given below.

Table 1.1:

Table showing historical volatility of crude oil for the month of JAN 2012

DATE	Pi	LOG(Pi/Pi-1)	(LOGSi-ALOG)	(LOGSi-ALOG)2
31-Dec	5329			
02-Jan	5362	0.002681089	0.002556549	0.00000653
03-Jan	5494	0.010561845	0.010437305	0.000108937
04-Jan	5507	0.001026421	0.000901881	0.00000081
05-Jan	5504	-0.000236651	-0.000361191	1.30459E-07
06-Jan	5416	-0.00699977	-0.00712431	0.00005075
07-Jan	5433	0.001361049	0.001236509	0.00000152
09-Jan	5369	-0.005146301	-0.005270841	0.00002778
10-Jan	5397	0.002259014	0.002134474	0.00000455
11-Jan	5355	-0.003392943	-0.003517483	0.00001237
12-Jan	5335	-0.001625051	-0.001749591	0.00000306
13-Jan	5173	-0.013391945	-0.013516485	0.000182695
14-Jan	5198	0.002093797	0.001969257	0.00000387
16-Jan	5216	0.001501308	0.001376768	0.00000189
17-Jan	5195	-0.001752031	-0.001876571	0.00000352
18-Jan	5168	-0.002263047	-0.002387587	0.0000057
19-Jan	5155	-0.001093835	-0.001218375	0.00000148
20-Jan	5070	-0.00722071	-0.00734525	0.00000539
21-Jan	5155	0.00722071	0.00709617	0.00000503
23-Jan	5043	-0.009539701	-0.009664241	0.00000933
24-Jan	5083	0.003431142	0.003306602	0.00001093
25-Jan	5045	-0.003258939	-0.003383479	0.00001144
27-Jan	5062	0.00146097	0.00133643	0.00000178
28-Jan	5020	-0.003618424	-0.003742964	0.000014
30-Jan	5017	-0.000259616	-0.000384156	0.00000014
31-Jan	5022	0.000432607	0.000308067	0.00000009
	AVERAGE	**0.003113697**	**SSD**	**0.000473692**
	ALOG	**0.000124548**		
	TP	**64**		
	HV(%)	**28.432979**		

Table 1.2:

Table showing historical volatility of crude oil for the month of FEB 2012

DATE	Pi	LOG(Pi/Pi-1)	(LOGSi-ALOG)	(LOGSi-ALOG)2
01-Feb	4946	-0.006622596	-0.0072004	0.00005184
02-Feb	4810	-0.012109036	-0.01268684	0.000160956
03-Feb	4825	0.001352241	0.000774441	0.00000059
04-Feb	4852	0.002423475	0.001845675	0.0000034
06-Feb	4859	0.000626107	4.83069E-05	0.00000002
07-Feb	4952	0.008233737	0.007655937	0.00005861
08-Feb	4964	0.001051137	0.000473337	0.00000022
09-Feb	5032	0.00590886	0.00533106	0.00002842
10-Feb	4997	-0.003031283	-0.00360908	0.00001302
11-Feb	5017	0.001734752	0.001156952	0.00000133
13-Feb	5042	0.00215874	0.00158094	0.00000249
14-Feb	5074	0.002747622	0.002169822	0.0000047
15-Feb	5109	0.00298544	0.00240764	0.00000579
16-Feb	5155	0.003892767	0.003314967	0.00001098
17-Feb	5187	0.002687578	0.002109778	0.00000445
18-Feb	5235	0.004000438	0.003422638	0.00001171
20-Feb	5260	0.002069058	0.001491258	0.00000222
21-Feb	5265	0.000412631	-0.00016517	0.00000002
22-Feb	5293	0.002303518	0.001725718	0.00000297
23-Feb	5330	0.003025315	0.002447515	0.00000599
24-Feb	5419	0.007191942	0.006614142	0.00004374
25-Feb	5454	0.002795983	0.002218183	0.00000492
27-Feb	5440	-0.001116234	-0.00169403	0.00000286
28-Feb	5378	-0.004978102	-0.0055559	0.00003086
29-Feb	5282	-0.007822401	-0.0084002	0.00007056
	AVERAGE	**-0.014444997**	**SSD**	**0.00052266**
	ALOG	**-0.0005778**		
	TP	**64**		
	HV(%)	**29.866647**		

Table 1.3:

Table showing historical volatility of crude oil for the month of MAR 2012

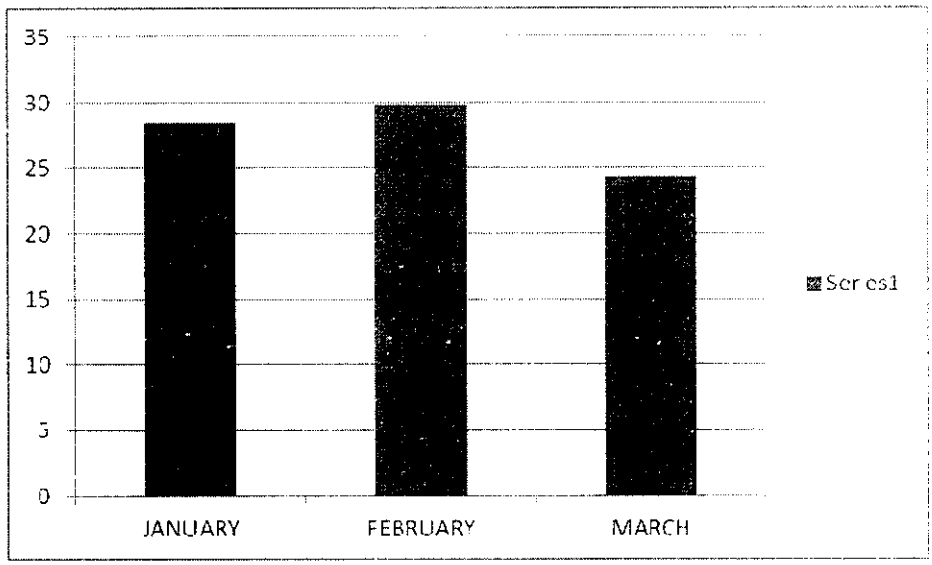
DATE	Pi	LOG(Pi/Pi-1)	(LOGSi-ALOG)	(LOGSi-ALOG)2
29-Feb	5282			
01-Mar	5388	0.00862919	0.00839173	0.00007042
02-Mar	5346	-0.003398633	-0.003636093	0.00001322
03-Mar	5359	0.001054803	0.000817343	0.00000066
05-Mar	5395	0.002907692	0.002670232	0.00000071
06-Mar	5381	-0.001128457	-0.001365917	0.00000186
07-Mar	5403	0.001771975	0.001534515	0.00000235
08-Mar	5413	0.00080306	0.0005656	0.00000031
09-Mar	5407	-0.000481658	-0.000719118	0.00000051
10-Mar	5406	-8.03282E-05	-0.000317788	0.0000001
12-Mar	5389	-0.001367858	-0.001605318	0.00000257
13-Mar	5399	0.000805144	0.000567684	0.00000032
14-Mar	5400	8.04324E-05	-0.000157028	0.00000002
15-Mar	5353	-0.003796516	-0.004033976	0.00001322
16-Mar	5391	0.003072088	0.002834628	0.00000802
17-Mar	5427	0.00289049	0.00265303	0.00000703
19-Mar	5455	0.002234933	0.001997473	0.00000398
20-Mar	5395	-0.004803306	-0.005040766	0.0000254
21-Mar	5443	0.003846885	0.003609425	0.00001302
22-Mar	5418	-0.001999334	-0.002236794	0.000005
23-Mar	5499	0.006444719	0.006207259	0.00003853
24-Mar	5487	-0.000948759	-0.001186219	0.00001407
26-Mar	5480	-0.000554402	-0.000791862	0.00000062
27-Mar	5473	-0.00055511	-0.00079257	0.00000062
28-Mar	5397	-0.00607303	-0.00631049	0.00003982
29-Mar	5293	-0.008450524	-0.008687984	0.00007548
30-Mar	5301	0.00065591	0.00041845	0.00000017
31-Mar	5274	-0.002217679	-0.002455139	0.00000602
	AVERAGE	**0.006411511**	**SSD**	**0.00034343**
	ALOG	**0.000237463**		
	TP	**64**		
	HV(%)	**24.209926**		

HISTORICAL VOLATILITY OF CRUDE OIL (JAN2012-MAR2012)

This diagram shows the historical price volatility of crude oil for the period of JAN2012-MAR2012.

Table 1.1

Chart showing historical volatility of crude oil



INTERPRETATION:

The chart above shows the historical volatility of crude oil from JAN 2012-MAR 2012. The historical volatility is increased in the month February i.e. 29.86% and decreased in the month of March i.e. 24.20%. If the over all average of volatility for three months it seems to be 27.49%. Where the highest volatility is compared with the average it seems1.08 times more than the average.

HISTORICAL VOLATILITY OF NATURAL GAS

The price volatility of natural gas is calculated using the formula given in the process of analysis of data. The tabulated analysis for the period JAN2012-MAR2012 is given below.

Table 1.4:

Table showing historical volatility of natural gas for the month of JAN 2012

DATE	Pi	LOG(Pi/Pi-1)	(LOGSi-ALOG)	(LOGSi-ALOG)2
31-Dec	167.4			
02-Jan	170.5	0.00796893	0.007857259	0.00006173
03-Jan	169.1	-0.003580776	-0.003692447	0.00001363
04-Jan	173.4	0.010905486	0.010793815	0.000116506
05-Jan	167.5	-0.015034282	-0.015145953	0.0002294
06-Jan	171	0.008981299	0.008869628	0.00007867
07-Jan	171.3	0.000761253	0.000649582	0.00000042
09-Jan	168.9	-0.006127713	-0.006239384	0.00003892
10-Jan	161.5	-0.019457123	-0.019568794	0.000382938
11-Jan	152.9	-0.023765041	-0.023876712	0.000570097
12-Jan	148.6	-0.012388676	-0.012500347	0.000156259
13-Jan	148.7	0.000292159	0.000180488	0.00000003
14-Jan	147.3	-0.004108222	-0.004219893	0.0000178
16-Jan	141.2	-0.01836805	-0.018479721	0.0003415
17-Jan	136	-0.016295788	-0.016407459	0.000269205
18-Jan	135.3	-0.002241112	-0.002352783	0.00000553
19-Jan	129.7	-0.018357821	-0.018469492	0.000341122
20-Jan	129.6	-0.000334975	-0.000446646	0.0000001
21-Jan	130.5	0.00300551	0.002893839	0.00000837
23-Jan	137.9	0.023953755	0.023842084	0.000568445
24-Jan	142.2	0.01333533	0.013223659	0.000174865
25-Jan	145.2	0.00906702	0.008955349	0.00008019
27-Jan	142	-0.009678272	-0.009789943	0.00009584
28-Jan	143.9	0.00577245	0.005660779	0.00003204
30-Jan	145	0.003307208	0.003195537	0.00001021
31-Jan	133.5	-0.035886737	-0.035998408	0.001295885
	AVERAGE	**-0.027917807**	**SSD**	**0.004889702**
	ALOG	**-0.001116712**		
	TP	**64**		
	HV(%)	**91.351471**		

Table 1.5:

Table showing historical volatility of natural gas for the month of FEB 2012

DATE	Pi	LOG(Pi/Pi-1)	(LOGSi-ALOG)	(LOGSi-ALOG)2
31-Jan	133.5			
01-Feb	145	0.035886737	0.033986207	0.00115506
02-Feb	133.5	-0.035886737	-0.037787267	0.00142788
03-Feb	128.2	-0.017593241	-0.019493771	0.00038001
04-Feb	133.3	0.016942124	0.015041594	0.00022625
06-Feb	132.9	-0.001305168	-0.003205698	0.00001027
07-Feb	134	0.003579817	0.001679287	0.00000028
08-Feb	131.9	-0.006860003	-0.008760533	0.00007674
09-Feb	131.6	-0.000988906	-0.002889436	0.00000834
10-Feb	133.9	0.007524688	0.005624158	0.00003163
11-Feb	128.2	-0.018892552	-0.020793082	0.00043235
13-Feb	131.4	0.01070734	0.00880681	0.00007756
14-Feb	135.4	0.013023299	0.011122769	0.00012372
15-Feb	130.6	-0.015675487	-0.017576017	0.00030892
16-Feb	135.8	0.016956593	0.015056063	0.00022669
17-Feb	141.7	0.01847008	0.01656955	0.00027455
18-Feb	142.6	0.002749675	0.000849145	0.00000072
20-Feb	157.6	0.043436688	0.041536158	0.00172525
21-Feb	136.8	-0.061470116	-0.063370646	0.00401584
22-Feb	136.4	-0.001271727	-0.003172257	0.00001006
23-Feb	136.3	-0.000318514	-0.002219044	0.00000492
24-Feb	133	-0.010644215	-0.012544745	0.00015737
25-Feb	133.7	0.002279766	0.000379236	0.00000014
27-Feb	132	-0.005557476	-0.007458006	0.00005562
28-Feb	125.3	-0.02262286	-0.02452339	0.0006014
29-Feb	128.7	0.011627476	0.009726946	0.00009416
	AVERAGE	**0.047514212**	**SSD**	**0.01142573**
	ALOG	**0.001900568**		
	TP	**64**		
	HV(%)	**139.642087**		

Table 1.6:

Table showing historical volatility of natural gas for the month of MAR 2012

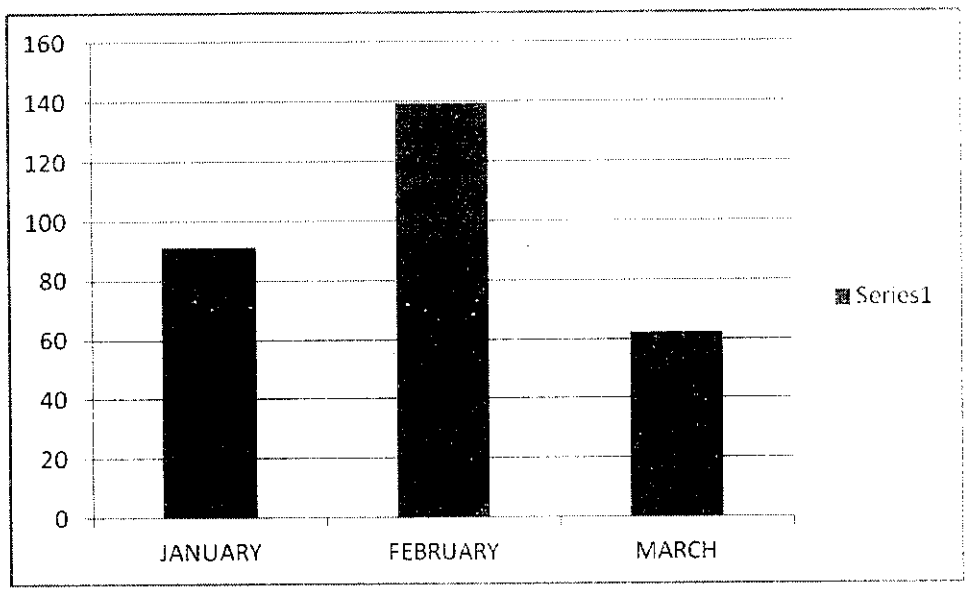
DATE	Pi	LOG(Pi/Pi-1)	(LOGSi-ALOG)	(LOGSi-ALOG)2
29-Feb	128.7			
01-Mar	122.9	-0.020026664	-0.020657554	0.00042673
02-Mar	124.8	0.006662702	0.006031812	0.00003638
03-Mar	124.4	-0.001394205	-0.002025095	0.0000041
05-Mar	119.3	-0.018179937	-0.018810827	0.00035385
06-Mar	120.7	0.005066826	0.004435936	0.00001968
07-Mar	117.3	-0.012409258	-0.013040148	0.00017005
08-Mar	114	-0.012393161	-0.013024051	0.00016963
09-Mar	115.8	0.006803708	0.006172818	0.0000381
10-Mar	116	0.00074943	0.00011854	0.00000001
12-Mar	113.4	-0.009844935	-0.010475825	0.00010974
13-Mar	112.3	-0.004233298	-0.004864188	0.00002366
14-Mar	116.7	0.0166911	0.01606021	0.00025793
15-Mar	115.5	-0.004488872	-0.005119762	0.00002621
16-Mar	116.7	0.004488872	0.003857982	0.00001488
17-Mar	115.5	-0.004488872	-0.005119762	0.00002621
19-Mar	118.8	0.012234456	0.011603566	0.00013464
20-Mar	119.2	0.001459815	0.000828925	6.8712E-07
21-Mar	118.5	-0.002557905	-0.003188795	0.00001016
22-Mar	118.1	-0.001468453	-0.002099343	0.0000044
23-Mar	117.9	-0.000736093	-0.001366983	0.00000186
24-Mar	117.4	-0.001845708	-0.002476598	0.00000613
26-Mar	114.8	-0.009726209	-0.010357099	0.00010727
27-Mar	111.4	-0.013056697	-0.013687587	0.00018735
28-Mar	111.4	0	-0.00063089	0.00000039
29-Mar	116.3	0.018694524	0.018063634	0.00032629
30-Mar	115.7	-0.002246356	-0.002877246	0.00000827
31-Mar	116.5	0.002992566	0.002361676	0.00000557
	AVERAGE	**-0.017034098**	**SSD**	**0.0024702**
	ALOG	**-0.000630893**		
	TP	**64**		
	HV(%)	**62.382009**		

HISTORICAL VOLATILITY OF NATURAL GAS (JAN2012-MAR2012)

This diagram shows the historical price volatility of natural gas for the period of JAN2012-MAR2012.

Table 1.2

Chart showing historical volatility of natural gas



INTERPRETATION :

The chart above shows the historical volatility of natural gas from JAN2012-MAR2012. The historical volatility is increased in the month February i.e. 139.64% and decreased in the month of March i.e. 62.38%. If the over all average of volatility for three months it seems to be 97.79%. Where the highest volatility is compared with the average it seems 0.700times more than the average.

HISTORICAL VOLATILITY OF COPPER :

The price volatility of copper is calculated using the formula given in the process of analysis of data. The tabulated analysis for the period JAN2012-MAR2012 is given below.

Table 1.7

Table showing historical volatility of copper for the month of JAN 2012

DATE	Pi	LOG(Pi-Pi-1)	(LOGSi-ALOG)	(LOGSi-ALOG)2
31-Dec	408.4			
02-Jan	411.6	0.003389633	0.003381853	0.00001143
03-Jan	417.65	0.00633712	0.00632934	0.00004006
04-Jan	407.5	-0.010684873	-0.01069265	0.000114333
05-Jan	406.3	-0.001280791	-0.00128857	0.00000166
06-Jan	405.3	-0.001070219	-0.001078	0.00000162
07-Jan	405.8	0.000535439	0.000527659	0.00000027
09-Jan	402.95	-0.003060883	-0.00306866	0.00000941
10-Jan	407.75	0.00514281	0.00513503	0.00002636
11-Jan	411.15	0.003606325	0.003598545	0.00001294
12-Jan	420.3	0.009559095	0.009551315	0.00009122
13-Jan	419.5	-0.000827425	-0.0008352	0.00000069
14-Jan	419.65	0.000155262	0.000147482	0.00000002
16-Jan	422.05	0.002476677	0.002468897	0.00000609
17-Jan	423.4	0.001386949	0.001379169	0.0000019
18-Jan	422.8	-0.000615875	-0.00062366	0.00000038
19-Jan	427.55	0.004851932	0.004844152	0.00002346
20-Jan	421.15	-0.006550106	-0.00655789	0.000043
21-Jan	421.85	0.000721248	0.000713468	0.0000005
23-Jan	424.9	0.003128678	0.003120898	0.00000974
24-Jan	426.1	0.001224803	0.001217023	0.00000148
25-Jan	427	0.000916341	0.000908561	0.00000082
27-Jan	429.6	0.002636398	0.002628618	0.0000069
28-Jan	429.7	0.000101081	9.3301E-05	0.0000008
30-Jan	425.85	-0.003908702	-0.00391648	0.00001533
31-Jan	422.35	-0.003584153	-0.00359193	0.0000129
	AVERAGE	**-0.00019452**	**SSD**	**0.00043331**
	ALOG	**-0.00000778**		
	TP	**64**		
	HV(%)	**27.194132**		

Table 1.8

Table showing historical volatility of copper for the month of FEB 2012

DATE	Pi	LOG(Pi/Pi-1)	(LOGSi-ALOG)	(LOGSi-ALOG)2
31-Jan	422.35			
01-Feb	423.45	0.001129639	0.001048739	0.00000109
02-Feb	416.8	-0.006874427	-0.00695533	0.00004837
03-Feb	424.15	0.007591761	0.007510861	0.00005641
04-Feb	424.1	-0.00005119	-0.0001321	0.00000001
06-Feb	423.8	-0.00030732	-0.00038822	0.00000015
07-Feb	426.1	0.002350582	0.002269682	0.00000515
08-Feb	429.8	0.003754877	0.003673977	0.00001349
09-Feb	439.15	0.009346476	0.009265576	0.00008585
10-Feb	429.9	-0.009245442	-0.00932634	0.00008698
11-Feb	430.15	0.000252482	0.000171582	0.0000008
13-Feb	424.85	-0.005384305	-0.0054652	0.00002986
14-Feb	423.65	-0.001228412	-0.00130931	0.00000171
15-Feb	421.7	-0.00200361	-0.00208451	0.00000434
16-Feb	421.3	-0.000412142	-0.00049304	0.00000024
17-Feb	412.25	-0.009430795	-0.00951169	0.00009047
18-Feb	413.15	0.000947093	0.000866193	0.00000075
20-Feb	414.6	0.001521541	0.001440641	0.00000207
21-Feb	421.9	0.007580228	0.007499328	0.00005623
22-Feb	422.9	0.00102816	0.00094726	0.00000089
23-Feb	418.9	-0.004127325	-0.00420822	0.0000177
24-Feb	423.1	0.004332665	0.004251765	0.00001807
25-Feb	422.65	-0.000462152	-0.00054305	0.00000029
27-Feb	426.65	0.004090877	0.004009977	0.00001607
28-Feb	428.65	0.002031078	0.001950178	0.0000038
29-Feb	425.55	-0.003152233	-0.00323313	0.00001045
	AVERAGE	**-0.002022595**	**SSD**	**0.00055124**
	ALOG	**-0.0000809**		
	TP	**64**		
	HV(%)	**30.672185**		

Table 1.9

Table showing historical volatility of copper for the month of MAR 2012

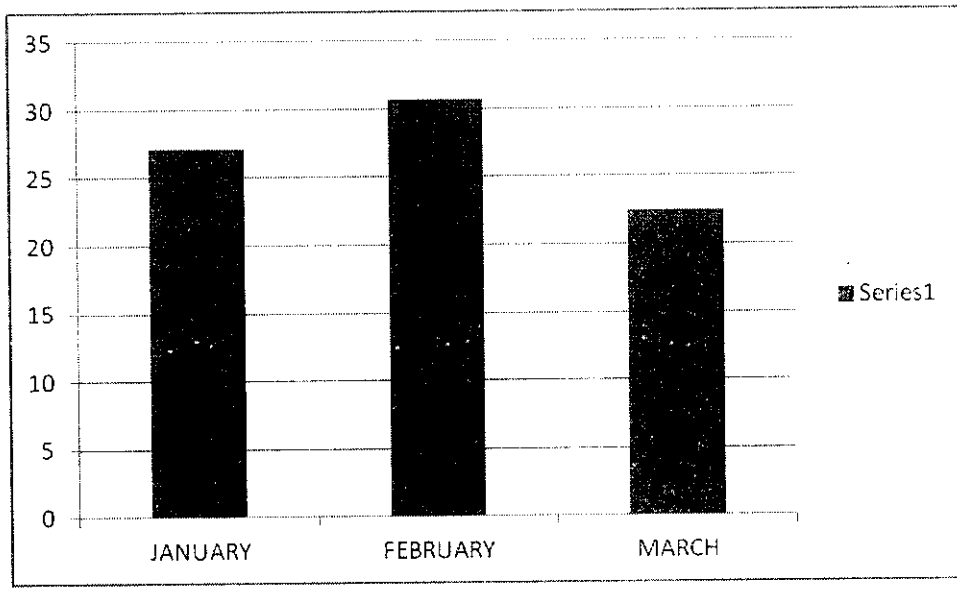
DATE	Pi	LOG(Pi/Pi-1)	(LOGSi-ALOG)	(LOGSi-ALOG)2
29-Feb	425.55			
01-Mar	430.8	0.0053251	0.00511297	0.00002614
02-Mar	431.5	0.000705105	0.000492975	0.00000024
03-Mar	431.65	0.000150945	-6.11848E-05	0.00000003
05-Mar	428.65	-0.003028917	-0.003241047	0.0000105
06-Mar	422.1	-0.006687476	-0.006899606	0.0000476
07-Mar	421.9	-0.000205827	-0.000417957	0.00000015
08-Mar	422.55	0.000668581	0.000456451	0.0000002
09-Mar	427.1	0.004651465	0.004439335	0.0000197
10-Mar	426.5	-0.000610536	-0.000822666	0.00000067
12-Mar	427.4	0.000915482	0.000703352	0.00000049
13-Mar	432.2	0.004850245	0.004638115	0.00002151
14-Mar	429	-0.00322747	-0.0034396	0.00001183
15-Mar	434.6	0.00563243	0.0054203	0.00002937
16-Mar	432.15	-0.002455205	-0.002667335	0.00000711
17-Mar	432.2	5.02452E-05	-0.000161885	0.0000026
19-Mar	434.85	0.002654712	0.002442582	0.00000596
20-Mar	430.4	-0.004467212	-0.004679342	0.00002189
21-Mar	431	0.000605008	0.000392878	0.00000015
22-Mar	429.9	-0.001109825	-0.001321955	0.00000174
23-Mar	432.1	0.002216821	0.002004691	0.00000401
24-Mar	432.15	5.0251E-05	-0.000161879	0.00000002
26-Mar	440.1	0.007916851	0.007704721	0.00005936
27-Mar	437.3	-0.002771891	-0.002984021	0.00000089
28-Mar	430.7	-0.006604606	-0.006816736	0.00004646
29-Mar	431.75	0.001057474	0.000845344	0.00000071
30-Mar	431.25	-0.000503238	-0.000715368	0.00000051
31-Mar	431.65	0.000402637	0.000190507	0.00000003
	AVERAGE	**0.005727737**	**SSD**	**0.00031987**
	ALOG	**0.000212138**		
	TP	**64**		
	HV(%)	**22.448124**		

HISTORICAL VOLATILITY OF COPPER (JAN2012-MAR2012)

This diagram shows the historical price volatility of copper for the period of JAN 2012-MAR 2012.

Table1.3

Chart showing historical volatility of copper



INTERPRETATION :

The chart above shows the historical volatility of copper from JAN 2012-MAR 2012. The historical volatility is increased in the month February i.e. 30.67% and decreased in the month of March i.e. 22.44%. If the over all average of volatility for three months it seems to be 26.77%. Where the highest volatility is compared with the average it seems 1.14 times more than the average.

HISTORICAL VOLATILITY OF ALUMINIUM :

The price volatility of aluminium is calculated using the formula given in the process of analysis of data. The tabulated analysis for the period JAN2012-MAR2012 is given below.

Table 1.0

Table showing historical volatility of aluminium for the month of JAN 2012

DATE	Pi	LOG(Pi/Pi-1)	(LOGSi-ALOG)	(LOGSi-ALOG)2
31-Dec	107.35			
02-Jan	109	0.006624449	0.006439889	0.00004147
03-Jan	110.3	0.005149014	0.004964454	0.00002464
04-Jan	111.2	0.003529275	0.003344715	0.00001118
05-Jan	109.55	-0.006492405	-0.006676965	0.00004458
06-Jan	109.55	0	-0.00018456	0.00000007
07-Jan	110.1	0.002174937	0.001990377	0.00000396
09-Jan	111.95	0.007236779	0.007052219	0.00004973
10-Jan	112.45	0.001935362	0.001750802	0.00000306
11-Jan	112.55	0.00038604	0.00020148	0.00000007
12-Jan	113.5	0.003650362	0.003465802	0.00001201
13-Jan	111.5	-0.007720994	-0.007905554	0.00006249
14-Jan	111.95	0.001749231	0.001564671	0.00000244
16-Jan	111.85	-0.000388109	-0.000572669	0.00000032
17-Jan	111.85	0	-0.00018456	0.00000003
18-Jan	112.4	0.002130323	0.001945763	0.00000378
19-Jan	112.75	0.001350239	0.001165679	0.00000135
20-Jan	112.1	-0.002510938	-0.002695498	0.00000726
21-Jan	112.1	0	-0.00018456	0.00000003
23-Jan	112.3	0.000774144	0.000589584	0.00000034
24-Jan	112.55	0.000965743	0.000781183	0.00000061
25-Jan	113.1	0.002117106	0.001932546	0.00000373
27-Jan	112.6	-0.001924214	-0.002108774	0.00000444
28-Jan	112.7	0.000385526	0.000200966	0.00000004
30-Jan	113.55	0.003263223	0.003078663	0.00000947
31-Jan	112.35	-0.004614062	-0.004798622	0.00002302
	AVERAGE	**-0.004614062**	**SSD**	**0.00031012**
	ALOG	**-0.000184562**		
	TP	**64**		
	HV(%)	**23.005900**		

Table 2.1

Table showing historical volatility of aluminium for the month of FEB 2012

DATE	Pi	LOG(Pi/Pi-1)	(LOGSi-ALOG	(LOGSi-ALOG)2
31-Jan	113.55			
01-Feb	112.3	-0.004807382	-0.004992022	0.00002492
02-Feb	109.05	-0.012754086	-0.012938726	0.000167411
03-Feb	110.1	0.004161649	0.003977009	0.00001581
04-Feb	110	-0.000394634	-0.000579274	0.00000033
06-Feb	109.3	-0.002772523	-0.002957163	0.00000874
07-Feb	110.95	0.006507145	0.006322505	0.00003997
08-Feb	111	0.000195672	1.10322E-05	0.00000001
09-Feb	112.85	0.007178585	0.006993945	0.00004891
10-Feb	111.7	-0.00444839	-0.00463303	0.00002146
11-Feb	111.95	0.000970925	0.000786285	0.00000061
13-Feb	109.7	-0.00881747	-0.00900211	0.00008103
14-Feb	109.75	0.000197901	1.32613E-05	0.00000001
15-Feb	109.2	-0.002181891	-0.002366531	0.0000056
16-Feb	107.8	-0.005603878	-0.005788518	0.0000335
17-Feb	106.8	-0.004047508	-0.004232148	0.00001791
18-Feb	107	0.000812525	0.000627885	0.00000039
20-Feb	107.65	0.002630256	0.002445616	0.00000598
21-Feb	110	0.009378651	0.009194011	0.00008452
22-Feb	111.5	0.005882182	0.005697542	0.00003246
23-Feb	111.2	-0.00117008	-0.00135472	0.00000183
24-Feb	111.9	0.002725299	0.002540659	0.00000645
25-Feb	112.65	0.00290111	0.00271647	0.00000737
27-Feb	113.85	0.004601839	0.004417199	0.00001951
28-Feb	113.5	-0.001337173	-0.001521813	0.00000231
29-Feb	113.55	0.000191277	6.63703E-06	0.00000004
	AVERAGE	**-0.004616105**	**SSD**	**0.00062708**
	ALOG	**-0.000184644**		
	TP	**64**		
	HV(%)	**32.714190**		

Table 2.2

Table showing historical volatility of aluminium for the month of MAR 2012

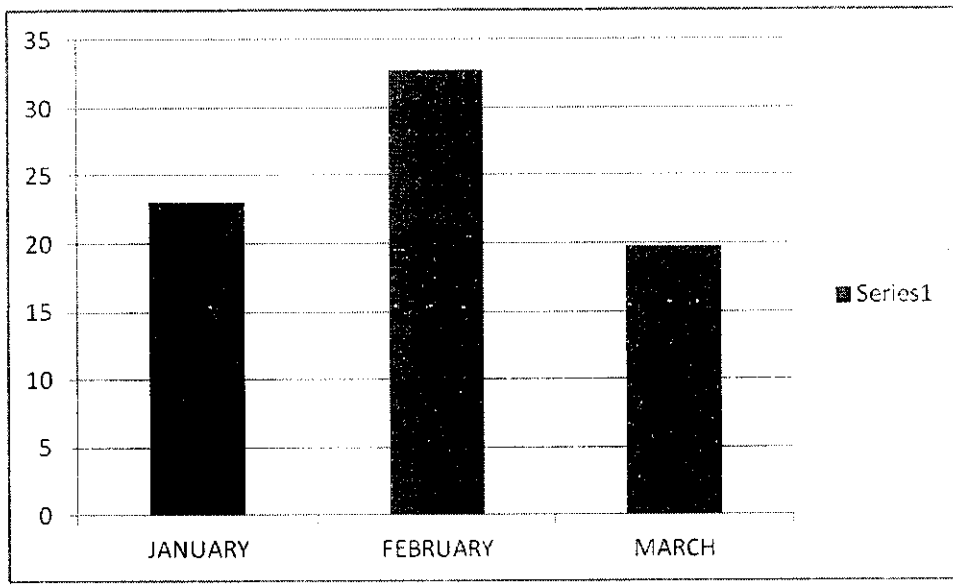
DATE	Pi	LOG(Pi/Pi-1)	(LOGSi-ALOG)	(LOGSi-ALOG)2
29-Feb	113.5			
01-Mar	114.65	0.004378198	0.004351468	0.00001893
02-Mar	114.3	-0.001327829	-0.001354559	0.00000183
03-Mar	114.35	0.000189939	0.000163209	0.00000002
05-Mar	113.15	-0.004581611	-0.004608341	0.00002123
06-Mar	112.1	-0.004048946	-0.004075676	0.00001661
07-Mar	110.55	-0.006046866	-0.006073596	0.00003688
08-Mar	110	-0.002166062	-0.002192792	0.0000048
09-Mar	110.6	0.002362442	0.002335712	0.00000545
10-Mar	110.7	0.000392494	0.000365764	0.00000013
12-Mar	110.45	-0.000981901	-0.001008631	0.00000101
13-Mar	111.6	0.004498474	0.004471744	0.00001999
14-Mar	110.85	-0.002928497	-0.002955227	0.00000873
15-Mar	111.8	0.003706106	0.003679376	0.00001353
16-Mar	112.1	0.001163809	0.001137079	0.00000129
17-Mar	112.15	0.000193665	0.000166935	0.00000002
19-Mar	112.6	0.001739113	0.001712383	0.00000293
20-Mar	112	-0.002320368	-0.002347098	0.0000055
21-Mar	110.55	-0.005659276	-0.005686006	0.00003233
22-Mar	110.2	-0.001377152	-0.001403882	0.00000197
23-Mar	109.9	-0.001183902	-0.001210632	0.00000146
24-Mar	109.95	0.000197541	0.000170811	0.00000002
26-Mar	110.3	0.001380279	0.001353549	0.00000183
27-Mar	109.9	-0.00157782	-0.00160455	0.00000257
28-Mar	108.95	-0.003770458	-0.003797188	0.00001441
29-Mar	108.15	-0.003200711	-0.003227441	0.00001041
30-Mar	107.35	-0.003224475	-0.003251205	0.00001057
31-Mar	106.45	-0.003656383	-0.003683113	0.00001356
	AVERAGE	**0.000721815**	**SSD**	**0.00024801**
	ALOG	**0.00002673**		
	TP	**64**		
	HV(%)	**19.766414**		

HISTORICAL VOLATILITY OF ALUMINIUM (JAN2012-MAR2012)

This diagram shows the historical price volatility of aluminium for the period of JAN2012-MAR2012.

Table 1.4

Chart showing historical volatility of aluminium



INTERPRETATION :

The chart above shows the historical volatility of aluminium from JAN 2012-MAR 2012. The historical volatility is increased in the month February i.e. 32.71% and decreased in the month of March i.e. 19.76%. If the over all average of volatility for three months it seems to be 25.16. Where the highest volatility is compared with the average it seems 1.30 times more than the average.

HISTORICAL VOLATILITY OF CARDAMOM :

The price volatility of cardamom is calculated using the formula given in the process of analysis of data. The tabulated analysis for the period JAN2012-MAR2012 is given below.

Table 2.3

Table showing historical volatility of cardamom for the month of JAN 2012

DATE	Pi	LOG(Pi/Pi-1)	(LOGSi-ALOG)	(LOGSi-ALOG)2
31-Dec	658.5			
02-Jan	660.7	0.001448528	0.001047878	0.00000109
03-Jan	664.3	0.002359946	0.001959296	0.00000383
04-Jan	660.8	-0.002294218	-0.002694868	0.00000726
05-Jan	653.3	-0.004957376	-0.005358026	0.0000287
06-Jan	644.4	-0.005957126	-0.006357776	0.00004042
07-Jan	640.4	-0.002704208	-0.003104858	0.00000964
09-Jan	642.5	0.001421809	0.001021159	0.00000104
10-Jan	643.9	0.000945293	0.000544643	0.00000029
11-Jan	637.7	-0.004202008	-0.004602658	0.00002118
12-Jan	644.1	0.004336882	0.003936232	0.00001549
13-Jan	648.7	0.003090599	0.002689949	0.00000723
14-Jan	653.1	0.002935786	0.002535136	0.00000642
16-Jan	668.7	0.010251639	0.009850989	0.00009704
17-Jan	659.1	-0.006280012	-0.006680662	0.00004463
18-Jan	657.2	-0.001253757	-0.001654407	0.00000273
19-Jan	663.3	0.004012443	0.003611793	0.00001304
20-Jan	658.1	-0.003418106	-0.003818756	0.00001458
21-Jan	664.5	0.004203094	0.003802444	0.00001445
23-Jan	690.3	0.016542888	0.016142238	0.000260572
24-Jan	678.4	-0.007552034	-0.007952684	0.00006324
25-Jan	688.6	0.006481179	0.006080529	0.00003997
27-Jan	705.2	0.010345285	0.009944635	0.00009889
28-Jan	709.5	0.002640096	0.002239446	0.00000501
30-Jan	721.6	0.007344125	0.006943475	0.00004821
31-Jan	702.8	-0.011464772	-0.011865422	0.000140788
	AVERAGE	**-0.010016244**	**SSD**	**0.00098574**
	ALOG	**-0.00040065**		
	TP	**64**		
	HV(%)	**41.016211**		

Table 2.4

Table showing historical volatility of cardamom for the month of FEB 2012

DATE	Pi	LOG(Pi/Pi-1)	(LOGSi-ALOG)	(LOGSi-ALOG)2
31-Jan	702.8			
01-Feb	710.6	0.00479345	0.00392784	0.00001542
02-Feb	717.5	0.004196702	0.003331092	0.00001109
03-Feb	716	-0.000908883	-0.001774493	0.00000314
04-Feb	744.4	0.016893342	0.016027732	0.000256888
06-Feb	753.1	0.005046283	0.004180673	0.00001747
07-Feb	769.2	0.009186628	0.008321018	0.00006923
08-Feb	794.6	0.014109285	0.013243675	0.000175395
09-Feb	826.3	0.016989192	0.016123582	0.00025997
10-Feb	793.2	-0.017755047	-0.018620657	0.000346729
11-Feb	762.3	-0.017256786	-0.018122396	0.000328421
13-Feb	792.8	0.017037722	0.016172112	0.000261537
14-Feb	806.5	0.00744073	0.00657512	0.00004323
15-Feb	812.8	0.003379323	0.002513713	0.00000631
16-Feb	795.3	-0.009452712	-0.010318322	0.000106468
17-Feb	801.8	0.003535069	0.002669459	0.00000712
18-Feb	813	0.006024494	0.005158884	0.00002661
20-Feb	828.5	0.008201967	0.007336357	0.00005382
21-Feb	846	0.00907785	0.00821224	0.00006744
22-Feb	867.8	0.011049283	0.010183673	0.000103707
23-Feb	900	0.015822864	0.014957254	0.000223719
24-Feb	891.2	-0.004267332	-0.005132942	0.00002634
25-Feb	924.6	0.015978711	0.015113101	0.000228406
27-Feb	961.3	0.016905053	0.016039443	0.000257264
28-Feb	922.8	-0.017751356	-0.018616966	0.000346591
29-Feb	959.3	0.016846859	0.015981249	0.0002554
	AVERAGE	**0.021640309**	**SSD**	**0.00349771**
	ALOG	**0.000865612**		
	TP	**64**		
	HV(%)	**77.262109**		

Table 2.5

Table showing historical volatility of cardamom for the month of MAR 2012

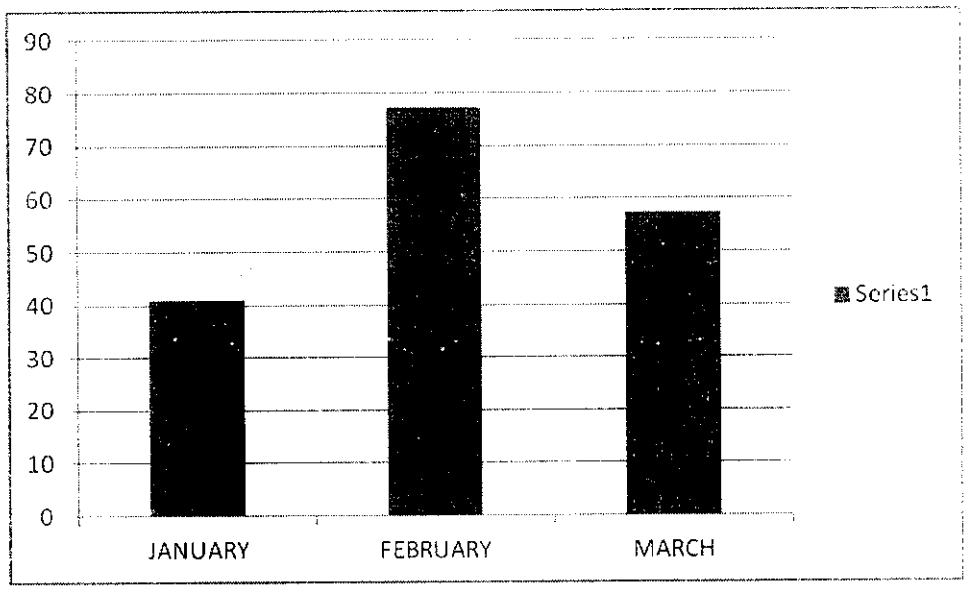
DATE	Pi	LOG(Pi/Pi-1)	(LOGSi-ALOG)	(LOGSi-ALOG)2
29-Feb	959.3			
01-Mar	922.8	-0.016846859	-0.017509209	0.00030657
02-Mar	959.3	0.016846859	0.016184509	0.00026194
03-Mar	947.2	-0.005512755	-0.006175105	0.00003813
05-Mar	958.2	0.005014477	0.004352127	0.00001894
06-Mar	972.4	0.006388784	0.005726434	0.00003279
07-Mar	962.9	-0.004263763	-0.004926113	0.00002426
08-Mar	947.7	-0.006910306	-0.007572656	0.00005734
09-Mar	947.7	0	-0.00066235	0.00000043
10-Mar	916.4	-0.0145858	-0.01524815	0.00023251
12-Mar	906.3	-0.004813101	-0.005475451	0.00002998
13-Mar	936.8	0.014374902	0.013712552	0.00018803
14-Mar	921.2	-0.007292953	-0.007955303	0.00006328
15-Mar	905.3	-0.007561409	-0.008223759	0.00006763
16-Mar	872	-0.016276035	-0.016938385	0.00028691
17-Mar	867.8	-0.002096839	-0.002759189	0.00000761
19-Mar	891.2	0.011555532	0.010893182	0.00011866
20-Mar	882.8	-0.004112853	-0.004775203	0.0000228
21-Mar	900	0.008380185	0.007717835	0.00005956
22-Mar	913.5	0.006466042	0.005803692	3.3683E-05
23-Mar	924.3	0.005104401	0.004442051	0.00001973
24-Mar	917.7	-0.003112221	-0.003774571	0.00001424
26-Mar	928.6	0.005127948	0.004465598	0.00001994
27-Mar	936.8	0.003818203	0.003155853	0.00000995
28-Mar	921.2	-0.007292953	-0.007955303	0.00006328
29-Mar	906.3	-0.007081949	-0.007744299	0.00005997
30-Mar	922.8	0.007835606	0.007173256	0.00005145
31-Mar	920.6	-0.001036615	-0.001698965	0.00000288
	AVERAGE	**-0.017883474**	**SSD**	**0.00209248**
	ALOG	**-0.000662351**		
	TP	**64**		
	HV(%)	**57.414813**		

HISTORICAL VOLATILITY OF CARDAMOM (JAN2012-MAR2012)

This diagram shows the historical price volatility of cardamom for the period of JAN2012-MAR2012.

Table 1.5

Chart showing historical volatility of cardamom



INTERPRETATION :

The chart above shows the historical volatility of cardamom from JAN 2012-MAR 2012. The historical volatility is increased in the month February i.e. 77.26% and decreased in the month of January i.e. 41.01%. If the over all average of volatility for three months it seems to be 58.56%. Where the highest volatility is compared with the average it seems 1.31 times more than the average.

HISTORICAL VOLATILITY OF COTTON :

The price volatility of cotton is calculated using the formula given in the process of analysis of data. The tabulated analysis for the period JAN2012-MAR2012 is given below.

Table2.6

Table showing historical volatility of cotton for the month of JAN 2012

DATE	Pi	LOG(Pi/Pi-1)	(LOGSi-ALOG)	(LOGSi-ALOG)2
31-Dec	17578			
02-Jan	17580	4.94106E-05	-0.000386869	0.00000014
03-Jan	17810	0.005645049	0.005208769	0.00002713
04-Jan	17910	0.002431666	0.001995386	0.00000398
05-Jan	17840	-0.00170074	-0.002137016	0.00000456
06-Jan	17920	0.001943155	0.001506875	0.00000227
07-Jan	18200	0.006733383	0.006297103	0.00003965
09-Jan	18700	0.011770219	0.011333939	0.000128458
10-Jan	18240	-0.01081677	-0.011253053	0.000126631
11-Jan	18440	0.004736083	0.004299803	0.00001848
12-Jan	18510	0.001645502	0.001209222	0.00000146
13-Jan	18360	-0.00353374	-0.003970022	0.00001576
14-Jan	18660	0.007038963	0.006602683	0.00004359
16-Jan	18910	0.005779889	0.005343609	0.00002855
17-Jan	18590	-0.00741214	-0.007848419	0.00006159
18-Jan	18750	0.003721882	0.003285602	0.00001079
19-Jan	18610	-0.0032549	-0.003691179	0.00001362
20-Jan	18340	-0.00634704	-0.006783322	0.00004601
21-Jan	18370	0.000709825	0.000273545	0.00000007
23-Jan	18510	0.003297262	0.002860982	0.00000818
24-Jan	18550	0.000937495	0.000501215	0.00000025
25-Jan	18320	-0.00541844	-0.005854725	0.00003427
27-Jan	17820	-0.01201777	-0.01245405	0.000155103
28-Jan	17790	-0.00073175	-0.001168032	0.00000136
30-Jan	18310	0.012512396	0.012076116	0.000145833
31-Jan	18120	-0.00453015	-0.004966431	0.00002466
	AVERAGE	**-0.01090705**	**SSD**	**0.00094229**
	ALOG	**-0.00043628**		
	TP	**64**		

Table2.7

Table showing historical volatility of cotton for the month of FEB 2012

DATE	Pi	LOG(Pi/Pi-1)	(LOGSi-ALOG)	(LOGSi-ALOG)2
31-Jan	18120			
01-Feb	17890	-0.00554785	-0.00572903	0.00003282
02-Feb	17730	-0.0039016	-0.00408278	0.00001666
03-Feb	17940	0.005113703	0.004932523	0.00002432
04-Feb	18080	0.003375987	0.003194807	0.0000102
06-Feb	18480	0.009503541	0.009322361	0.0000869
07-Feb	18210	-0.00639202	-0.0065732	0.0000432
08-Feb	18330	0.002852519	0.002671339	0.00000713
09-Feb	18310	-0.00047412	-0.0006553	0.00000042
10-Feb	18010	-0.00717463	-0.00735581	0.0000541
11-Feb	18070	0.00144444	0.00126326	0.00000159
13-Feb	17830	-0.00580681	-0.00598799	0.00003585
14-Feb	17690	-0.00342351	-0.00360469	0.00001299
15-Feb	17820	0.003179867	0.002998687	0.00000899
16-Feb	17730	-0.00219896	-0.00238014	0.00000566
17-Feb	17850	0.002929485	0.002748305	0.00000755
18-Feb	17800	-0.00121822	-0.0013994	0.00000195
20-Feb	17800	0	-0.00018118	0.00000003
21-Feb	17650	-0.00367529	-0.00385647	0.00001487
22-Feb	17470	-0.0044518	-0.00463298	0.00002146
23-Feb	17120	-0.00878914	-0.00897032	0.00008046
24-Feb	16910	-0.00536015	-0.00554133	0.0000307
25-Feb	16980	0.001794078	0.001612898	0.0000026
27-Feb	16760	-0.00566367	-0.00584485	0.00003416
28-Feb	17040	0.007195576	0.007014396	0.0000492
29-Feb	17080	0.001018276	0.000837096	0.00000073
	AVERAGE	**-0.00452958**	**SSD**	**0.00058454**
	ALOG	**-0.00018118**		
	TP	**64**		
	HV(%)	**31.585042**		

Table2.8

Table showing historical volatility of cotton for the month of MAR 2012

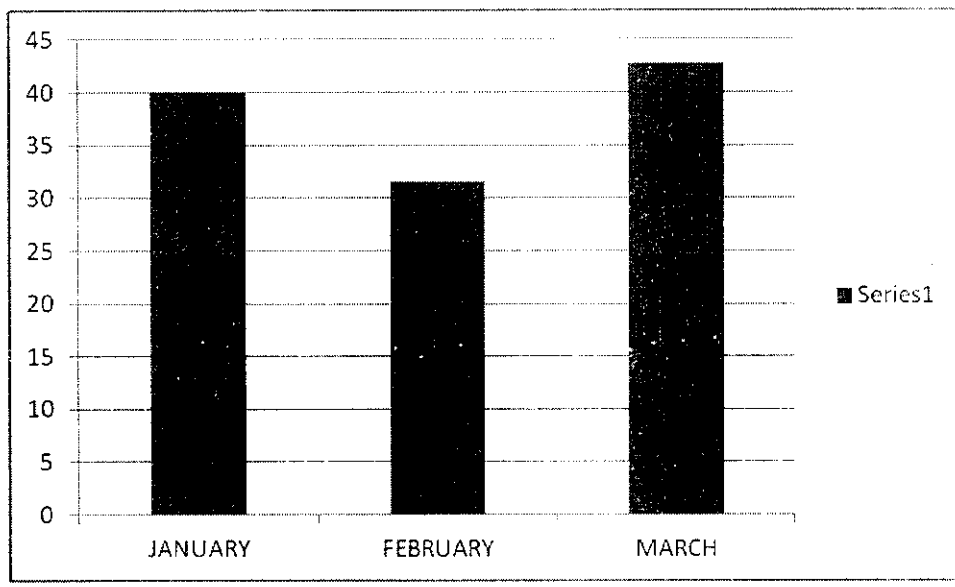
DATE	Pi	LOG(Pi/Pi-1)	(LOGSi-ALOG)	(LOGSi-ALOG)2
29-Feb	17080			
01-Mar	17360	0.007061854	0.006384504	0.00004076
02-Mar	17320	-0.001001833	-0.001679183	0.00000281
03-Mar	17160	-0.004030604	-0.004707954	0.00002216
05-Mar	16470	-0.017823684	-0.018501034	0.000342288
06-Mar	16580	0.002890927	0.002213577	0.00000489
07-Mar	16830	0.00649959	0.00582224	0.00003389
08-Mar	16830	0	-0.00067735	0.00000045
09-Mar	16880	0.001288326	0.000610976	0.00000037
10-Mar	16670	-0.005436842	-0.006114192	0.00003738
12-Mar	16620	-0.00130458	-0.00198193	0.00000392
13-Mar	16580	-0.001046493	-0.001723843	0.00000297
14-Mar	16720	0.003651747	0.002974397	0.00000884
15-Mar	16730	0.000259668	-0.000417682	0.00000017
16-Mar	16930	0.005161017	0.004483667	0.0000201
17-Mar	16870	-0.001541876	-0.002219226	0.00000492
19-Mar	16630	-0.006222833	-0.006900183	0.00004761
20-Mar	16570	-0.001569741	-0.002247091	0.00000504
21-Mar	16550	-0.00052451	-0.00120186	0.00000144
22-Mar	16630	0.002094251	0.001416901	0.000002
23-Mar	16840	0.005449838	0.004772488	0.00002277
24-Mar	16780	-0.001550131	-0.002227481	0.00000496
26-Mar	16780	0	-0.00067735	0.00000045
27-Mar	16590	-0.00494557	-0.00562292	0.00003161
28-Mar	16850	0.006753519	0.006076169	0.00003691
29-Mar	17100	0.006396205	0.005718855	0.0000327
30-Mar	16420	-0.017622958	-0.018300308	0.000334901
31-Mar	16850	0.011226752	0.010549402	0.00011129
	AVERAGE	**0.018288607**	**SSD**	**0.00115759**
	ALOG	**0.000677356**		
	TP	**64**		
	HV(%)	**42.704375**		

HISTORICAL VOLATILITY OF COTTON (JAN2012-MAR2012) :

This diagram shows the historical price volatility of cotton for the period of JAN2012-MAR2012.

Table 1.6

Chart showing historical volatility of cotton



INTERPRETATION :

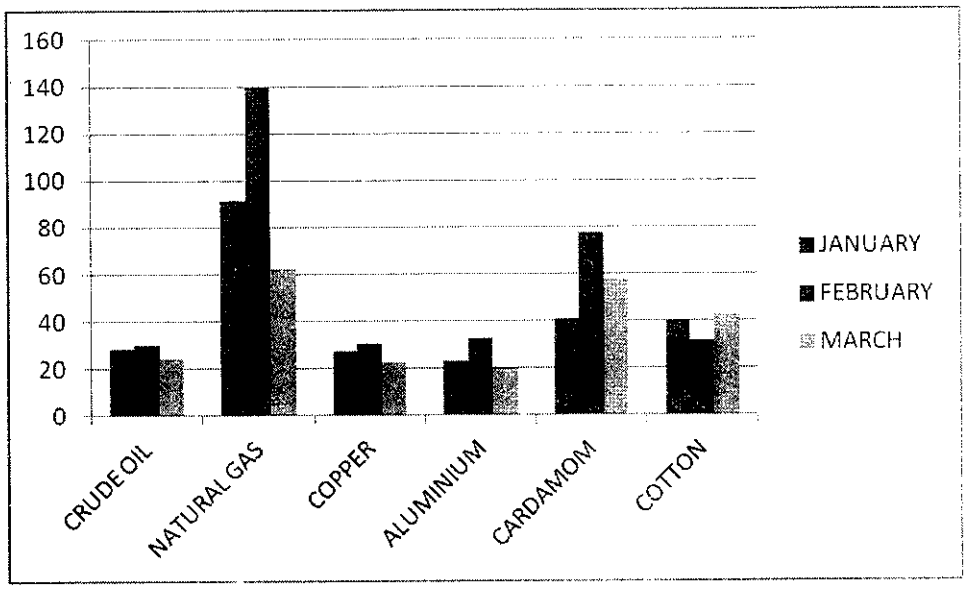
The chart above shows the historical volatility of cotton from JAN2012-MAR2012. The historical volatility is increased in the month March i.e. 42.70% and decreased in the month of February i.e. 31.58%. If the over all average of volatility for three months it seems to be 38.12%. Where the highest volatility is compared with the average it seems 1.12 times more than the average.

ICE VOLATILITY OF COMMODITY MARKET

ble 2.9

Historical price volatility of commodity market

TH	CRUDE OIL	NATURAL GAS	COPPER	ALUMINIUM	CARDAMOM	COTTON
ARY	28.43	91.35	27.19	23	41.01	40.1
UARY	29.86	139.64	30.67	32.71	77.26	31.58
CH	24.2	62.38	22.44	19.76	57.41	42.7



PRICE VOLATILITY

The correlation of volatility is calculated using the formula given in the process Of analysis data . The tabulated analysis for the period (JAN 2012-MAR 2012)

Table 3.0

Table showing price volatility

PRODUCTS	CRUDE OIL	NATURAL GAS	COPPER	ALUMINIUM	CARDAMOM	COTTON
CRUDE OIL	1	.912	.982	.841	.296	-1.00
NATURAL GAS	.912	1	.973	.989	.661	-1.00
COPPER	.982	.973	1	.928	.470	-1.00
ALUMINIUM	.841	.989	.928	1	.765	-1.00
CARDAMOM	.296	.661	.470	.765	1	-1.00
COPPER	-1.00	-1.00	-1.00	-1.00	-1.00	1

INTERPRETATION :

- Crude oil has strong positive relationship with natural gas, copper, aluminium.
- Crude oil has strong negative relationship with cotton.

aluminium and have weak positive relationship with cardamom.

- Copper has strong positive relationship with crude oil, Natural gas, aluminium.
- Copper has weak positive relationship with cardamom.
- Copper has strong negative relationship with cotton.
- Aluminium has strong positive relationship crude oil, natural gas, copper, cardamom and strong negative relationship with cotton.
- Cardamom has weak positive relationship with crude oil, natural gas, copper, aluminium and have strong negative relationship with cotton.
- Cotton has strong negative relationship with crude oil, natural gas, Copper, aluminium and cardamom.

CHAPTER -4

FINDINGS, SUGGESTIONS AND CONCLUSIONS

4.1 FINDINGS

- The historical volatility of crude oil have more volatility in the month of February 2012 is 29.86% and less happened in the month of march 2012 is 24.20%. The average volatility for 3 months it seem 27.49%. When the highest volatility is compared with the average it seems 1.08 times more than the average.
- The historical volatility of natural gas have more volatility in the month of february 2012 is 139.64% and less happened in the month of march 2012 is 62.38%. The average volatility for 3 months it seem 97.79%. When the highest volatility is compared with the average it seems 1.42 times more than the average.
- The historical volatility of copper have more volatility in the month of february 2012 is 30.67% and less happened in the month of march 2012 i.e. 22.44%. The average volatility for 3 months it seem 26.77%. When the highest volatility is compared with the average it seems 1.14 times more than the average.
- The historical volatility of aluminium have more volatility in the month of Feb 2012 is 32.71% and less happened in the month of march 2012 is 19.76%. The average volatility for 3 months it seem 25.16%. When the highest volatility is compared with the average it seems 1.30 times more than the average.
- The historical volatility of cardamom have more volatility in the month of february 2012 is 77.26% and less happened in the month of january 2012 is 41.01%. The average volatility for 3 months it seem 58.56%. When the highest volatility is compared with the average it seems 1.31 times more than the average.
- The historical volatility of cotton have more volatility in the month of march 2012 is 42.70% and less happened in the month of february 2012 is 31.58%. The average volatility for 3 months it seem 38.12%. When the highest volatility is compared with the average it seems 1.12 times more than the average.

4.2 SUGGESTION

It is suggested that always go with the trend, now the trend is in bullish mode. Due to high volatility in natural gas, investors only having surplus money can enter into the markets with pre determined risk and return. The zero sum game of futures trading forces all participants to continuously research the behavior of their peers and to adapt their strategy in an effort to stay ahead in the pursit of excess returns. Investors follow these volatility trends can given a tremendous trading advantage.

4.3 CONCLUSIONS

Holding the positions in the market conform the volume is good. If the investor wants to hold his position it is always better to hold the long position rather than holding the short positions. It gives investors a better basis for estimating future returns and risk.

CHAPTER-5

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APPENDIX

CRUDE OIL

MONTH	CLOSING PRICE	MONTH	CLOSING PRICE	MONTH	CLOSING PRICE
2-JAN	5362	1-FEB	4946	1-MAR	5388
3-JAN	5494	2-FEB	4810	2-MAR	5346
4-JAN	5507	3-FEB	4825	3-MAR	5359
5-JAN	5504	4-FEB	4852	5-MAR	5395
6-JAN	5416	6-FEB	4859	6-MAR	5381
7-JAN	5433	7-FEB	4952	7-MAR	5403
9-JAN	5369	8-FEB	4964	8-MAR	5413
10-JAN	5397	9-FEB	5032	9-MAR	5407
11-JAN	5355	10-FEB	4997	10-MAR	5406
12-JAN	5335	11-FEB	5017	12-MAR	5389
13-JAN	5173	13-FEB	5042	13-MAR	5399
14-JAN	5198	14-FEB	5074	14-MAR	5400
16-JAN	5216	15-FEB	5109	15-MAR	5353
17-JAN	5195	16-FEB	5155	16-MAR	5391
18-JAN	5168	17-FEB	5187	17-MAR	5427
19-JAN	5155	18-FEB	5235	19-MAR	5455
20-JAN	5070	20-FEB	5260	20-MAR	5395
21-JAN	5155	21-FEB	5265	21-MAR	5443
23-JAN	5043	22-FEB	5293	22-MAR	5418
24-JAN	5083	23-FEB	5330	23-MAR	5499
25-JAN	5045	24-FEB	5419	24-MAR	5487
27-JAN	5062	25-FEB	5454	26-MAR	5480
28-JAN	5020	27-FEB	5440	27-MAR	5473
30-JAN	5017	28-FEB	5378	28-MAR	5397
31-JAN	5022	29-FEB	5282	29-MAR	5293
				30-MAR	5301
				31-MAR	5274

NATURAL GAS

MONTH	CLOSING PRICE	MONTH	CLOSING PRICE	MONTH	CLOSING PRICE
2-JAN	170.50	1-FEB	145.00	1-MAR	122.90
3-JAN	169.10	2-FEB	133.50	2-MAR	124.80
4-JAN	173.40	3-FEB	128.20	3-MAR	124.40
5-JAN	167.50	4-FEB	133.30	5-MAR	119.30
6-JAN	171.00	6-FEB	132.90	6-MAR	120.70
7-JAN	171.30	7-FEB	134.00	7-MAR	117.30
9-JAN	168.90	8-FEB	131.90	8-MAR	114.00
10-JAN	161.50	9-FEB	131.60	9-MAR	115.80
11-JAN	152.90	10-FEB	133.90	10-MAR	116.00
12-JAN	148.60	11-FEB	128.20	12-MAR	113.40
13-JAN	148.70	13-FEB	131.40	13-MAR	112.30
14-JAN	147.30	14-FEB	135.40	14-MAR	116.70
16-JAN	141.20	15-FEB	130.60	15-MAR	115.50
17-JAN	136.00	16-FEB	135.80	16-MAR	116.70
18-JAN	135.30	17-FEB	141.70	17-MAR	115.50
19-JAN	129.70	18-FEB	142.60	19-MAR	118.80
20-JAN	129.60	20-FEB	157.60	20-MAR	119.20
21-JAN	130.50	21-FEB	136.80	21-MAR	118.50
23-JAN	137.90	22-FEB	136.40	22-MAR	118.10
24-JAN	142.20	23-FEB	136.30	23-MAR	117.90
25-JAN	145.20	24-FEB	133.00	24-MAR	117.40
27-JAN	142.00	25-FEB	133.70	26-MAR	114.80
28-JAN	143.90	27-FEB	132.00	27-MAR	111.40
30-JAN	145.00	28-FEB	125.30	28-MAR	111.40
31-JAN	133.50	29-FEB	128.70	29-MAR	114.70
				30-MAR	112.35
				31-MAR	115.75

COPPER

MONTH	CLOSING PRICE	MONTH	CLOSING PRICE	MONTH	CLOSING PRICE
2-JAN	411.60	1-FEB	423.45	1-MAR	430.80
3-JAN	417.65	2-FEB	416.80	2-MAR	431.50
4-JAN	407.50	3-FEB	424.15	3-MAR	431.65
5-JAN	406.30	4-FEB	424.10	5-MAR	428.65
6-JAN	405.30	6-FEB	423.80	6-MAR	422.10
7-JAN	405.80	7-FEB	426.10	7-MAR	421.90
9-JAN	402.95	8-FEB	429.80	8-MAR	422.55
10-JAN	407.75	9-FEB	439.15	9-MAR	427.10
11-JAN	411.15	10-FEB	429.90	10-MAR	426.50
12-JAN	420.30	11-FEB	430.15	12-MAR	427.40
13-JAN	419.50	13-FEB	424.85	13-MAR	432.20
14-JAN	419.65	14-FEB	423.65	14-MAR	429.00
16-JAN	422.05	15-FEB	421.70	15-MAR	434.60
17-JAN	423.40	16-FEB	421.30	16-MAR	432.15
18-JAN	422.80	17-FEB	412.25	17-MAR	432.20
19-JAN	427.55	18-FEB	413.15	19-MAR	434.85
20-JAN	421.15	20-FEB	414.60	20-MAR	430.40
21-JAN	421.85	21-FEB	421.90	21-MAR	431.00
23-JAN	424.90	22-FEB	422.90	22-MAR	429.90
24-JAN	426.10	23-FEB	418.90	23-MAR	432.10
25-JAN	427.00	24-FEB	423.10	24-MAR	432.15
27-JAN	429.60	25-FEB	422.65	26-MAR	440.10
28-JAN	429.70	27-FEB	426.65	27-MAR	437.30
30-JAN	425.85	28-FEB	428.65	28-MAR	430.70
31-JAN	422.35	29-FEB	425.55	29-MAR	431.75
				30-MAR	431.25
				31-MAR	431.65

ALUMINIUM

MONTH	CLOSING PRICE	MONTH	CLOSING PRICE	MONTH	CLOSING PRICE
2-JAN	109.00	1-FEB	112.30	1-MAR	114.65
3-JAN	110.30	2-FEB	109.05	2-MAR	114.30
4-JAN	111.20	3-FEB	110.10	3-MAR	114.35
5-JAN	109.55	4-FEB	110.00	5-MAR	113.15
6-JAN	109.55	6-FEB	109.30	6-MAR	112.10
7-JAN	110.10	7-FEB	110.95	7-MAR	110.55
9-JAN	111.95	8-FEB	111.00	8-MAR	110.00
10-JAN	112.45	9-FEB	112.85	9-MAR	110.60
11-JAN	112.55	10-FEB	111.70	10-MAR	110.70
12-JAN	113.50	11-FEB	111.95	12-MAR	110.45
13-JAN	111.50	13-FEB	109.70	13-MAR	111.60
14-JAN	111.95	14-FEB	109.75	14-MAR	110.85
16-JAN	111.85	15-FEB	109.20	15-MAR	111.80
17-JAN	111.85	16-FEB	107.80	16-MAR	112.10
18-JAN	112.40	17-FEB	106.80	17-MAR	112.15
19-JAN	112.75	18-FEB	107.00	19-MAR	112.60
20-JAN	112.10	20-FEB	107.65	20-MAR	112.00
21-JAN	112.10	21-FEB	110.00	21-MAR	110.55
23-JAN	112.30	22-FEB	111.50	22-MAR	110.20
24-JAN	112.55	23-FEB	111.20	23-MAR	109.90
25-JAN	113.10	24-FEB	111.90	24-MAR	109.95
27-JAN	112.60	25-FEB	112.65	26-MAR	110.30
28-JAN	112.70	27-FEB	113.85	27-MAR	109.90
30-JAN	113.55	28-FEB	113.50	28-MAR	108.95
31-JAN	112.35	29-FEB	113.55	29-MAR	108.15
				30-MAR	107.35
				31-MAR	109.25

CARDAMOM

MONTH	CLOSING PRICE	MONTH	CLOSING PRICE	MONTH	CLOSING PRICE
2-JAN	660.70	1-FEB	710.60	1-MAR	922.80
3-JAN	664.30	2-FEB	717.50	2-MAR	959.30
4-JAN	660.80	3-FEB	716.00	3-MAR	947.20
5-JAN	653.30	4-FEB	744.40	5-MAR	958.20
6-JAN	644.40	6-FEB	753.10	6-MAR	972.40
7-JAN	640.40	7-FEB	769.20	7-MAR	962.90
9-JAN	642.50	8-FEB	794.60	8-MAR	947.70
10-JAN	643.90	9-FEB	826.30	9-MAR	947.70
11-JAN	637.70	10-FEB	793.20	10-MAR	916.40
12-JAN	644.10	11-FEB	762.30	12-MAR	906.30
13-JAN	648.70	13-FEB	792.80	13-MAR	936.80
14-JAN	653.10	14-FEB	806.50	14-MAR	921.20
16-JAN	668.70	15-FEB	812.80	15-MAR	905.30
17-JAN	659.10	16-FEB	795.30	16-MAR	872.00
18-JAN	657.20	17-FEB	801.80	17-MAR	867.80
19-JAN	663.30	18-FEB	813.00	19-MAR	891.20
20-JAN	658.10	20-FEB	828.50	20-MAR	882.80
21-JAN	664.50	21-FEB	846.00	21-MAR	900.00
23-JAN	690.30	22-FEB	867.80	22-MAR	913.50
24-JAN	678.40	23-FEB	900.00	23-MAR	924.30
25-JAN	688.60	24-FEB	891.20	24-MAR	917.70
27-JAN	705.20	25-FEB	924.60	26-MAR	928.60
28-JAN	709.50	27-FEB	961.30	27-MAR	936.80
30-JAN	721.60	28-FEB	922.80	28-MAR	921.20
31-JAN	702.80	29-FEB	959.30	29-MAR	906.30
				30-MAR	922.80
				31-MAR	916.75

COTTON

MONTH	CLOSING PRICE	MONTH	CLOSING PRICE	MONTH	CLOSING PRICE
2-JAN	17580	1-FEB	17890	1-MAR	17360
3-JAN	17810	2-FEB	17730	2-MAR	17320
4-JAN	17910	3-FEB	17940	3-MAR	17160
5-JAN	17840	4-FEB	18080	5-MAR	16470
6-JAN	17920	6-FEB	18480	6-MAR	16580
7-JAN	18200	7-FEB	18210	7-MAR	16830
9-JAN	18700	8-FEB	18330	8-MAR	16830
10-JAN	18240	9-FEB	18310	9-MAR	16880
11-JAN	18440	10-FEB	18010	10-MAR	16670
12-JAN	18510	11-FEB	18070	12-MAR	16620
13-JAN	18360	13-FEB	17830	13-MAR	16580
14-JAN	18660	14-FEB	17690	14-MAR	16720
16-JAN	18910	15-FEB	17820	15-MAR	16730
17-JAN	18590	16-FEB	17730	16-MAR	16930
18-JAN	18750	17-FEB	17850	17-MAR	16870
19-JAN	18610	18-FEB	17800	19-MAR	16630
20-JAN	18340	20-FEB	17800	20-MAR	16570
21-JAN	18370	21-FEB	17650	21-MAR	16550
23-JAN	18510	22-FEB	17470	22-MAR	16630
24-JAN	18550	23-FEB	17120	23-MAR	16840
25-JAN	18320	24-FEB	16910	24-MAR	16780
27-JAN	17820	25-FEB	16980	26-MAR	16780
28-JAN	17790	27-FEB	16760	27-MAR	16590
30-JAN	18310	28-FEB	17040	28-MAR	16850
31-JAN	18120	29-FEB	17080	29-MAR	17100
				30-MAR	16420
				31-MAR	16375