

# **IMPACT OF STOCK MARKET FLUCTUATIONS ON COMMODITY DERIVATIVES IN INDIA**

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**MASTER OF PHILOSOPHY IN COMMERCE**

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## **Preface**

A derivative is a financial instrument which derives its value from some other financial price. This “other financial price” is called the underlying. Derivatives, a phenomenon of the financial and commodity markets of the 1980s and 1990s, allow fast, easy, and affordable management of market risks faced by financial institutions, businesses and individuals.

Commodity derivatives are such instruments that have been devised to achieve price risk management by basing the value of a security on the value of an underlying commodity. Commodity derivatives trading although have witnessed a long and chequered history, with the recent measures of liberalisation, the sector has witnessed a massive boom in the country.

In commodity derivatives, as the name states, the underlying is a commodity such as gold, wheat, machinery etc. Originally, commodity derivatives were designed to protect farmers from the risk of under or over production of crops. Commodity derivatives were a financial instrument for investors who traded in the underlying commodity. However, commodity derivatives are now used as an investment tool for managing risk and are traded in the market most frequently by investors who have no need for the commodity itself.

Commodity derivatives trading in India notwithstanding its long and tumultuous history, with globalisation and recent measures of liberalisation, has witnessed a massive resurgence turning it into one of the most rapidly growing areas in the financial sector today. The present study endeavors to test the efficacy and performance of commodity derivatives in steering the price risk management. There are 25 commodity derivative exchanges in India as of now and derivative contracts on nearly 100 commodities are available for trade.

National Commodity & Derivatives Exchange Limited (NCDEX) is an online multi commodity exchange based in India. It was incorporated as a private limited company incorporated on 23 April 2003 under the Companies Act, 1956. It has commenced its operations on 15 December 2003. NCDEX is regulated by Forward Market Commission (FMC) in respect of futures trading in commodities. NCDEX currently facilitates trading of 57 commodities. NCDEX is the largest commodity derivatives exchange with a turnover of around Rs 3,000 crore (Rs 30 billion) every fortnight. It is only in the last decade that commodity derivatives exchanges have been actively encouraged. But, the markets have suffered from poor liquidity and have not grown to any significant level till recently.

In the year 2003, four national commodity exchanges became operational; National Multi-Commodity Exchange of India (NMCE), National Board of Trade (NBOT), National Commodity and Derivatives Exchange (NCDEX) and Multi Commodity Exchange (MCX).

The onset of these exchanges and the introduction of futures contracts on new commodities by the Forward Market Commission have triggered significant levels of trade. Now the commodities futures trading in India is all set to match the volumes on the capital markets.

In this study, the first chapter with a title Introduction contains brief explanation on Derivatives, Description of Commodity Derivatives and types of derivatives i.e. Futures/forwards contract, Options and Swaps. It also mentioned about the statement of the problem which the previous studies conducted on commodity futures. Hence, the present study will determine the significance of commodity derivatives listed in NCDEX.

The second chapter, "Review of Literature" gives some ideas that had been put to use for the research. Several studies attempted to compare the impact of derivatives markets in comparison to buffer stock schemes that had been favoured since 1930s and highlighted that derivatives markets offered a more effective and welfare raising method of dealing with price volatility (Gilbert,

1985). By taking a position in the derivatives market, the producer can potentially offset losses in the spot market. However, with regard to the stabilisation effect of futures trading on the spot prices, the evidence is mixed. Recent study in 2010 shows that there is no statistically significant relationship indicating that changes in index and swap fund positions have increased market volatility.

The third chapter with the topic, 'History and prospects of Commodity Derivatives' emphasised about the history of Commodity market which dates back to 1875 with the setting up of Bombay Cotton Trade Association Ltd. Thereafter the trading in oilseeds started in 1900 followed by raw jute futures trading in Kolkata with the establishment of the Calcutta Hessian Exchange Ltd. In 1919. Gradually organised forwards market shaped in other commodities. Popular committees like Dantwala Committee (1966), Khusro committee (1980), Kabra Committee (1993) and L.C Gupta Committee Report (1997) played very important role in shaping the regulatory framework for derivatives trading in India.

The fourth chapter, 'Data Analysis and Findings' analysed the findings of Agricultural Products and Non-Agricultural Products by deriving the results from Regression line. The available data of each commodity in the NCDEX is compared with SENSEX and Nifty. For the Regression, all the commodities are assumed as dependent variables while the markets i.e. SENSEX and Nifty are the independent variables. This chapter informs us that the commodities are insignificantly correlated with the market.

The last chapter with the topic Conclusions and Suggestions contains summary of the research findings and suggestions. The study concludes that the impact of most of the commodities in SENSEX and Nifty are insignificant. None of the commodity during the study is found correlated with SENSEX and Nifty.

## ACKNOWLEDGEMENT

I owe a deep sense of gratitude to my supervisor and joint supervisor, Dr. Bhartendu Singh and Dr. A.N Shankar, Department of Commerce, Mizoram University. Their practical insight, approachability has been a wonderful resource for meeting the demands of the research I have undertaken. There was a time I left this research to languish, their words of encouragement and superb professional backup yet rekindled my dying endeavor. Working under their supervision has been a privilege and rewarding experience.

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Above all, I thank the Almighty God for granting me good health and strength to accomplish this challenging assignment.

Dated: 27<sup>th</sup> June, 2012  
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## **DECLARATION**

I, F. Brenda Sangdingliani, hereby declare that except where reference is made to the work of others, the work described in this thesis is record of the work done by me and that the contents of this thesis did not form basis of the award of any previous degree to me or to the best of my knowledge to anybody else, and that the thesis has not been submitted by me for any research degree in other University/Institute.

This is being submitted to the Mizoram University for the degree of Master of Philosophy in Commerce.

Dated:

Place: Aizawl

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### Introduction

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This study is based on the axiom that capital market is imperfect. This in turn affects commodity derivative pricing. Based on the various samples surveyed, this study will endeavour to explore the dynamics involved in the price change of derivatives. Within the broad framework of India Capital Market, the groups of commodities fluctuate in their price change on a daily basis. The main instrument to find out this change is the understanding of the market behaviour through the change in commodity derivatives. With the introduction of National Commodity & Derivatives Exchange Ltd.<sup>1</sup> in 2003, price variation change of these commodities has become more accessible for record. Since its inception, investors and speculators have become wiser in making future buying and investing. However, this step in the right direction can be enhanced, and the potential investor and speculators given more data for smarter choice, if they could understand the nature and magnitude of changes of commodity derivatives.

The capital market in India dates back to around 200 years, when the East India Company took over the commercial transactions within parts of the British Empire. They enacted, through their rough politics, the empire's government policy. This heterogeneous set up kept on developing as India became more aware of the changes in the economics of business, and it further went forward using this British establishment as its foundation of modern trade policies. By 1990s India had entered a phase of economic policy called Liberalization, Privatisation and Globalisation (LPG) that greatly did away with the socialist attitude aggressively followed since the time of first Prime Minister of India, Mr. Jawaharlal Nehru. Through this novel introduction, the Indian economy had witnessed dramatic policy changes. The idea behind

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<sup>1</sup> The Exchange is popularly known with its initials NCDEX. The exchange maintained an index of ten most liquid commodity index traded on the exchange names DHAANYA.

the new economic model, popularly known as LPG, was to make the Indian economy one of the fastest growing economies in the world. An array of reforms was initiated with regard to industrial, trade and social sector to make the economy more competitive. The economic changes initiated have had a dramatic effect on the overall growth of the economy. It also heralded the integration of the Indian economy into the global economy.

In conjunction with this, Securities and Exchange Board of India (SEBI) was established in the India in 1992. SEBI became the authority instantly as it laid out its rules and guidelines to three particular groups: the issuers of securities, the investors, and the market intermediaries to remove the irregularities and constraints in the exchange of securities in the stock market. This also meant that capital market was now easily accessible to all sections in the social echelon, resulting in the development of capital market in India.

Once the capital market became more regularized and investors' friendly, a number of new investors are flocking towards it, and thus many innovative financial instruments were coming up in India. There appeared on the scene Derivatives; mainly Futures and Options. Investors and speculators could gauge the financial performance and stock performance of the derivatives with great accuracy and enhanced speed. Yet, the question remains as whether or not we could isolate commodity derivatives from the index movement.

The research strives to identify whether the commodity derivatives are affected by the indices in the stock market in India with special reference to S&P CNX NIFTY<sup>2</sup>/ SENSEX<sup>3</sup>, and NCDEX, comparing the index movements for these exchange institutions.

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<sup>2</sup> S&P CNX NIFTY is an index maintained by National Stock Exchange of India, which is popularly known as Nifty. In this study both this names have been used interchangeably.

<sup>3</sup> SENSEX is an index maintained by the Stock Exchange, Mumbai.

India has a long and chequered history of commodity derivative trading, spanning over 130 years. The commodity derivative exchanges witnessed several ups and downs for the past 13 decades, with a booming phase of unbridled free futures trading in as many as 300 markets during the pre-independence era, followed by a ban on such trading for almost a decade after the outbreak of the Second World War in 1939. Subsequent to independence in 1947, the then Government of Bombay enacted the Bombay Forward Contracts Act and permitted futures trading in cotton and oilseeds under the auspices of the recognized associations. Outside Bombay Presidency, commodity futures trading was also revived, but remained free and unregulated except by the exchanges organizing such trading.

With the Constitution of India coming into force on January 26, 1949, the subject of futures trading came under the Union List. As a result, the Government of India brought on the Statute Book the Forward Contracts (Regulation) Act, 1952 (FCRA), and established the Forward Markets Commission (FMC) in 1953. Under the FCRA, futures trading came to be allowed in select agricultural commodities and their products under the auspices of associations recognized by the Government of India. By mid-1960s, around 30 associations were recognized for trading in about a score of commodities. Trading was subject to severe regulatory measures. But no sooner the markets began to bloom with some activity, the government turned volte-face, and proscribed futures trading in almost all major food crops in the fond hope of restraining the raging inflation in the economy.

Following the launch of economic reforms in the early 1990s, and especially after India signed the General Agreement on Trade and Tariffs (GATT) to enter the World Trade Organization (WTO), the World Bank and UNCTAD submitted a joint report to the Government of India recommending revival of futures trading in farm commodities and their products to render trade in such commodities competitive in the world markets after the envisaged removal of trade and non-trade barriers. As a result, futures trading was revived, after a lapse of nearly three and a half decades, towards the close of the 20<sup>th</sup> century. The onset of the new millennium thereafter

witnessed the setting up of three new national commodity exchanges, which were permitted to trade in commodities of their choice, unlike the traditional regional and single commodity exchanges that traded in one or few closely related commodities only. At present, there are almost two dozen commodity exchanges, including three national exchanges, trading in as many as 100 commodities together.

The new national commodity exchanges marked a distinct transfer scene on the commodity derivative trading landscape in the country. In contrast with the conventional commodity exchanges, in which prevailed the long established floor-based open outcry trading system, the new national exchanges organized derivative trading on screen-based anonymous automated electronic system. The national exchanges also guaranteed the performance of the contracts, eliminating thereby the counterparty risks, whereas the old exchanges did not provide any such guarantee, but distributed the losses arising from any defaults among the members entitled to receive payments from the defaulting member.

Incidentally, while trading volumes in several non-agricultural commodities, especially metals and energy products, has been quite high, the major agri-commodities have failed to take off. To be sure, as much as around 80% of the trading turnover in commodity exchanges is confined to half a dozen non-farm goods, whereas the rest is widely dispersed among a wide spectrum of agricultural commodities and their products.

Despite a long history of commodity futures trading in the country, futures markets are still viewed with suspicion by many in both the academic and official circles. The recent deflation in the values of various assets underlying the different derivatives, including commodity derivatives, following the global meltdown, have provoked even more doubts about the much acclaimed economic utility of futures trading for price discovery and risk management. As a result, its support for futures business in many commodities notwithstanding, the authorities have still not permitted such trading in several food grains like rice and millets, and some major pulses,



too. The government also continues to suspend futures trading in commodities as soon as it suspects that such trading may affect adversely the prices of those commodities to the detriment of one or the other class of society.

Even in USA, which has the most active commodity exchanges in the world, the new administration of President Obama is not merely rewriting the rules of regulation, but even investigating the role of commodity futures trading in the steep rise in prices of wheat and crude oil in 2007-08, regardless of the fact that commodities as an asset class have revealed the resoluteness and resilience in the face of global financial crisis.

Meanwhile, the FMC and the Union Ministry of Consumer Affairs in India are considering seriously reviving the Bill to amend the FCRA, since it lapsed after the dissolution of the last Lok Sabha. The Bill seeks to not only strengthen, enlarge, and upgrade the FMC, with more regulatory powers, but also legalize options, permit trading in intangibles with cash settlement provisions, and allowing the entry of financial institutions, including foreign financial institutes, in commodity derivative trading business to broaden and deepen the markets. Against such conflicting views and vista, commodity futures markets present a massive research agenda on major policy and empirical issues.

Rising price volatility has led to a number of specialized financial instruments that allow participants to hedge against unexpected price movement. Like any other derivative, futures contracts can be used as an insurance against unfavourable price fluctuations. Hedging effectiveness of futures markets is one of the important determinants of success of futures contracts (Silber, 1985; Pennings & Meulenberg, 1997). In Indian context, S&P CNX Nifty index futures and commodity futures are comparatively new and were introduced in the year 2000 and 2003 respectively. In last 4-5 years, the Indian stocks as well as commodity markets have grown considerably. Bose (2007) found that Indian stock markets are more volatile as compared to developed markets. Indian commodity futures markets are going through

many ups and downs and many a times allegations of speculative activity have been made in the popular press. Despite controversies, there is a need for systematic investigation of stock market indices and commodity derivatives markets to assess their effectiveness in transferring the risk.

## **Types of Derivatives**

Derivatives can be classified by the product underlying a derivative and by the relationship between the derivative and the underlying product. This relationship is exhibited in three main types of derivative contracts: *future/forwards*, *options*, and *swaps*.

### **Futures/forwards contract**

In a *futures* or *forwards* contract the purchase or sale of an asset is designated at a future date but at a price specified today. Futures contracts are standardized contracts purchased or sold on an exchange, while forward contracts are less standardized and are traded OTC. In futures and forwards contracts, the risks of changes in the prices of the underlying product (asset, index, rate, etc.) are transferred between counterparties over the life of the contract.

#### Forward contracts

A forward contract is an agreement between two parties to exchange at some fixed future date a given quantity of a commodity for a price defined today. The fixed price today is known as the forward price.

#### Futures contracts

A futures contract has the same general features as a forward contract but is transacted through a futures exchange.

## **Options**

In an *options* contract, the buyer of the contract has the option or the right to buy (call option) or sell (put option) an asset. The price at which the sale takes place is specified at the time the parties enter into the option.

## **Swaps**

*Swaps* are contracts to exchange a stream of cash flows on specified future dates based on the value of the underlying asset, price or rate. The two most common swaps are *interest rate swaps* and *currency swaps*. Complex derivatives are created by combining these more simple derivatives with each other or by combining them with traditional securities and loans to create *hybrid* instruments or structured securities.

## **Description of Commodity Derivatives**

A *derivative* is a financial instrument which derives its value from some other financial price. This “other financial price” is called *the underlying*.

Commodity derivatives are such instruments that have been devised to achieve price risk management by basing the value of a security on the value of an underlying commodity. Commodity derivatives trading although have witnessed a long and chequered history, with the recent measures of liberalisation, the sector has witnessed a massive boom in the country.

In commodity derivatives, as the name states, the underlying is a commodity such as gold, wheat, machinery etc. Originally, commodity derivatives were designed to protect farmers from the risk of under or over production of crops. Commodity derivatives were a financial instrument for investors who traded in the underlying commodity. However, commodity derivatives are now used as an investment tool for managing risk and are traded in the market most frequently by investors who have no need for the commodity itself (i.e. they never actually are possession of the commodities; they keep trading them in the market).

Commodity derivatives trading in India notwithstanding its long and tumultuous history, with globalisation and recent measures of liberalisation, has witnessed a massive resurgence turning it into one of the most rapidly growing areas in the financial sector today. The present study endeavors to test the efficacy and performance of commodity derivatives in steering the price risk management. The critical analytics of performance divulges that these markets although are yet to achieve minimum critical liquidity, almost all the commodities capture an evidence of co-integration in both spot and future prices, presaging that these markets are marching in the right direction of achieving improved operational efficiency, *albeit*, at a slower pace. In the case of some commodities, however, the volatility in the future price has been substantially lower than the spot price indicating an inefficient utilisation of information.

Several commodities appear to attract wide speculative trading. Hedging proves to be an effective proposition in respect of some commodities, while others entail moderate or considerably higher risk. As the markets develop, it remains to be seen whether the information content of future prices could be factored in the course of future monetary policy setting. Commodity derivatives trading although has witnessed a long and chequered history, with the recent measures of liberalisation, the sector has witnessed a massive boom in the country.

The origin of commodity derivatives markets dates as far as back to the 17th century, when they were informally established in Amsterdam and centered on the trade in Tulips. The modern form, however, came into existence in the 19th century, *inter alia*, in London, Chicago and New York. Notwithstanding the fact that India is considered a pioneer in some forms of derivatives in commodities, commodity derivatives market in India has had a turbulent history. The first ever organised derivatives market evolved with the setting up of Bombay Cotton Trade Association Ltd., in 1875.

Commodity Derivative markets were set up in India in cotton in 1875 and in oilseeds in 1900 at Bombay. Forward trading in raw jute and jute goods

started at Calcutta in 1912. Forward Markets in Wheat had been functioning at Hapur since 1913, and in bullion at Bombay, since 1920. With the enactment of Defense of India Act- 1935, however, the market was subjected to restriction/ prohibition from time to time, owing to the apprehensions of speculation in times of scarcity. After independence, the market received a fillip with the enactment of Forward Contracts Regulation Act (FCRA) in December 1952. The derivatives markets, which were once vibrant and attracted huge trading volumes in commodities, particularly, cotton, oilseeds, bullion and jute were either suspended or prohibited during 1960s and 1970s.

Concomitantly, the revival of this industry in India had a slow and shaky start. It began with the setting up of the Dantwala Committee (1966) and subsequently, the Khusro Committee (1980). In the post reforms era, accepting partially the recommendations of Kabra Committee (1993), the Government of India permitted derivatives trading in large number of commodities. A number of initiatives were also undertaken subsequently to decontrol and develop the forward markets in commodities. There are presently 21 regional exchanges in the country.

After Independence, the Constitution of India adopted by Parliament on 26<sup>th</sup> January, 1950 placed the subject of "Stock Exchanges and Futures Market" in the Union list and therefore the responsibility for regulation of forward contracts devolved on government of India. The Parliament passed the Forward Contracts (Regulation) Act, 1952, (FCRA) which presently regulates forward contracts in commodities all over India. Exchange controls were in place and RBI had jurisdiction over forex (foreign exchange) as well as money market. The Securities Contracts (Regulation) Act (SCRA) was enacted in 1957 on the lines of FCRA, 1952, but another department of the government regulated security markets.

The Securities and Exchanges Board of India (SEBI) was given a statutory status in the year 1991. (Ahuja N L, 2006) Derivative trading was introduced in securities as later as in the year 2001, after the term "security" in the SCRA was amended to include derivatives contract in securities.

Consequently, regulation of derivatives came within the purview of SEBI. We thus have separate regulatory authorities for forex, money market and commodity derivative markets.

India is one of the top producers of a large number of commodities, and also has a long history of trading in commodities and related derivatives. The commodities derivatives market has experienced fluctuations resulting from political and other socio-economic factors, however it has been unsheltered under regulated market canopy. The market has made enormous progress in terms of technology, transparency and the trading activity. Interestingly, this has happened only after the Government's policy to include commodities, and market forces were allowed to play their role to administer price mechanisms. The management of price risk is about to assume even greater importance in future with the promotion of free trade and removal of trade barriers in the world. All this augurs well for a study on the commodity derivatives markets.

Derivatives markets play a very useful economic role in price discovery. Price discovery is the way in which a market establishes the price or prices for items traded in that market, and then disseminates those price as information throughout the market and the economy as a whole. In this way market prices are important not just to those buying and selling but also those producing and consuming in other markets and in other locations and all those affected by commodity and security price levels, exchange rates and interest rates.

Despite these largely uncontrollable factors causing fragmented spot markets, it would be necessary to address some of the other issues, which contribute to the fragmentation. The prices of commodities are influenced by their qualities, grades, seasons of production, the quality of storage and warehousing etc. Unlike securities, commodities come in different grades and qualities. Commodities are also bulky involving difficulties in transportation, which affect spatial integration. These issues can be addressed by introducing nationwide warehouse receipt system.

Under this system, the warehouses ( Kolamkar D.S., 2003), which meet the prescribed standards of storage, preservation, testing, grading and certification would be licensed by the Central Regulatory Authority and warehouse receipts issued by these warehouses could become negotiable. The Central Regulatory Authority could evolve a system of inspection, monitoring and surveillance to ensure that the licensed warehouses comply with the prescribed standards and warehouse receipts issued by them truly reflect the quality, quantity and the ownership of the goods. Commodity exchanges could create market place for trading and settlement of warehouse receipts to facilitate hassle free trading in commodities. This would improve the collateral value of the goods and consequently the credit flow to the commodity sector. This would obviate the need for distress-sale by the farmers and even by some of the mills which do not have waiting capacity due to inadequate liquid assets necessary for meeting the immediate consumption or working capital needs.

**Statement of the Problem:**

A number of studies have been conducted on commodity index, but there is a need for further research on the market impact of commodity index funds. The first reason is that direct tests of the relationship between index fund positions and price movements in energy futures markets have been hampered by the lack of publically-available data on positions of index funds in these markets. The second reason is ongoing concerns about the power of time-series statistical tests used in the studies that fail to find evidence of a relationship between index fund positions and movements in commodity futures prices.

Efforts in India have been made for valuation of derivatives and their pricing but need is felt for converging the present study in the field of commodity derivatives in India. The present study will focus on the performances of commodity derivatives listed on NCDEX and its association with the stock market indices.

## **\Objective of the study**

- To study the impact of capital market indices fluctuations on agricultural commodity derivatives listed on NCDEX.
- To study the impact of capital market indices fluctuations on non-agricultural commodity derivatives listed on NCDEX.

## **Hypothesis**

H<sub>01</sub> Agricultural Commodity Derivative prices are independent of capital market fluctuations.

H<sub>11</sub> Agricultural Commodity Derivative prices are dependent on capital market fluctuations.

H<sub>02</sub> Non-Agricultural Commodity Derivative prices are independent of capital market fluctuations.

H<sub>12</sub> Non-Agricultural Commodity Derivative prices are dependent on capital market fluctuations.

## **Research Methodology**

In order to pursue the objective stated above, forty seven commodity derivative prices, as shown in table-1, have been collected from NCDEX website for past 4 years (1<sup>st</sup> April 2007 to 30<sup>th</sup> March 2011) relating to the prices of all classes of commodity derivatives. Relating to the same period the Bombay Stock Exchange Sensitive Index (SENSEX) and S&P CNX NIFTY have also been collected. With a view to identify the impact of capital market movements on commodity derivative prices, suitable statistical techniques such as time series analyses, regressions etc, have been applied at 0.05 level of significance to associate commodity derivative prices with SENSEX and S&P CNX NIFTY.

**Sample :** Spot and Future Prices of Commodity Derivatives listed on NCDEX, SENSEX, and S&P CNX Nifty for a four years period from 1<sup>st</sup> April 2007 to 31<sup>th</sup> March 2011.



**Table-1.1: List of Commodity derivatives listed on NCDEX consisting sample of the study**

<b>Agricultural Products</b>	<b>Pulses</b>	Chana	<b>Non Agricultural</b>	<b>Metal</b>	Steel
	<b>Fibres</b>	Indian 28.5 mm Cotton			Copper
		V-797 kapas			Zinc
	<b>Spices</b>	Pepper			Nickel
		Turmeric		Aluminium	
		Jeera		<b>Energy</b>	Lead
		Chilli			Crude oil
		Corainder			Thermal Coal
	<b>Plantation Products</b>	Rubber			Brent Crude Oil
		<b>Cereals</b>		Barley	Natural Gas
	Maize-Food/industrial			Gasoline	
	Wheat			<b>Precious Metals</b>	Heating Oil
	<b>Oil and Oil Seeds</b>	Castor seeds			Gold
		Cotton seed oilcake			Gold 100 gms
		Soy bean	Gold International		
		Refined soy oil	Silver		
		Soybean meal (Export)	Silver 5 kg		
		Mustard Seed	Silver International		
		Kachhi Ghani	Platinum		
		Crude Palm Oil	<b>Others</b>	Carbon Emmission Reduction Credits (CER)	
		<b>Others</b>		Guar Seeds	
	Guar Gum				
	Gur				
	Potato				
	Sugar M and S				
	Almond				
	Mentha Oil				

Source: Compiled from [www.ncdex.com](http://www.ncdex.com)

## **Chapter plan**

1. Introduction
  2. Review of Literature
  3. History and Prospects of Commodity Derivatives in India
  4. Data Analysis and Findings
  5. Conclusions and Suggestions
- Bibliography

### Review of Literature

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Ross (1976) and Hakansson (1982) opined that with market imperfections, derivatives make the market more complete by allowing investment choices that were previously cost inefficient or impossible due to regulatory or institutional constraints. Since investors benefit from an expanded opportunity set, the required returns and risks in existing asset markets should fall. In addition, Danthine (1978) argues that derivatives, by promoting information-based trading, increase the depth and liquidity of the market and reduce volatility. Grossman (1988) shows that option trading allows diverse opinions about volatility to be revealed that can reduce volatility. Detemple and Selden (1991) show that option trading can allow more efficient risk sharing, which increases the demand for the asset and reduces volatility.

Stein (1987) is the only theoretical study that implies volatility could increase, arguing that poorly informed speculators can have a destabilizing effect on the market.

Nance, Smith and Smithson (1993) study the use of derivatives by 159 large U.S. non-financial corporations on their responses to a questionnaire. They find that firms using derivatives have more growth options, are larger, employ fewer hedging substitutes, have less coverage of fixed claims, and face more convex tax functions. Géczy, Minton, and Schrand (1997) analyze a sample of 372 *Fortune 500* non-financial firms in the United States. They find that firms with greater growth options, tighter financial constraints, extensive foreign exchange rate exposure, and economies of scale in hedging activities are more likely to use currency derivatives.

In India, Jogani and Fernandes, (2003) describe India's long history in arbitrage trading, with line operators and traders arbitraging prices between exchanges located in different cities, and between two exchanges in the same city. Their study of Indian equity derivatives markets in 2002 indicates that markets were inefficient at that time. They argue that lack of knowledge; market frictions and regulatory impediments have led to low levels of capital employed in arbitrage trading in India. Gambhir and Goel, (2003) importers, exporters and banks use the rupee forward market to hedge their foreign currency exposure. Turnover and liquidity in this market has been increasing, although trading is mainly in shorter maturity contracts of one year or less. However, more recent evidence suggests that the efficiency of Indian equity derivatives markets may have improved (ISMR, 2004). Fitch Ratings, (2004) used derivatives describe themselves as hedgers and Indian laws generally require that derivatives be used for hedging purposes only.

Floros and Vougas (2006) studied the hedging effectiveness in Greek Stock index futures market for the period of 1999-2001 and found that time varying hedge ratio estimated by GARCH model provides highest variance reduction as compared to the other methods. There are very few empirical investigations of the stock futures markets and hedge ratios in emerging market context (Choudhry, 2004; Floros & Vougas, 2006; Bhaduri & Durai, 2008) and especially in Indian commodity futures' context. Choudhary (2004) investigated the hedging effectiveness of Australian, Hong Kong, and Japanese stock futures markets. Both constant hedge models and time varying models were used to estimate and compare the hedge ratio and hedging effectiveness. He found that time-varying GARCH hedge ratio outperformed the constant hedge ratios in most of the cases, inside-the-sample as well as outside-the-sample. However, the simple OLS-based strategy also performed well at shorter time horizons. Roy and Kumar (2007) studied hedging effectiveness of wheat futures in India using least square method and found that hedging effectiveness provided by futures markets was low (15%). Bhaduri and Durai (2008) found similar results while analyzing the effectiveness of hedge ratio through mean return and variance reduction

between hedge and unhedged position for various horizon periods of NSE Stock Index Futures. The above studies reveal contradictory results as the method followed and sample in the study is different.

Not surprisingly, a flurry of studies has been completed in an attempt to sort out which side of the debate is correct. Some studies find evidence that commodity index funds have impacted commodity futures prices (Gilbert, 2009; Einloth, 2009; Tang and Xiong, 2010). Results in these studies negate the argument that *no* evidence exists of a relationship between index fund trading and movements in commodity futures prices. However, the evidence is weak because the data and methods used in most of these studies are subject to a number of important criticisms. Hamilton's (2009) study, while not definitive in terms of empirics, is the most important of this group because his theoretical model shows the conditions that must occur for index fund speculation to lead to bubble impacts in a storable commodity market such as crude oil.

Little evidence exists on the relationship between index fund positions and movements in commodity futures prices (Stoll and Whaley, 2009; Buyuksahin and Harris, 2009; Sanders and Irwin, 2010a, 2010b; Aulerich, Irwin, and Garcia, 2010). This constitutes a rejection of the first theoretical requirement for speculative impacts. Evidence in crude oil markets (Kilian and Murphy, 2010) indicates a rejection of theoretical requirement for speculative impacts a zero or near zero price elasticity of demand. In a nutshell the study revealed that commodity derivative prices are not affected by the stock market indices movements.

Irwin and Sander (2010) are of the contention that the increased participation of index fund investments in commodity markets in USA represents a significant structural change, and has no impact on price volatility, implied or realised, in agricultural futures markets. They observed that index funds did *not* cause a bubble in commodity futures prices. There is no statistically significant relationship indicating that changes in index and swap fund positions have increased market volatility. Their study was limited

to agricultural product futures related listed on Commodity Futures Trading Commission (CFTC) USA. An extension of the above study to generalize the outcomes on all commodity futures in India is felt essential to draw relevant conclusions.

The standard use of derivatives is in managing price risks through hedging. Firms with a core business exposure to underlying factors, such as commodity prices, exchange rates, or interest rates, can reduce their net exposures to these factors by assuming offsetting exposures through derivatives. Rational, value-maximizing motivations for such corporate hedging activities are provided by Mayers and Smith (1987); Main (1983); Stulz (1984); Smith and Stulz (1985); and Froot, Scharfstein, and Stein (1993); among others.

Cooper and Mello (1991), Sorensen and Bollier (1994), Jarrow and Turnbull (1995), and Longstaff and Schwartz (1995) also provide pricing models for financial contracts in the presence of default risk. They make the same trade-off as Johnson and Stulz (1987) and take the source of the default risk as exogenous to their model.

Previous studies of the effects of USDA (United States Department of Agriculture) reports on commodity futures prices provide only in-direct evidence to support the efficient markets hypothesis. Like most studies of stock price behaviour (i.e., Fama et al., Castanias (1979)), they observe the behaviour of futures prices around the announcement date. Gorham (1978) studies the changes in soybean, wheat, and corn prices after the re-releases of monthly USDA crop production forecasts. He observes the changes in prices after the announcements, given the differences in the most recent forecasts and the forecasts of the previous month. Results indicate that changes in production harvest forecasts, and to a lesser degree wheat production forecasts, have a significant effect on subsequent price changes. Because changes in soybean production forecasts do not have a significant effect on price; he concludes that traders are better able to anticipate forecasts for soybean production as compared to corn or wheat production. Fackler (1985),

comparing the variance of price changes of corn and soy-bean futures after the release of reports to all other times, finds that variance is 2.5 times greater after the release of those reports for both contracts. This indicates that price adjustments occur in response to the reports supporting the notion of market efficiency. Miller (1979) and Hoffman (1980) study the short-term behaviour of live hog futures prices before and after the release of US Department of Agriculture's, Hogs & Pigs Reports (1988). Miller examined price changes one day before and after the release of reports, whereas Hoffman (1980) used weekly averages of prices before and after the release of the reports. The results of the three studies suggest that futures prices generally react quickly to new information, but some exceptions are noted, especially for deferred contracts.<sup>1</sup>

Lapan, Moschini, and Hanson (1991) examine the issue of whether options on commodity futures contracts are useful for hedgers under the standard assumptions: hedgers are risk-averse expected utility maximizers, the hedger's net return is a linear function of the cash and futures price, and there is no output uncertainty. Under these conditions they establish the well-known result that option contracts will not be used by hedgers when futures contracts alone are available if the hedger perceives the futures price and options price as unbiased.' However, they go on to show that if the price distribution is symmetrical and if a hedger expects a price different than the market value of the futures contract (i.e., there exists a price bias), then options are useful to achieve an optimal net-open position.

Previous studies have shown that the distribution of returns in stock and futures markets are typically skewed, and the extent of this skewness, together with the variability of re-turns, is an important determinant of the excess return earned by these securities (Kraus & Litzenberger (1976); Junkus (1991); Aggarwal (1990); Aggarwal, Rao, and Hiraki (1989)).

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The December USDA Hogs and Pigs report (1988) estimated all hogs and pigs on farms in the U.S. at 59.4 million head.

Merton (1976) posited that the total change in asset price is composed of two parts: the normal small vibrations in price, which are modelled by a geometric Brownian motion, and abnormal large vibrations in price due to the arrival of important information, which are modelled by a jump process. The large price changes modelled by the jump process produce greater-than-normal probabilities in the tail of the distribution. The jump-diffusion process has been applied successfully to stock and foreign currency prices displaying large price changes over a small time interval.

Bates (1991, 1996a, 1996b) tests his model on the S&P 500 Index and on foreign currency options. Like currencies, commodity and commodity futures prices are systematically related to macro-economic measures or indices and jump risk can-not be diversified away. Therefore, Bates's (1991) adjusted model provides an appropriate theoretical basis for pricing American options on commodity futures.

There is a large literature that analyzes the effects of introducing a derivative in incomplete markets, depending on the particular type of market incompleteness. In the case of allocational incompleteness, the introduction of the derivative asset is shown to improve the allocational spanning of the economy [Ross (1976), Detemple and Selden (1986), Geanakoplos (1990)]. In the case of informational incompleteness, the derivative has been analyzed as an additional signal [Grossman (1977, 1988), Back (1993), Huang and Wang (1997)] or as a focal point capable of coordinating people's expectations [Guesnerie and Rochet (1993), Brennan and Cao (1996)].

Zvi Bodie (1976, p. 459) defined the effectiveness of common stocks as an inflationary hedge as "the extent to which they can be used to reduce the risk of an investor's real return which stems from uncertainty about the future level of prices of consumption goods."

If we try to imagine the mechanism by which a speculative market would achieve and maintain informational efficiency, we are led, like Cootner (1967, p. 80) to the following kind of story: Given the uncertainty of the real world, the many actual and virtual investors will have many, perhaps equally



many, price forecasts. . . . If any group of investors was consistently better than average in forecasting stock price, they would accumulate wealth and give their forecasts greater and greater weight. In the process, they would bring the present price closer to the true value. Conversely, investors who were worse than average in forecasting ability would carry less and less weight. If this process worked well enough, the present price would reflect the best information about the future in the sense that the present price, plus normal profits, would be the best estimate of the future price.

Samuelson (1972a) proves market efficiency when traders have homogeneous expectations, and Grossman (1976) shows that, without wealth effects on demand, even when traders have different information in the long run the market price will discount all of the information.

In the literature, several studies attempted to compare the impact of derivatives markets in comparison to buffer stock schemes that had been favoured since 1930s and highlighted that derivatives markets offered a more effective and welfare raising method of dealing with price volatility (Gilbert, 1985). By taking a position in the derivatives market, the producer can potentially offset losses in the spot market. However, with regard to the stabilisation effect of futures trading on the spot prices, the evidence is mixed. Newbery (1990) observes that since forward markets reduce risk, they encourage fringe firms to supply more output and thus, reduce the spot price. Furthermore, forward markets concentrate trading in one location and reduce information and other transaction costs, which can also lower prices. Similarly, Netz (1995) and Morgan (1999) concluded that the level of inventories held in the spot market will be determined by the *basis* and will ensure a more efficient process of private storage, which in turn, ensures a smoother pattern of prices in the spot market. According to Turnovsky and Campbell (1985), since forward markets reduce the price risk of holding inventories, larger inventories are held and prices tend to stabilise as a consequence. Conversely, Kawai (1983) shows that when the storage is subject to shocks, increased storage can destabilise prices. It is also revealed that risk reduction

encourages producers to undertake more risky investment projects, and risky investment destabilise spot prices (Newbery, 1987).

Similarly, Cox (1976) finds that in many markets, forward trading is stabilising whereas Figlewski (1981) and Simpson and Ireland (1985) conclude that opposite is true. Varangis and Larson (1996) cited several examples in the case of cotton and oil in Mexico and Algeria, where group of producers is represented by an agent who trades on their behalf. In doing so, minimum prices for output could be guaranteed and thus, risk is reduced for an individual trader for the cost of a small premium. Other such examples are provided by Claessens and Duncan (1993) and World Bank (1999).

Recent studies have revealed that despite the relative noise in the commodity futures markets, they remain an important source of information about the likely conditions of future developments in inflation and monetary conditions. An earlier study provides indirect observations on the short-end of the term structure by using a measure of the real interest rate extracted from commodity futures prices (Cornell and French, 1986). They found that it was expected inflation in commodity prices and not the real returns that increased when there was an unexpected increase in the money supply. Others have found that the long-term expected inflation rate falls when there is a surprise increase in the federal funds rate (Gürkaynak, Sack & Swanson 2003). Conversely, the short-term response is different (Armesto and Gavin, 2005), *i.e.*, expected inflation, at least as observed in the commodity markets, moves in the same direction over the ensuing 3 to 9 months as a surprise in the federal funds rate target.

In this regard, studies derive measures of the interest rate and expected inflation from commodity futures prices and use these measures to examine how interest rates and expected inflation respond to monetary policy shocks (Armesto and Gavin, 2005). Although the commodity futures data contain a substantial amount of idiosyncratic noise, they remain an important source of information about how markets respond to the evolving stance of monetary policy. These results show that the commodity expected inflation

rate does respond significantly to surprises in the federal funds rate. The expected inflation rate in commodities is calculated from the relative basis in commodity markets and the basis is defined as the difference between the spot and the future price of a commodity.

In India, financial institutions have not been heavy users of exchange-traded derivatives so far, with their contribution to total value of NSE trades being less than 8% in October 2005. However, market insiders feel that this may be changing, as indicated by the growing share of index derivatives (which are used more by institutions than by retail investors). In contrast to the exchange-traded markets, domestic financial institutions and mutual funds have shown great interest in OTC fixed income instruments. Transactions between banks dominate the market for interest rate derivatives, while state-owned banks remain a small presence (Chitale, 2003). Corporations are active in the currency forwards and swaps markets, buying these instruments from banks.

It is notorious that commodity prices are volatile, and there is a substantial literature on the wisdom of complete or partial elimination of this volatility. The modern academic literature starts from Waugh (1944) who argued that consumers benefit from price volatility (since they can take advantage of low prices by increasing consumption) and Oi (1961) who argued the parallel proposition for producers. Massell (1969), noting that Waugh (1944) had assumed supply side disturbances whilst Oi (1961) had assumed demand side disturbances, provided an integrated model. In the same spirit, Samuelson (1972b) showed that, notwithstanding the contributions of Waugh (1944) and Oi (1961), it will not be beneficial within a standard competitive market-clearing model to destabilise prices. The literature is surveyed in Turnovsky (1978).

Using transactions data from 1988 to 1992, Andrew & Rene (1996) construct overnight and intraday returns for a portfolio of Japanese stocks using their NYSE-traded American Depositary Receipts (ADRs) and a matched-sample portfolio of U. S. stocks. We find that U. S. macroeconomic

announcements, shocks to the Yen/Dollar foreign exchange rate and Treasury bill returns, and industry effects have no measurable influence on U.S. and Japanese return correlations. However, large shocks to broadbased market indices (Nikkei Stock Average and Standard and Poor's 500 Stock Index) positively impact both the magnitude and persistence of the return correlations.

A recent article by King, Sentana, & Wadhvani (1994) uses monthly stock returns to document that these covariances indeed change over time. Relating asset returns to factors derived from macroeconomic variables enables the authors to explain only a trivial part of the covariance dynamics. Other authors have come to similar conclusions. In particular, after investigating the impact of macroeconomic variables, Von & Jeon (1989) look at industry effects using weekly data and find little evidence that industry effects help us understand these covariances better. Using a different approach, Ammer and Mei (1994) find that most of the covariance between national indices is explained by comovement across countries in common stock risk premium rather than by comovement in fundamental variables. Longin and Solnik (1995) are somewhat more successful focusing on correlations rather than covariances. They use monthly excess returns for seven major countries from 1960 to 1990 and find that correlations increase over time, are larger when large shocks occur, and are related to dividend yields and interest rates. They do not investigate the impact of macroeconomic variables other than interest rates. The evidence for monthly and weekly returns suggests that exposure to macroeconomic and industry factors are not helpful in understanding levels or changes in cross-country covariances.

### History and Prospects of Commodity Derivatives in India

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A *derivative* is a financial instrument which derives its value from some other financial price. This “other financial price” is called *the underlying*. Derivatives, a phenomenon of the financial and commodity markets of the 1980s and 1990s, allow fast, easy, and affordable management of market risks faced by financial institutions, businesses and individuals.

A wheat farmer may wish to contract to sell his harvest at a future date to eliminate the risk of a change in prices by that date. The price for such a contract would obviously depend upon the current spot price of wheat. Such a transaction could take place on a wheat forward market. Here, the wheat forward is the “derivative” and wheat on the spot market is “the underlying”. The terms “derivative contract”, “derivative product”, or “derivative” are used interchangeably. The most important derivatives are futures and options.

Derivatives are the future contracts whose value depends upon the underlying assets. When derivatives are introduced in the stock market, the underlying asset may be anything as component of stock market like, stock prices or market indices, interest rates, etc. Many financial and commercial firms as well as governments use derivatives to hedge or manage their risks. For the financial system as a whole, derivatives can improve market efficiencies by providing price discovery and by transferring risks to those more willing and able to bear them.

On the other hand, the commodity form is a social relationship, and a commodity is anything that is governed by it. In the banal usage of neoclassical economics, however, the social texture of the commodity is erased: the word comes to designate any object produced for use or exchange, or it is given the specialized sense of an unelaborated primary

product, or else it is displaced by the unspecific term "goods." A generalized abstraction, it loses all its historicity and its social particularity. In its simplest form, the Marxist concept of the commodity refers to things produced for exchange rather than for immediate use; in this broad sense, the commodity is to be found (although episodically rather than as a dominant form) in many pre-capitalists societies. In its more complex definition, the concept refers to a matrix of conditions of exchange (the capitalist market), conditions of production (capital investment and wage labour, which is itself a commodity at another level), and conditions of consumption (private rather than collective appropriation of goods). The classic historical studies of commoditisation have been directed to land, labour, money, risk, and art. It is the interlocking commoditisation of land and labour, which, by offering an explanation for the formation of a new class of landless labourers and for the primitive accumulation that generated capital for the industrialisation farming, or petty commodity production, and for industrial capitalism, has provided the key narrative of the rise of the capitalist mode of production.

Commodity markets are markets where raw or primary products are exchanged. These raw commodities are traded on regulated commodities exchanges, in which they are bought and sold in standardized contracts.

The modern commodity markets have their roots in the trading of agricultural products. While wheat and corn, cattle and pigs, were widely traded using standard instruments in the 19th century in the United States, other basic foodstuffs such as soybeans were only added quite recently in most markets. For a commodity market to be established there must be very broad consensus on the variations in the product that make it acceptable for one purpose or another.

The economic impact of the development of commodity markets is hard to overestimate. Through the 19th century "the exchanges became effective spokesmen for, and innovators of, improvements in transportation, warehousing, and financing, which paved the way to expanded interstate and international trade."

Historically, dating from ancient Sumerian use of sheep or goats, other peoples using pigs, rare seashells, or other items as commodity money, people have sought ways to standardize and trade contracts in the delivery of such items, to render trade itself more smooth and predictable.

Commodity money and commodity markets in a crude early form are believed to have originated in Sumer where small baked clay tokens in the shape of sheep or goats were used in trade. Sealed in clay vessels with a certain number of such tokens, with that number written on the outside, they represented a promise to deliver that number. This made them a form of commodity money i.e. more than an I.O.U. (I owe you) but than a guarantee by a nation(state or bank). However, they were also known to contain promises of time and date of delivery which made them like a modern futures contract. Regardless of the details, it was only possible to verify the number of tokens inside by shaking the vessel or by breaking it, at which point the number or terms written on the outside became subject to doubt. Eventually the tokens disappeared, but the contracts remained on flat tablets. This represented the first system of commodity accounting.

Classical civilizations built complex global markets trading gold or silver for spices, cloth, wood and weapons, most of which had standards of quality and timeliness. Considering the many hazards of climate, piracy, theft and abuse of military fiat by rulers of kingdoms along the trade routes, it was a major focus of these civilizations to keep markets open and trading in these scarce commodities. Reputation and clearing became central concerns, and the states which could handle them most effectively became very powerful empires, trusted by many peoples to manage and mediate trade and commerce.

The origin of commodity derivatives markets dates as far as back to the 17th century, when they were informally established in Amsterdam and centred on the trade in Tulips. The modern form, however, came into existence in the 19th century, *inter alia*, in London, Chicago and New York. Notwithstanding the fact that India is considered a pioneer in some forms of

derivatives in commodities, commodity derivatives market in India has had a turbulent history.

Trading in derivatives first started to protect farmers from the risk of the value of their crop going below the cost price of their produce. Derivative contracts were offered on various agricultural products like cotton, rice, coffee, wheat, pepper etc.

The first organised exchange, the Chicago Board of Trade (CBOT) with standardised contracts on various commodities was established in 1848. In 1874, the Chicago Produce Exchange which is now known as Chicago Mercantile Exchange was formed (CME). CBOT and CME are two of the largest commodity derivatives exchanges in the world.

The history of derivatives markets in the US can be traced back to 1851, when the Chicago Board of Trade first began trading contracts for future delivery, providing farmers the opportunity to negotiate a guaranteed price for their crops before they were harvested. Futures and options markets grew in scope and scale, and derivatives exchanges emerged in major cities throughout the country, encompassing a range of agriculture, mineral, energy and metal commodities. In US and other Western countries, derivatives trading is allowed in a range of commodities including live cattle, feeder cattle, hogs, pork bellies, fluid milk, rubber, tea, wool and industrial metals and even in a number of non-commodities such as weather index and pollution permits. In advanced countries, there are several innovations in packaging natural-disaster/weather risk into various forms of tradable financial assets- catastrophic bonds; insurance contracts; weather derivative contracts; exotic options, *etc.*, providing the holder with large amounts of capital contingent upon the occurrence of some risky event.

The application of weather-based index insurance in the case of energy sector and cat bonds in the case of earthquake is quite advanced; nevertheless, applications in the agriculture sector are still limited. Weather related financial instruments are now spreading to potential clients in low income groups in developing countries (Fernando, 2004). Furthermore, in



some of the major derivative exchanges in the world such as Chicago Board of Trade (CBOT), London International Futures and Options Exchange (LIFEE), *etc*, there is convergence between the commodities and securities derivatives markets. With the globalisation of financial markets, significant developments are taking place in the international arena in terms of electronic trading, internet based commodity exchanges and electronic communication networks (ECNs) using multiple products and combination of networks as competitors to exchanges. There are increasing alliances, often international, to compete effectively with exchanges and ECNs. An overview of futures trading and the volumes traded around the world divulges massive divergence across the different exchanges.

The modern era of derivatives markets began in the 1970s as a result of two major events. The first event was the breakdown of the Bretton Woods international fixed exchange rate system, which reintroduced exchange rate fluctuations into the financial system. The second event was the creation of an options pricing formula by Fischer Black and Myron Scholes in 1973. It allowed investors to calculate the value of an option from the market price of the referenced item. These events, together with the new computational strength of computers, propelled the growth and development of derivatives.

International Swaps & Derivatives Association (ISDA) 2009 published the results of its first survey of derivatives usage by the world's major companies in 2003. The 2003 ISDA Derivatives Usage Survey found that 92 percent of the world's 500 largest companies, a broad-ranging sample covering industries that included banking, mining, manufacturing, aerospace, wholesalers of office and electronic equipment, and retail, used derivative instruments to manage and hedge their business and financial risks.

ISDA recently updated this survey for companies in the Fortune Global 500. The results show that the use of derivatives by businesses continues to grow. According to the most recent results, just over 94 percent of the sample i.e. 471 out of 500 companies report using derivatives.

## 2009 ISDA Derivatives Usage Survey:

New survey shows that 94 percent of the world's largest corporations report using derivatives to manage business and macroeconomic risks. Foreign exchange and interest rate derivatives are the most widely used instruments among large global corporations. Reported derivatives usage was uniformly high among companies based in developed economies

### Survey Background

The survey was conducted in March and April of 2009 using information reported in the most recent available annual reports of the 2008 Fortune Global 500 and, in some cases, by contacting the companies directly. Most financial reports did not differentiate between usage of OTC (Over-the-counter) and exchange traded derivatives.

Of the 500 companies included in the Fortune Global 500, eight did not report sufficient information to make a determination. These companies were classified as not using derivatives.

The numbers are percent of companies in the sample using derivatives. Not surprisingly considering the global scale of the companies surveyed, the largest number of companies (441) report using foreign exchange derivatives, followed by interest rate derivatives (416), commodity derivatives (240), equity derivatives (143), and credit derivatives (101).

### Cross-industry Comparisons

Companies in all industries report using derivatives to manage risks. The use of derivatives by financial services companies is almost universal (98 percent), followed by basic materials companies (97 percent), technology companies (95 percent), and health care, industrial goods, and utilities (92 percent each). Services companies report the lowest usage rates (88 percent).

## Derivatives use and Company size

One might expect derivatives usage to be relatively higher among the largest companies in the sample, but derivatives usage is almost uniformly distributed across companies of all sizes: derivatives use throughout the 500 firm samples is as high as for the 100 largest firms.

## Cross-country and Regional Comparisons

Although the use of derivatives is common to companies worldwide, the survey results suggest that there are regional differences. All the reporting companies based in the Netherlands, Canada, Switzerland, Great Britain, France, and Japan use derivatives. Among the rest of the ten countries with the largest number of companies in the Fortune Global 500, 97 percent of German companies, and 92 percent of US-based companies report using derivatives. Within the ten largest user countries, derivatives use is lower among South Korean (87 percent) and Chinese (62 percent) companies. Finally, large companies in emerging market jurisdictions report high rates of derivatives use. For example, of the six Indian firms and five each Russian, Brazilian, and Mexican firms in the sample, all report using derivatives.

Derivatives use is almost universal across borders and across industries. Despite occasional controversies, the use of derivatives for risk management is now as commonplace among financial institutions and corporations as to be considered routine.

## Russia

As Russian financial institutions, corporations, and investors become more integrated into the international financial system, the need for risk management tools has encouraged growth of domestic derivatives markets, both on exchange and over-the-counter. The course of development has not been smooth, however, and ISDA is actively involved in reform efforts in three areas, namely, legal enforceability, close-out netting, and treatment of

collateral. The following discusses the obstacles to the development of OTC derivatives in Russia.

Despite considerable growth in the past years, the full potential of the derivatives market in Russia has yet to unfold. The primary reason is lack of an adequate legal framework. Recent amendments to the Russian Civil Code providing more legal certainty for derivatives transactions are steps in the right direction. Russian law, however, still does not set out a clear position on full legal rights for derivatives trades or enforceability of critical provisions of the ISDA Master Agreement, particularly those that relate to close-out netting and collateral. Such legal uncertainty means that market participants cannot take advantage of netting benefits when calculating their exposures and consequently face high capital charges.

Today's Russian derivatives market remains underdeveloped, limited onshore activities with futures and currency forwards and with far more activity occurring offshore. Even simple transactions are difficult to structure because securities market regulations, especially derivatives regulation, are complex, incomplete, and controversial. At present, the only part of the market covered by comprehensive legislation is futures and options on equities and equity indices (Federal Financial Markets Service (FFMS), 2006). In contrast, an efficient legal framework for currency, interest rate, and commodity derivatives remains to be developed.

### Africa

- With a population of 1 billion, 4-5% annual growth, 53 countries, \$320 billion annual commodity base and rapid integration with global markets, Africa presents a perfect opportunity for a commodity derivatives market to flourish. The continent accounts for 10% of the world oil reserve and 14.6% of world's arable land.
- 47 countries of sub-Saharan Africa accounted for 73% of total foreign direct investment to the region, up from 64% in the preceding year. North Africa attracted the residual 27%.

- Returns earned by international banks on African equities were higher than that in most other markets. Africa's average Gross Domestic Savings rose to 26% of the GDP in 2008 compared to 21.8% in 2004.
- Trade of unprocessed commodities such as agri-commodities, metals, minerals and energy accounts for nearly 85% of Africa's total annual exports.

Most African countries have no derivative markets, with the exception of South Africa and the North African economies of Morocco, Egypt and Tunisia, where the volume of derivative transactions is small but growing. Where derivative markets exist, they are largely in their infancy and mostly focused on foreign-exchange derivative contracts.

In South Africa, derivative products include forwards and futures, forward rate agreements, interest-rate swaps, basis swaps, options, equity derivatives, and commodity futures with exchange-based and over-the-counter trade. South Africa's agricultural commodities futures markets sees active trade in maize, wheat, sunflower seeds and soya beans, thereby providing risk-management tools for regional producers as well as pricing benchmarks.

Zambia and Malawi also have agricultural commodity exchanges, with the Zambian exchange trading mainly in wheat and maize but also in soya, fertilizer, cement, maize barn, cottonseed and kidney beans.

A commodities spot and derivatives exchange is being established in Botswana as a hub for pan-African trading. It is expected that the Botswana commodities exchange will catalyse performance in African commodity and financial markets through enhancing price discovery, market transparency and risk management.

Other agricultural commodity exchanges in Africa, including operations in Kenya, Nigeria, Ghana, Ivory Coast and Uganda have struggled to take off or to achieve appropriate scale.

The role of derivatives in the current financial crisis has been widely discussed and to some extent their limited use in Africa has turned out to be a boon. Nonetheless, the role of derivative instruments is well-recognized as a means for companies to adequately manage their market risks, in Africa as in the rest of the world.

#### Pan-African organised market:

- Due to lack of a forum for organised trade and management of price and currency risks, market participants face relatively high costs and higher risks.
- The absence of an organised commodity or futures exchange and a central counter party clearing house in Africa (except for South Africa) has created a near-vacuum in the exchange, brokerage and investment space. Thus, the need of a pan African organised market is paramount.

#### Bourse Africa- The Emerging African Exchange:

Bourse Africa is a pan-African multi-asset spot and derivatives exchange, depository platform and central counter party clearing house operating on a Hub and Spoke model, connecting all the major African economies. This network- would combine the continental scale with a local market focus, thus increasing liquidity and reducing transaction costs.

#### SAFEX Commodity Derivatives Market:

The Commodity Derivatives Market provides a platform for price discovery and efficient price risk management for the grains market in South and Southern Africa. More recently, the Division also offers derivatives on precious metals and crude oil.

Commodity markets have existed for many centuries and were the first to innovate contracts in which to manage price risk. The use of derivative instruments through futures and options contracts, provide market participants

with the ability to manage their price risk in the underlying physical market. By trading on a formal exchange which connects buyers and sellers, not only is price discovery achieved in a transparent fashion, but all transactions are guaranteed through the derivatives clearing structure.

Producers and users of agricultural commodities who hedge their price risk are thereby limiting their exposure to adverse price movements. This encourages increased productivity in the agricultural sector as farmers and users are able to concentrate their efforts on managing production risks. Production risks associated with variables such as the weather, farm/production management and seasonal conditions.

The physically settled commodities rely on warehouse receipts to facilitate the delivery process. The warehouse receipts are utilized by financial institutions who offer financing to clients who own the receipts. Derivative contracts also enable institutions to fund input costs to producers who hedge their price risk and in so doing encourage sustainable production.

The cash settled commodities, like gold and crude oil, reference highly liquid international markets for the final cash settlement value thereby providing all participants with the assurance that the local settlement price is not open to any abuse.

#### Benefits to Africa:

1. To ensure that the Africans:-
  - become price-makers rather than price takers for the commodities that contribute to approximately 90% of their export revenues per year.
  - have the instruments to increase the financing, value addition and risk management they need to drive economic and social development on the continent.
  - can efficiently and securely trade, fulfilling the vision of African economic integration.

- engage in trade on a level playing field with the rest of the world-fair and transparent price discovery and equal market access.
- 2. To stimulate investment to upgrade commodity production and marketing activities, and to develop world-class infrastructure.
- 3. To create a new industry that generates jobs in their hundreds of thousands, and builds the capacity of a new cadre of skilled African professionals.

Commodity Derivatives business offers a full range of over-the-counter and exchange-traded price risk management solutions for a diverse range of clients worldwide. Underlyings trading include oil, gas, power, metals, soft commodities and carbon emissions. Clients who are served include producers, consumers, refiners and transportation companies, as well as traders, hedge funds and financial institutions. They also offer investors access to the commodity asset class through a variety of strategies and structured solutions.

Commodity Futures is a market leader in the provision of global clearing and financing solutions for listed commodity futures and options to the corporate and institutional client base of BNP Paribas (**BNP** (Banque Nationale de Paris) **Paribas** was one of the first banks to start a dialogue with India in 1860 beginning operations in Calcutta)

Asia is expanding its influence on the global commodities market. With the strong demand for raw materials and natural resources from China and India, commodity prices have shown signs of resurgence amid growing optimism about the recovery prospects of the Asian economy and dollar weakness. Building on the success of the streamed Commodity Derivatives session at the Derivatives World Asia 2008, present the inaugural FOW Commodity Derivatives Asia-Pacific Summit – a one day highly focused event that brought market participants together from across Asia to discuss the pressing issues governing the derivatives market in 2009.



### Commodity derivatives vis-a-vis India (current trend):

The first ever organised derivatives market evolved with the setting up of Bombay Cotton Trade Association Ltd., in 1875. Thereafter Gujarati Vyapari Mandali started trading in oilseeds in 1900 and futures trading in raw jute goods began in Kolkata(the then Calcutta) with the establishment of the Calcutta Hessian Exchange Ltd.,in 1919. Forward trading in raw jute and jute goods started at Calcutta in 1912. In 1920 gold trading started in Bombay. Gradually,organised forwards market shaped up in commodities like cotton,groundnut, groundnut oil,raw jute,castor seed, wheat,rice,sugar,gold, silver etc. Forward Markets in Wheat had been functioning at Hapur since 1913, and in bullion at Bombay, since 1920. With the enactment of Defence of India Act- 1935, however, the market was subjected to restriction/ prohibition from time to time, owing to the apprehensions of speculation in times of scarcity. After independence,the market received a fillip with the enactment of Forward Contracts Regulation Act (FCRA) in December 1952. Post-independence,in the 1950s and 1960s, stringent policy measures made future trading difficult. Further,during the 1960s and 1970s, futures trading in some commodities like oilseeds, jute, and cotton was suspended, doubting the role of the futures market in hiking the crop spot prices. However, it was reincorporated into the Indian system in the 1980s on recommendation of Dantwala Committee(1966) and Khusro committee(1980).But this time trading was allowed in only few commodities like jiggery, jute, pepper, turmeric, etc. The essential commodities were kept out of the trading domain. The commodity derivatives market ,however, remained a poor performer, owing to intense government intervention, restrictions, downgraded arrangements and lack of physical delivery of crops, lack of proper warehouses, improper documentation process etc. The Kabra Committee set up in1993 set policy changes in 1993, drafted recommendations meant for development of futures market in India, which have largely implemented and have led to the new-day commodities trading culture in India. Deregulation and liberalization following the Forex crisis, in early 1990s, also necessitated policy changes which led to re-introduction of futures trading in commodities in India. The growing

realisation of forthcoming issues post-globalization and non-sustainability of the Govt support to commodity sector led the Government to explore the alternative of market-based mechanism, viz., futures markets, primarily to cope with price-volatility in the commodity sector.

The derivatives markets, which were once vibrant and attracted huge trading volumes in commodities, particularly, cotton, oilseeds, bullion and jute were either suspended or prohibited during 1960s and 1970s.

Introduction of derivatives in the Indian capital market was initiated by the Government following L C Gupta Committee Report on Derivatives in December 1997. The Committee was appointed by the Securities and Exchange Board of India (SEBI) by a Board resolution dated November 18, 1996 in order "to develop appropriate regulatory framework for derivatives trading in India". The Committee's concern is with financial derivatives in general and equity derivatives in particular but it has tried to examine the need for financial derivatives in a broader perspective. The Committee recommends that a formal mechanism be established for such coordination between SEBI and RBI in respect of all financial derivatives markets. This will help to avoid the problem of overlapping jurisdictions. SEBI appointed L.C.Gupta Committee on 18th November 1996 to develop appropriate regulatory framework for the derivatives trading and to recommend suggestive bye-laws for Regulation and Control of Trading and Settlement of Derivatives Contracts. The Committee was also to focus on the financial derivatives and equity derivatives. The Committee submitted its report in March 1998.

The Board of SEBI in its meeting held on May 11, 1998 accepted the recommendations and approved the introduction of derivatives trading in India beginning with Stock Index Futures. The Board also approved the "Suggestive Bye-laws" recommended by the LC Gupta Committee for Regulation and Control of Trading and Settlement of Derivatives Contracts. SEBI circulated the contents of the Report in June 98.

The LC Gupta Committee had conducted a wide market survey with contact of several entities relevant to derivatives trading like brokers, mutual

funds, banks/FIs, FIIIs and merchant banks. The Committee observation was that there is a widespread recognition of the need for derivatives products including Equity, Interest Rate and Currency derivatives products. However Stock Index Futures is the most preferred product followed by stock index options. Options on individual stocks is the third in the order of preference. The participants took interviews, mostly stated that their objective in derivative trading would be hedging. But there were also a few interested in derivatives dealing for speculation or dealing. The Committee strongly favoured the introduction of financial derivatives to facilitate hedging in a most cost-efficient way against market risk. There is a need for equity derivatives, interest rate derivatives and currency derivatives. There should be phased introduction of derivatives products. To start with, index futures to be introduced, which should be followed by options on index and later options on stocks. The derivative trading should take place on a separate segment of the existing stock exchanges with an independent governing council where the number of trading members should be limited to 40 percent of the total number. Common Governing Council and Governing Board members not allowed. The Chairman of the governing council should not be permitted to trade (broking/dealing business) on any of the stock exchanges during his term. Trading to be based on On-line screen trading with disaster recovery site. Per half hour capacity should be 4-5 times the anticipated peak load. Percentage of broker-members in the council to be prescribed by SEBI. Other recommendations of the Committee about the structure of Derivative Exchanges are as under:

The settlement of derivatives to be through an independent clearing corporation/clearing house, which should become counter party for all trades or alternatively guarantee the settlement of all trades. The clearing corporation to have adequate risk containment measures and to collect margins through EFT (Electronic Funds Transfer). The derivative exchange to have both on-line trading and surveillance systems. It should disseminate trade and price information on real time basis through two information vending net works. It should inspect 100 percent of members every year. The segment can start with a minimum of 50 members. The Committee recommended separate

membership for derivatives segment. Members of equity segment cannot automatically become members of derivative segment. Provision for arbitration and investor grievances cells to be set up in four regions. Provision of adequate inspection capability and all members to be inspected. The report suggested the introduction of stock index futures in the first place to be followed by other products once the market matures. Following the recommendations and pursuing the integration policy, futures on benchmark indices (Sensex and Nifty 50) were introduced in June 2000. The policy was followed by introduction of index options on indices in June 2001, followed by options on individual stocks in July 2001. Stock futures were introduced on individual stocks in November, 2001 (Nath 2003).

Commodity derivatives trading in India notwithstanding its long and tumultuous history, with globalisation and recent measures of liberalisation, has witnessed a massive resurgence turning it one of the most rapidly growing areas in the financial sector today. This paper reendeavours to test the efficacy and performance of commodity derivatives in steering the price risk management. The critical analytics of performance divulges that these markets although are yet to achieve minimum critical liquidity, almost all the commodities throw an evidence of co-integration in both spot and future prices, presaging that these markets are marching in the right direction of achieving improved operational efficiency, *albeit*, at a slower pace. In the case of some commodities, however, the volatility in the future price has been substantially lower than the spot price indicating an inefficient utilisation of information.

The revival of this industry in India had a slow and shaky start. It began with the setting up of the Dantwala Committee (1966) and subsequently, the Khusro Committee (June 1980). In the post reforms era, accepting partially the recommendations of Kabra Committee (1993), the Government of India permitted derivatives trading in large number of commodities. In the seventies, most of the registered associations became inactive, as futures as well as forward trading in the commodities for which they were registered came to be either suspended or prohibited altogether. The Khusro Committee

(June 1980) had recommended reintroduction of futures trading in most of the major commodities, including cotton, kapas, raw jute and jute goods and suggested that steps may be taken for introducing futures trading in commodities, like potatoes, onions, etc. at appropriate time. The government, accordingly initiated futures trading in Potato during the latter half of 1980 in quite a few markets in Punjab and Uttar Pradesh.

After the introduction of economic reforms since June 1991 and the consequent gradual trade and industry liberalization in both the domestic and external sectors, the Govt. of India appointed in June 1993 one more committee on Forward Markets under the chairmanship of Prof K N Kabra.

The committee submitted its report in September 1994. The majority report of the committee recommended that futures trading be introduced in:

- Basmati Rice
- Cotton and Kapas
- Raw Jute and Jute Goods
- Groundnut, rapeseed/mustard seed, cottonseed, sesame seed, sunflower seed, safflower seed, copra and soybean, and oils and oilcakes of all of them.
- Rice bran oil
- Castor oil and its oilcake
- Linseed
- Silver
- Onions.

The committee also recommended that some of the existing commodity exchanges particularly the ones in pepper and castor seed may be upgraded to the level of international futures markets.

The liberalised policy being followed by the Government of India and the gradual withdrawal of the procurement and distribution channel necessitated setting in place a market mechanism to perform the economic functions of price discovery and risk management. A number of initiatives were also undertaken subsequently to decontrol and develop the forward markets in commodities. There are presently 21 regional exchanges in the country.

Exchange-traded commodity derivatives have been trading only since 2000, and the growth in this market has been uneven. The number of commodities eligible for futures trading has increased from 8 in 2000 to 80 in 2004, while the value of trading has increased almost four times in the same period (Nair, 2004). However, many contracts barely trade and, of those that are active, trading is fragmented over multiple market venues, including central and regional exchanges, brokerages, and unregulated forwards markets. Total volume of commodity derivatives is still small, less than half the size of equity derivatives (Gorham et al, 2005).

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markets. Total volume of commodity derivatives is still small, less than half the size of equity derivatives (Gorham et al, 2005).

As of end 2002, futures trading had been permitted in all recommended commodities except bullion and basmati rice. The commodity derivatives markets have gained some respectability with commencement of trading at National Board of Trade (NBOT, originally SOPA). Within two years of its operation, NBOT has been able to trade a significant fraction of the aggregate volume being traded by all the exchanges. The initial liquidity at NBOT was brought by the operator in the informal bullion market at Saraffa in Indore. Now, the illegal trade in the Saraffa has vanished and the entire liquidity has migrated to the NBOT. The President of the NBOT facilitated the “pull and push” of these operators towards the legal market. The NBOT example shows that the leadership and channelling the liquidity from informal market to the official market was very significant in developing an exchange in a short run rather than the best systems and procedures and regulatory reforms.

The other developments in the direction of further liberalization of commodity derivative markets are:

- In paragraph 44 of the National Agricultural Policy announced by the government in 1999, it was stated that the government would enlarge the coverage of futures market to minimize the wide fluctuations in commodity prices, as also for hedging their risk. It was mentioned that an endeavour would be to cover all-important agricultural products under futures trading in the course of time.
- An expert committee on agricultural marketing headed by Mr. Shankerlal Guru recommended linkage of spot and forward markets, introduction of electronic warehouse receipt system, inclusion of more and more commodities under futures trading and promotion of national system of warehouse receipt.
- A sub-group on forwards and futures markets was formed under the chairmanship of Dr. Kalyan Raipuria (Economic Adviser, Department of

Consumer Affairs) to examine the feasibility of implementing the recommendations made by the expert committee, which recommended that the commodity specific approach to the grant of recognition should be given up. Exchanges which meet the criteria to be stipulated by the Government, should be able to trade contracts in any permitted commodity.

- In the Budget speech made on 28<sup>th</sup> February 2002, the Finance Minister announced expansion of futures and forwards trading to cover all agricultural commodities.
- The economic survey for the year 2000-2001 indicated the intention of the government to allow futures trading in Bullion. The policy statements announced by the government indicate its resolve to introduce reforms in commodity sector. A number of initiatives were also taken to decontrol the spot markets in commodities. The number of commodities listed as essential commodities has been pruned down to 17.

#### Commodity Derivatives individually:

Planned and sustained growth of any sector coupled with a prudent demand and supply management calls for a system, which can not only yield adequate returns to its producers but also ensure timely supply at desired prices to the consumers. Commodity derivatives or futures markets hold a key in insulating the producers and the trade functionaries from the seasonal and cyclical oscillations in the prices of commodities, which are aggravated by the high income and low price elasticity of demand and the shifts in such elasticity overtime. Derivatives markets hold an immense potential for the economy as they stabilise the amplitude of price variations, facilitate lengthy, complex production decisions, bring a balance between demand and supply, act as a price barometer to the farmers and the traders besides encouraging competition. These markets while enabling price discovery and better price



risk management engender inter-temporal price equilibrium and horizontal and vertical price integration. While ensuring price risk mitigation and remunerative returns, these markets also contribute in scaling down the downside risks associated with agricultural lending and thereby facilitate the flow of credit to agriculture. Besides, these markets through the use of warehouse receipts obviate the need for collaterals, the lack of which has currently impeded the flow of agricultural credit. They also hold a key role not only in reinvigorating the spot markets but also triggering the diversified growth of Indian agriculture in line with the consumption pattern. A strong, healthy, vibrant and well developed commodity exchanges can play a pivotal role in the globalisation of international trade by imparting a competitive pricing efficiency to exports. The promotion of derivatives trading has become imperative particularly, in the aftermath of WTO regime to face the challenges in terms of exposure to the vicissitudes of world commodity prices and heightened competition.

### The Indian Scenario

Commodity derivatives have had a long and a chequered presence in India. The commodity derivative market has been functioning in India since the nineteenth century with organised trading in cotton through the establishment of Cotton Trade Association in 1875. Over the years, there have been various bans, suspensions and regulatory dogmas on various contracts.

There are 25 commodity derivative exchanges in India as of now and derivative contracts on nearly 100 commodities are available for trade. The overall turnover is expected to touch Rs 5 lakh crore (Rs 5 trillion) by the end of 2004-2005.

National Commodity and Derivatives Exchange (NCDEX) is the largest commodity derivatives exchange with a turnover of around Rs 3,000 crore (Rs 30 billion) every fortnight.

It is only in the last decade that commodity derivatives exchanges have been actively encouraged. But, the markets have suffered from poor liquidity and have not grown to any significant level, till recently.

However, in the year 2003, four national commodity exchanges became operational; National Multi-Commodity Exchange of India (NMCE), National Board of Trade (NBOT), National Commodity and Derivatives Exchange (NCDEX) and Multi Commodity Exchange (MCX).

The onset of these exchanges and the introduction of futures contracts on new commodities by the Forwards Market Commission have triggered significant levels of trade. Now the commodities futures trading in India is all set to match the volumes on the capital markets.

#### Investing in Commodity Derivatives

Commodity derivatives, which were traditionally developed for risk management purposes, are now growing in popularity as an investment tool. Most of the trading in the commodity derivatives market is being done by people who have no need for the commodity itself.

They just speculate on the direction of the price of these commodities, hoping to make money if the price moves in their favour.

The commodity derivatives market is a direct way to invest in commodities rather than investing in the companies that trade in those commodities.

For example, an investor can invest directly in a steel derivative rather than investing in the shares of Tata Steel. It is easier to forecast the price of commodities based on their demand and supply forecasts as compared to forecasting the price of the shares of a company which depend on many other factors than just the demand and supply of the products they manufacture and sell or trade in.

Also, derivatives are much cheaper to trade in as only a small sum of money is required to buy a derivative contract.

Let us assume that an investor buys a tonne of soybean for Rs 8,700 in anticipation that the prices will rise to Rs 9,000 by June 30, 2012. He will be able to make a profit of Rs 300 on his investment, which is 3.4%. Compare this to the scenario if the investor had decided to buy soybean futures instead.

Before we look into how investment in a derivative contract works, we must familiarise ourselves with the buyer and the seller of a derivative contract. A buyer of a derivative contract is a person who pays an initial margin to buy the right to buy or sell a commodity at a certain price and a certain date in the future.

On the other hand, the seller accepts the margin and agrees to fulfil the agreed terms of the contract by buying or selling the commodity at the agreed price on the maturity date of the contract.

Now let us say the investor buys soybean futures contract to buy one tonne of soybean for Rs 8,700 (exercise price) on June 30, 2012. The contract is available by paying an initial margin of 10%, i.e. Rs 870. Note that the investor needs to invest only Rs 870 here.

On June 30, 2012, the price of soybean in the market is, say, Rs 9,000 (known as Spot Price; Spot Price is the current market price of the commodity at any point in time).

The investor can take the delivery of one tonne of soybean at Rs 8,700 and immediately sell it in the market for Rs 9,000, making a profit of Rs 300. So the return on the investment of Rs 870 is 34.5%. On the contrary, if the price of soybean drops to Rs 8,400 the investor will end up making a loss of 34.5%.

If the investor wants, instead of taking the delivery of the commodity upon maturity of the contract, an option to settle the contract in cash also

exists. Cash settlement comprises exchange of the difference in the spot price of the commodity and the exercise price as per the futures contract.

At present, the option of cash settlement lies only with the seller of the contract. If the seller decides to make or take delivery upon maturity, the buyer of the contract has to fulfil his obligation by either taking or making delivery of the commodity, depending on the specifications of the contract.

In the above example, if the seller decides to go for cash settlement, the contract can be settled by the seller paying Rs 300 to the buyer, which is the difference in the spot price of the commodity and the exercise price. Once again, the return on the investment of Rs 870 is 34.5%.

The above example shows that with very little investment, the commodity futures market offers scope to make big bucks. However, trading in derivatives is highly risky because just as there are high returns to be earned if prices move in favour of the investors, an unfavourable move results in huge losses.

The most critical function in a commodity derivatives exchange is the settlement and clearing of trades. Commodity derivatives can involve the exchange of funds and goods. The exchanges have a separate body to handle all the settlements, known as the clearing house.

For example, the seller of a futures contract to buy soybean might choose to take delivery of soybean rather than closing his position before maturity. The function of the clearing house or clearing organisation, in such a case, is to take care of possible problems of default by the other party involved by standardising and simplifying transaction processing between participants and the organisation.

In spite of the surge in the turnover of the commodity exchanges in recent years, a lot of work in terms of policy liberalisation, setting up the right legal system, creating the necessary infrastructure, large-scale training

programs, et cetera still needs to be done in order to catch up with the developed commodity derivative markets.

Also, trading in commodity options is prohibited in India. The regulators should look towards introducing new contracts in the Indian market in order to provide the investors with choice, plus provide the farmers and commodity traders with more tools to hedge their risks.

### Size of the Market

The trading of commodities consists of direct physical trading and derivatives trading. Exchange traded commodities have seen an upturn in the volume of trading since the start of the decade. This was largely a result of the growing attraction of commodities as an asset class and a proliferation of investment options which has made it easier to access this market.

The global volume of commodities contracts traded on exchanges increased by a fifth in 2010, and a half since 2008, to around 2.5 billion million contracts. During the three years up to the end of 2010, global physical exports of commodities fell by 2%, while the outstanding value of OTC commodities derivatives declined by two-thirds as investors reduced risk following a five-fold increase in value outstanding in the previous three years. Trading on exchanges in China and India has gained in importance in recent years due to their emergence as significant commodities consumers and producers. China accounted for more than 60% of exchange-traded commodities in 2009, up on its 40% share in the previous year.

Commodity assets under management more than doubled between 2008 and 2010 to nearly \$380bn. Inflows into the sector totalled over \$60bn in 2010, the second highest year on record, down from the record \$72bn allocated to commodities funds in the previous year. The bulk of funds went into precious metals and energy products. The growth in prices of many commodities in 2010 contributed to the increase in the value of commodities funds under management.

### Data Analysis and Findings

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#### **Agricultural Products:**

##### **1.Barley**

Barley is a cereal grain derived from the annual grass *Hordeum vulgare*. This widely adaptable crop is popular in temperate areas where it is grown as a summer crop and tropical areas where it is sown as a winter crop. In India, it is grown in rabi season. This cereal has many uses. It serves as a major animal fodder, as a base malt for beer and certain distilled beverages, and as a component of various health foods. It is used in soups and stews, and in barley bread of various cultures.

##### **Current Scenario**

Barley production in India is estimated 23 percent lower at 13 lakh tonnes in 2009-10 compared to 16.9 lakh tonnes last year, according to the fourth advance estimates. The new crop arrivals are expected in March-April 2011 after the rabi crop harvest. Moreover, production of Barley in top producing countries indicates a decline in 2010/11 compared to last year, according to the latest USDA estimates. Consumption demand for Barley in India mainly comes for malt, poultry and animal feed. Barley malt is majorly used for the production of alcoholic beverages in the country. China, Vietnam and India recorded strong annual increases in beer production in 2009 7.0%, 24.3% and 12.3%, respectively and drove the growth in overall beer production in Asia, where the annual growth rate of 5.5% was larger than those of other regions in 2009. Asia increased its production share in the global market by 1.6 percentage points and became the largest beer-producing region in the world, ahead of Europe, which had held that position since 1974.

## **Future Prospects**

Consumption demand for the cereal grain is expected to be higher given the increased demand from malt industry, poultry and animal feed, new food products of mixed grains (foodles, magi etc.), flour etc. The wider usage of the cereal in industries, feed and food support its demand in the country.

## **Factors influencing prices**

- Seasonal fluctuations in area sown, production and productivity
- Domestic and export demand
- Arrivals in the market and supply situation in different consuming and producing centres
- Price received by farmers for other competing crops
- Global production, stocks and supply
- Usage of cereal in different food products, value added products and a number of industries
- Other coarse grains supply and prices
- International price parity

## **Barley Futures**

Barley futures are trading at NCDEX since December 2006. NCDEX Barley futures are an ideal tool for price risk management for the producers as well as processing (malt and processed food) and export industry. Also, the market participants can benefit by taking position based on directional view on future prices, cash and carry arbitrage and calendar spread.

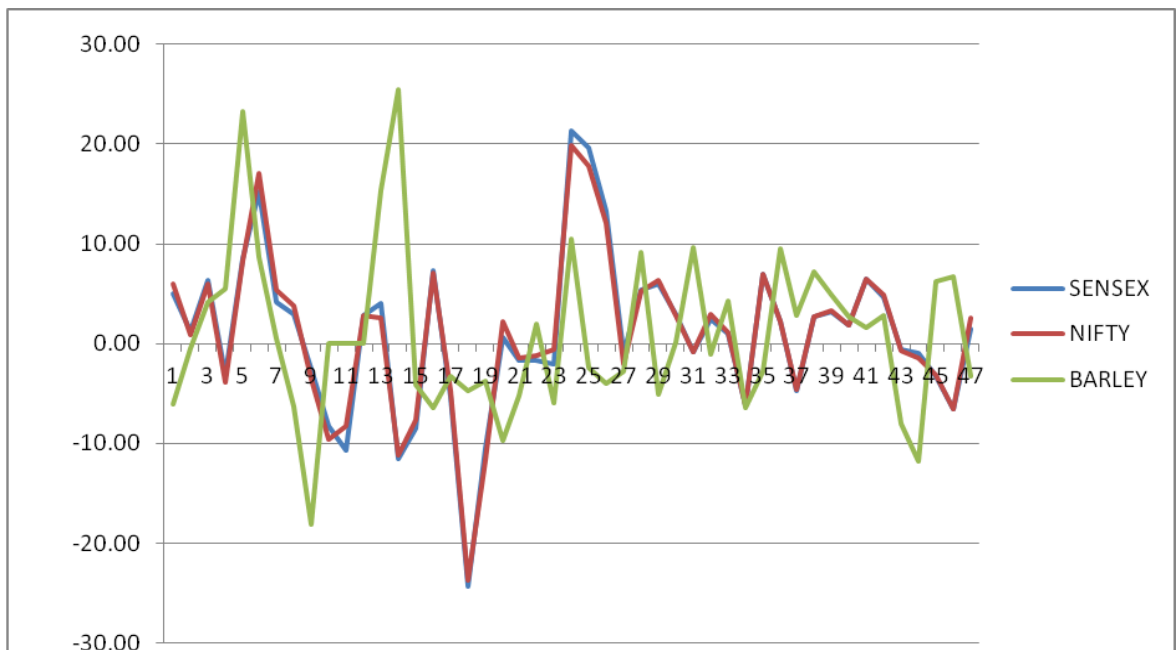
**Table 1: Result of Regression Line comparing Barley & SENSEX and Barley & Nifty**

SENSEX				Nifty			
R <sup>2</sup>	A	B	r	R <sup>2</sup>	α	β	r
0.02	0.74	0.14	0.14	0.02	0.74	0.14	0.13

**Regression Line of Barley on SENSEX:** Here Barley is the dependent variable and SENSEX is the independent variable. The value of  $r$ , i.e. correlation between Barley & SENSEX is just 0.14 which is insignificant. The value of  $R^2$ , the coefficient of Determination has a value of 0.02 which is able to explain hardly 2% variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of 0.74 which is positive but insignificant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Barley is towards the SENSEX market. In this case  $\beta$  value is 0.14 which suggests that if SENSEX increase by 10% Barley's price will hardly improve by 1.4%.

**Regression Line of Barley on NIFTY:** Here Barley is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Barley & SENSEX. It may be concluded that Barley & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) and Beta ( $\beta$ ) values are also insignificant and in addition  $R^2$  value is also insignificant.

**Graph 1: Variation of the market between SENSEX, Nifty & Barley**





## **2.Castor Seeds**

Castor plant (*Ricinus communis*) is grown in arid and semi-arid regions. It is cultivated in 30 different countries on commercial scale, of which India, China, Brazil, Russia, Thailand, Ethiopia and Philippines are major castor seed growing countries which accounts about 88% of the world's production. In India it is a kharif crop, sowing in July-August and arrivals from December onwards till March. Gujarat is the chief producing state, having a share of 86% of domestic production, followed by Andhra Pradesh and Rajasthan. Bag packed of castor seed contains 75kg by weight.

### **Current Scenario**

Castor is a non-edible oilseed crop; basically a cash crop, with average 46% oil recovery. Castor seed production in India is around 9-10 lakh MT. Castor oil (extracted from castor seed) and its derivatives have vast and varied applications in the manufacturing of soaps, lubricants, hydraulic and brake fluids, paints, dyes, coatings, inks, cold resistant plastics, waxes and polishes, nylon, pharmaceuticals and perfumes. Castor oil is the largest vegetable oil exported out of India. India is the biggest exporter of castor oil holding about 70% share of the international trade in this commodity followed by China & Brazil.

### **Future Prospects**

Castor seed due to its high oil content has its various uses. The supply of castor seed and its derivatives is highly fluctuating. Any change in the production trend in any of producing countries leads to a change in the level of the world production. The growing castor-based bio-fuel industry is also resulting in the increasing demand pressure on castor seed.

### **Factors influencing prices**

- Consumption and export pattern
- Estimated output based on the acreage and weather conditions and pest infestation etc

- Leftover stocks from the previous years production after meeting the demand
- Government policies and intervention
- Shifting cropping patterns in producing countries

### **Castor Seed Futures**

Given that castor seed have considerable price volatility and that the export realizations of castor oil have also vacillated between years, Exchange traded castor seed futures are ideal for price risk management needs of the processors, exporters and end users. Those with no natural exposure to castor seed trade can also benefit by undertaking 'cash-and-carry' arbitrage and 'calendar spread'. Speculators can take directional view on future prices and accordingly take positions in castor seed futures.

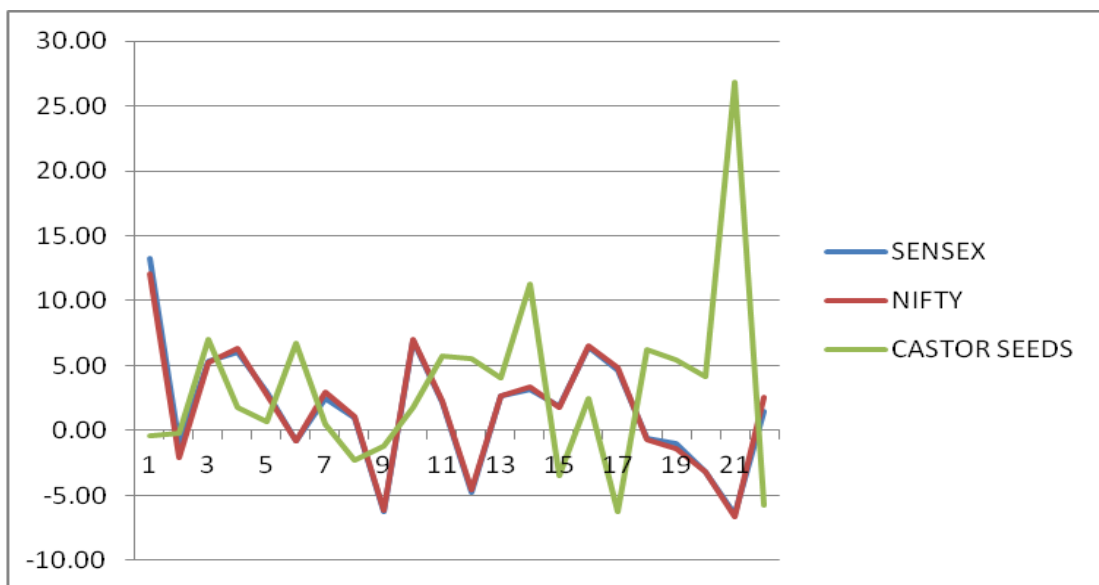
**Table 2: Result of Regression Line comparing Castor seeds & SENSEX and Castor seeds & Nifty**

SENSEX				Nifty			
R <sup>2</sup>	α	β	r	R <sup>2</sup>	α	β	r
0.14	4.12	-0.55	0.37	0.15	4.17	-0.59	0.39

**Regression Line of Castor seeds on SENSEX:** Here Castor seed is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Castor & SENSEX is just 0.37 which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of 0.14 which is able to explain hardly 14% variations in the SENSEX, in other words, it is having insignificant impact. Alpha (α), vertical intercept of the Regression line, has a value of 4.12 which is positive and significant. Beta (β), slope of the Regression line tells us how sensitive Castor is towards the SENSEX market. In this case β value is -0.55 which suggests that if SENSEX increase by 10% Castor's price will decrease by 5.5%.

**Regression Line of Castor seeds on NIFTY:** Here Castor seed is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Castor & SENSEX. It may be concluded that Castor & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) value is significant where Beta ( $\beta$ ) value is insignificant and in addition  $R^2$  value is also insignificant.

**Graph 2: Variation of the market between SENSEX, Nifty & Castor Seeds**



### **3.Chana**

Chickpea or chana is a very important pulse crop that grows as a seed of a plant named *Cicer arietinum* in the Leguminosae family. It contains 25% proteins, which is the maximum provided by any pulse and 60% carbohydrates. It places third in the importance list of the food legumes that are cultivated throughout the world. Chana is used as an edible seed and is also used for making flour throughout the globe. There are mainly two types of chickpea produced i.e. Desi and Kabuli.

Chana is usually suited to those areas having relatively cooler climatic conditions and a low level of rainfall. It yields best when grown on sandy, loam soils having an appropriate drainage system as this crop is very sensitive to

the excess water availability and a lack of such system can hamper the yield levels.

Chickpea is seeded in the months of September to November (Rabi Season) in India. The maturity period of desi type chickpea is 95-105 days and of kabuli type chickpea is 100-110 days. Harvesting of the plant is done when its leaves start drying and shedding and can be done directly or with the help of a harvester. In India, it is harvested in February, March and April.

### **Current Scenario:**

India is the largest producer of chickpea followed by Pakistan, Turkey and Iran. India produces around 6 to 8 million tonnes and contributes around 70% of the total world production. Chickpea is the most largely produced pulse crop in India accounting to a share of 40% of the total pulse production. India produces mostly the Desi type chickpeas.

Chana is grown in the drier areas of the country as they are best suited for its production. Madhya Pradesh produces the major share of around 40%. Uttar Pradesh and Rajasthan follow Madhya Pradesh contributing to 16% and 14% of production respectively. Since 1990, a rise in the productivity of chickpea in India has been observed from 614 kg per hectare to 735 kg per hectare.

### **Future Prospects :**

The domestic demand of chickpea is so large that after it being the largest producer of chana, India is also the largest importer of chana in the world. Over 4/5ths of the chana produced in the country is used to produce Chana Dal and over 4/5ths of this Dal is ground to make flour termed as Besan in India. The Indian imports figure around 3-4 lakh tons i.e. 30% of the total world imports. The countries which exports chickpea to India are Canada, Australia, Iran, Myanmar, Tanzania, Pakistan and Turkey. To fulfill the growing protein requirement of vegetarian population of India, demand for Chana will be even higher in the future.

### **Factors influencing prices :**

- Rainfall level and level of moisture in the soil
- Obstruction in the information movement
- Crop situation in the countries from where India imports the crop
- Prices of the other competitive pulses produced

### **Chana Futures :**

Chana Future started trading on NCDEX platform from April 2004 onwards. Because of higher open interest even in the far month contracts it has become an excellent tool for price risk management for processors and other market participants. Even an arbitrageur can trade using strategies like cash and carry and calendar spread. Speculators can take directional view on future prices and accordingly take position in Chana futures.

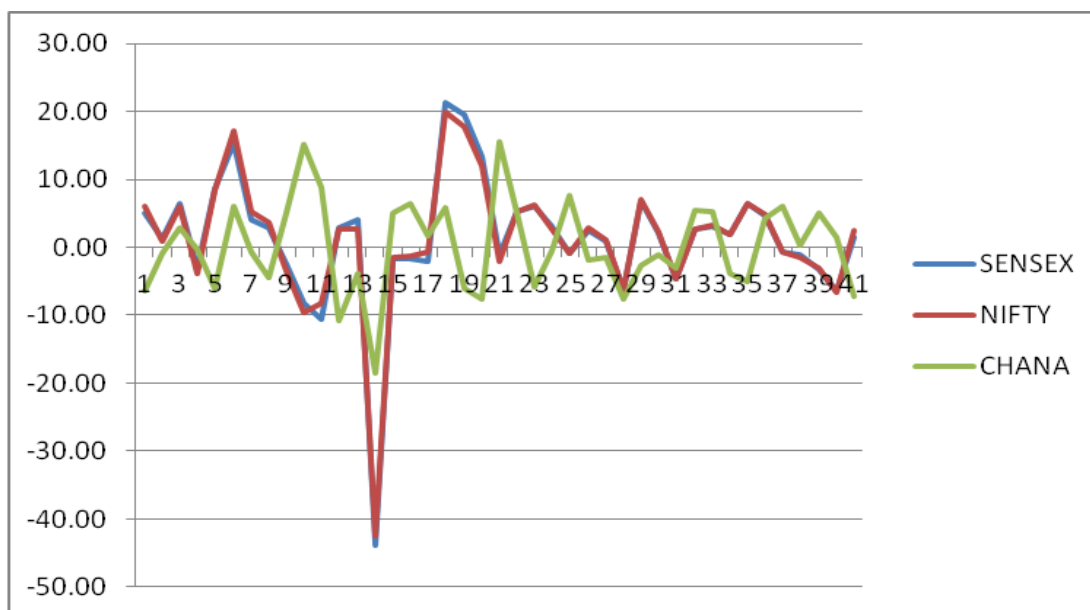
**Table 3: Result of Regression Line comparing Chana & SENSEX and Chana & Nifty**

SENSEX				Nifty			
$R^2$	$\alpha$	$\beta$	$r$	$R^2$	$\alpha$	$\beta$	$r$
0.02	0.05	0.10	0.14	0.02	0.05	0.10	0.14

**Regression Line of Chana on SENSEX:** Here Chana is the dependent variable and SENSEX is the independent variable. The value of  $r$ , i.e. correlation between Chana & SENSEX is just 0.14 which is insignificant. The value of  $R^2$ , the coefficient of Determination has a value of 0.02 which is able to explain hardly 2% variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of 0.05 which is positive but insignificant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Barley is towards the SENSEX market. In this case  $\beta$  value is 0.10 which suggests that if SENSEX increase by 10% Barley's price will hardly improve by 1.0%.

**Regression Line of Chana on NIFTY:** Here Chana is the dependent variable and Nifty is the independent variable. The results are exactly similar with the results between Chana & SENSEX. It may be concluded that Chana & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) value is significant where Beta ( $\beta$ ) value is insignificant and in addition  $R^2$  value is also insignificant.

**Graph 3: Variation of the market between SENSEX, Nifty & Chana**



#### **4.Chilli**

Chilli is a fruit of the plant *Capsicum annum* and *Capsicum frutescens* that belong to the family Solanaceae. It is known for its sharp acidic flavor and color. Its primarily used in making beverages and medicines. . Chilli thrives well on light loamy or sandy loam soils rich in lime and organic matters and requires a temperature range of 20-25 degrees. A warm humid climate favours growth while warm and dry weather enhances fruit maturity. Duration of crop is 3 to 4 months. Two crops are produced in the year in each dry and wet season in the country. The seed or the seedlings are planted in April and are harvested in August in dry season. In wet season the crop is planted as and when the rainfall occurs starting from august and harvesting takes place in December and chillies start reaching the major markets in February and March.

### **Current scenario:**

Global production of chilli stands at about 20.00 lakh MT to 25.00 lakh MT per annum. India is the largest producer and contributes about 10.00 lakh MT to 12 lakh MT annually followed by China, Nigeria, Peru, Bangladesh, Hungary. Domestically, Andhra contributes 49 % of total production followed by Karnataka (14 %), Orissa (7 %), Maharashtra (5 %), West Bengal (5 %), Rajasthan (5 %) and Tamil Nadu (4 %).

### **Future prospects:**

Globally Indian chillies are of superior quality which makes India the largest exporter of chillies. Domestic demand is good for chilli and the spice processing industry is growing at a very fast rate and is creating additional demand for commodity.

### **Factors influencing prices:**

- Domestic Fundamentals
- World production
- International trading price
- Domestic and Export demand
- Carry forward stocks
- Sowing and Harvesting
- Climatic conditions

### **About the future contracts:**

Chilli Futures contract was launched on 11th march 2005 and since then the contract has witnessed good participation from various supply chain participants. Using futures platform producers can hedge the price risk. With increasing export demand, exporters can hedge themselves against price risk. Thus the chilli contract provides space for every investor category.

**Table 4: Result of Regression Line comparing Chilli & SENSEX and Chilli & Nifty**

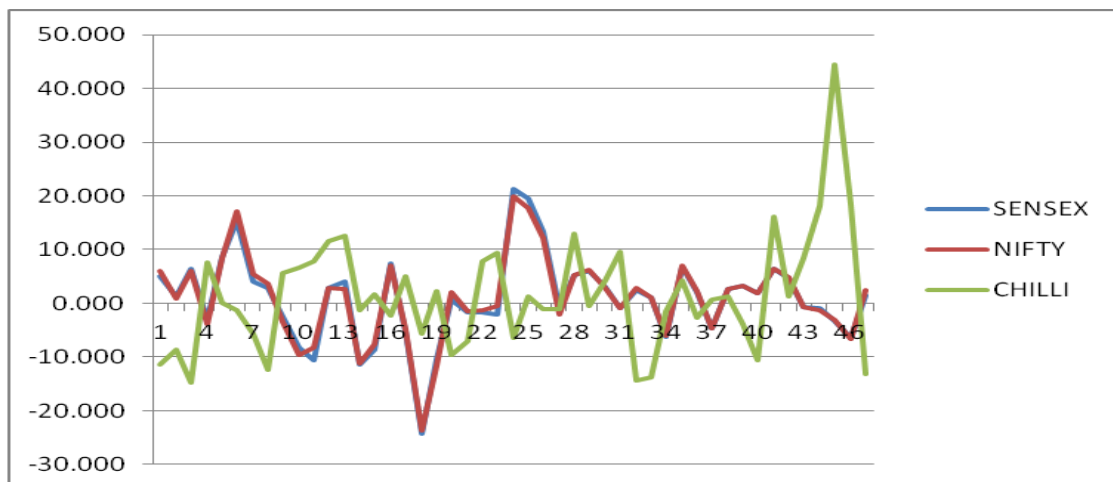
SENSEX				Nifty			
R <sup>2</sup>	α	β	r	R <sup>2</sup>	α	β	r
0.03	1.71	-0.22	0.16	0.03	1.76	-0.26	0.18

**Regression Line of Chilli on SENSEX:** Here Chilli is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Chilli & SENSEX is just 0.16 which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of 0.03 which is able to explain hardly 3% variations in the SENSEX, in other words, it is having insignificant impact. Alpha (α), vertical intercept of the Regression line, has a value of 1.71 which is positive and can be considered as significant. Beta (β), slope of the Regression line tells us how sensitive Chilli is towards the SENSEX market. In this case β value is -0.22 which suggests that if SENSEX increase by 10%

Castor's price will decrease by 2.2%.

**Regression Line of Chilli on NIFTY:** Here Chilli is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Chilli & SENSEX. It may be concluded that Chilli & Nifty are insignificantly correlated. The Alpha (α) value is significant where Beta (β) value is insignificant and in addition R<sup>2</sup> value is also insignificant.

**Graph 4: Variation of the market between SENSEX, Nifty & Chilli**





## **5.Coriander:**

Coriander (*Coriandrum sativum*) is an annual herb in the family Apiaceae. The plant requires good exposure to sunlight with medium to heavy loamy soil, sound drainage and well distributed moisture. The sowing period is from October to December; Harvesting extends from January to April and arrivals start from January and continue till April. The crop duration is of 90 days. The commercial parts of the plant are its leaf and seed. The aroma of the fruit is warm, nutty and spicy and it is used for its medicinal properties and also as flavouring and seasoning agent.

### **Current scenario:**

Global production of coriander is about 2.9 lakh MT to 3.35 lakh MT per years. India contributes around 80% of world coriander production and produces around 2.5-3.0 lakh MT annually, Other major producers are Morocco, Canada, Pakistan, Romania. Major importers are Indonesia, Singapore, Sri Lanka, UAE and USA. Rajasthan (60%) is the major producer of coriander in India followed by Madhya Pradesh, Andhra Pradesh, Karnataka, Tamil Nadu and Orissa. Annually 5-10% of total production from India is exported. Domestically major varieties are Badami, Eagle, Scooter, Double Parrot, Single Parrot, Super Green. Badami variety accounts to about 65 to 70% of total production.

### **Future prospects:**

India is the leading exporter and exports around 25000-30000 MT of coriander each year. The export demand has been increasing constantly both in terms of quantity and value. The major domestic buyers of coriander seed in India are spice processing agencies, which consume around 50% of the production and are mostly located in the southern states of India and Delhi. As the masala making business is growing exponentially, the demand from this sector is expected to increase in future.

### **Factors influencing prices:**

- Domestic Fundamentals
- World production
- International trading price
- Domestic and Export demand
- Carry forward stocks
- Sowing and Harvesting
- Climatic conditions

### **About the future contracts:**

Coriander futures contract was launched on August 2008. The supply fluctuation due to underlying fundamental factors leads to high price volatility. Inadequate storage period (6-8 months) effects availability and thus the prices during low availability months, such supply fluctuations provide opportunity to a speculator. For hedgers it minimizes price risk. Due to good availability in physical markets arbitragers can make use of the futures platform to make riskless profits. Thus the Coriander contract provides space for every investor category.

**Table 5: Result of Regression Line comparing Coriander & SENSEX and Coriander & Nifty**

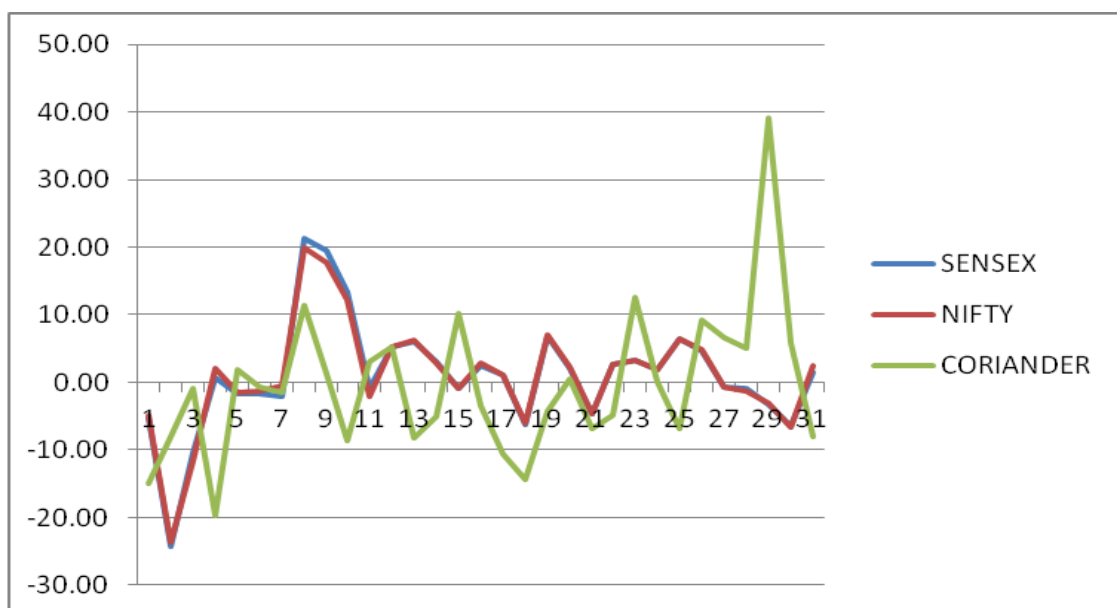
SENSEX				Nifty			
R <sup>2</sup>	$\alpha$	$\beta$	r	R <sup>2</sup>	$\alpha$	$\beta$	r
0.01	-0.63	0.15	0.11	0.01	-0.61	0.13	0.09

**Regression Line of Coriander on SENSEX:** Here Coriander is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Coriander & SENSEX is just 0.11 which is

insignificant. The value of  $R^2$ , the coefficient of Determination has a value of 0.01 which is able to explain hardly 1% variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of -0.63 which is negative and insignificant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Coriander is towards the SENSEX market. In this case  $\beta$  value is 0.15 which suggests that if SENSEX increase by 10% Barley's price will hardly improve by 1.5%.

**Regression Line of Coriander on NIFTY:** Here Coriander is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Coriander & SENSEX. It may be concluded that Coriander & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) and Beta ( $\beta$ ) values are also insignificant and in addition  $R^2$  value is also insignificant.

**Graph 5: Variation of the market between SENSEX, Nifty & Coriander**



## **6.Cotton Seed Oil Cake**

When kapas is ginned the lint and seed gets separated. When cotton seed is crushed for extraction of oil, the by-product which remains after extraction of oil is called Cotton Seed Oil Cake or Kapasia Khali in hindi. This

is mainly used as cattle feed. Cotton seed oil cake fresh production starts after the cotton arrivals in different regions of India.

### **Current Scenario**

Major production states of cotton seed oil cake in India are Gujarat, Maharashtra, Andhra Pradesh & Punjab and major consumption states are Rajasthan, Delhi, Punjab, & Haryana. The total annual production figure in India is about 65-75 lakh MT. Cotton seed oil cake has 6% oil content in general and greater the oil% in cotton seed oil cake better is the quality. Sound jute bags are used for its packing. Bag packed of cotton seed oil cake contains 50 kg by weight.

### **Future Prospects**

Cotton seed oil cake is majorly used as cattle feed since it has around 25% protein content in it. Consumption of cotton seed oil cake by cattle does add viscosity to the milk. As consumption of milk will increase in India year on year, the market of cotton seed oil cake will also grow.

### **Factors influencing prices**

- Domestic demand supply scenario.
- Price and availability of alternatives, such as RM seed meal, Pulses churri, Maize churri, Guar churri, etc.
- Cotton prices especially cotton seed prices.
- Quality of cotton seed oil cake especially the oil%.

### **Cotton Seed Oil Cake Futures**

Given that cotton seed oil cake have considerable price volatility and the domestic demand have also increased between years. Exchange traded cotton seed oil cake futures are ideal for price risk management needs of the Oil millers, Stockists, Dairies. Those with no natural exposure to cotton seed oil cake trade can also benefit by undertaking 'cash-and-carry' arbitrage and

'calendar spread'. Speculators can take directional view on future prices and accordingly take positions in cotton seed oil cake futures.

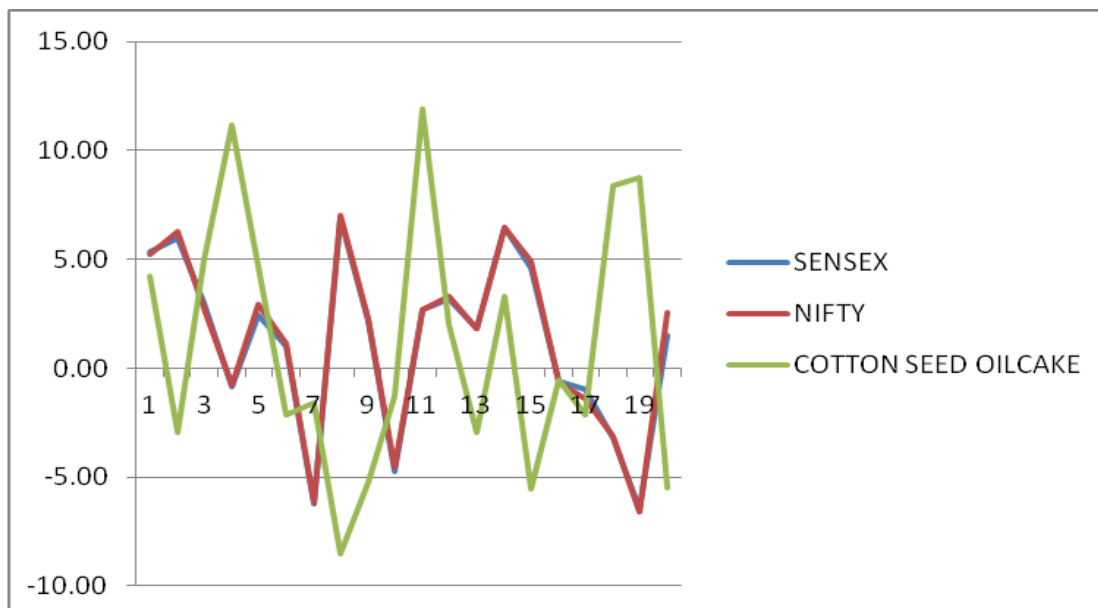
**Table 6: Result of Regression Line comparing Cotton Seed Oil Cake & SENSEX and Cotton Seed Oil Cake & Nifty**

SENSEX				Nifty			
R <sup>2</sup>	α	β	r	R <sup>2</sup>	α	β	r
0.07	1.53	-0.40	0.27	0.08	1.59	-0.42	0.29

**Regression Line of Cotton Seed Oil Cake on SENSEX:** Here Cotton Seed Oilcake is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Cotton Seed Oilcake & SENSEX is just 0.27 which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of 0.07 which is able to explain hardly 7% variations in the SENSEX, in other words, it is having insignificant impact. Alpha (α), vertical intercept of the Regression line, has a value of 1.53 which is positive and significant. Beta (β), slope of the Regression line tells us how sensitive Cotton Seed Oilcake is towards the SENSEX market. In this case β value is -0.40 which suggests that if SENSEX increase by 10% Cotton Seed Oilcake's price will decrease by 4.0%.

**Regression Line of Cotton Seed Oil Cake on NIFTY:** Here Cotton Seed Oil Cake is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Cotton Seed Oil Cake & SENSEX. It may be concluded that Cotton Seed Oil Cake & Nifty are insignificantly correlated. The Alpha (α) value is significant where Beta (β) value is insignificant and in addition R<sup>2</sup> value is also insignificant.

**Graph 6: Variation of the market between SENSEX, Nifty & Cotton Seed Oil Cake**



## 7.Palm oil

It is an edible palm oil and is derived from the mesocarp of the fruit of the oil palm (*Elaeis guineensis*). It is not to be confused with palm kernel oil derived from the kernel of the same fruit, or coconut oil derived from the kernel of the coconut palm (*Cocos nucifera*). The differences are in color (raw palm kernel oil lacks carotenoids and is not red), and in saturated fat content: Palm mesocarp oil is 41% saturated, while Palm Kernel oil and Coconut oil are 81% and 86% saturated respectively.

Naturally reddish in color because of a high beta-carotene content, palm oil, along with coconut oil, is one of the few highly saturated vegetable fats. It is semi-solid at room temperatures and contains several saturated and unsaturated fats in the forms of glyceryl laurate (0.1%, saturated), myristate (1%, saturated), palmitate (44%, saturated), stearate (5%, saturated), oleate (39%, monounsaturated), linoleate (10%, polyunsaturated), and alpha-linolenate (0.3%, polyunsaturated). Like all vegetable oils, palm oil does not

contain cholesterol, although saturated fat intake increases both LDL and HDL cholesterol.

Palm oil is a common cooking ingredient in the tropical belt of Africa, Southeast Asia and parts of Brazil. Its increasing use in the commercial food industry in other parts of the world is buoyed by its lower cost and the high oxidative stability (saturation) of the refined product when used for frying.

### Market Influencing Factors

- World demand and supply fluctuations of the competitive edible oils
- Domestic demand and supply fluctuations of other oils and oilseeds
- Seasonal cycles, as April to December is the peak production period
- Import policies of the importing nations

### Market:

Malaysia is the largest producer of palm oil in the world with approximately 43% contribution in the world's production. Indonesia has been the closest competitor to the leader country in this production context. It contributes to approximately 40% in the world figures. The world production has increased with time and is still rising @ 7%. The same is the case with the area covered under the cultivation of oil palm tree. This crop is cultivated in around 28 million acres of land over the world.

**Table 7: Result of Regression Line comparing Crude Palm Oil & SENSEX and Crude Palm Oil & Nifty**

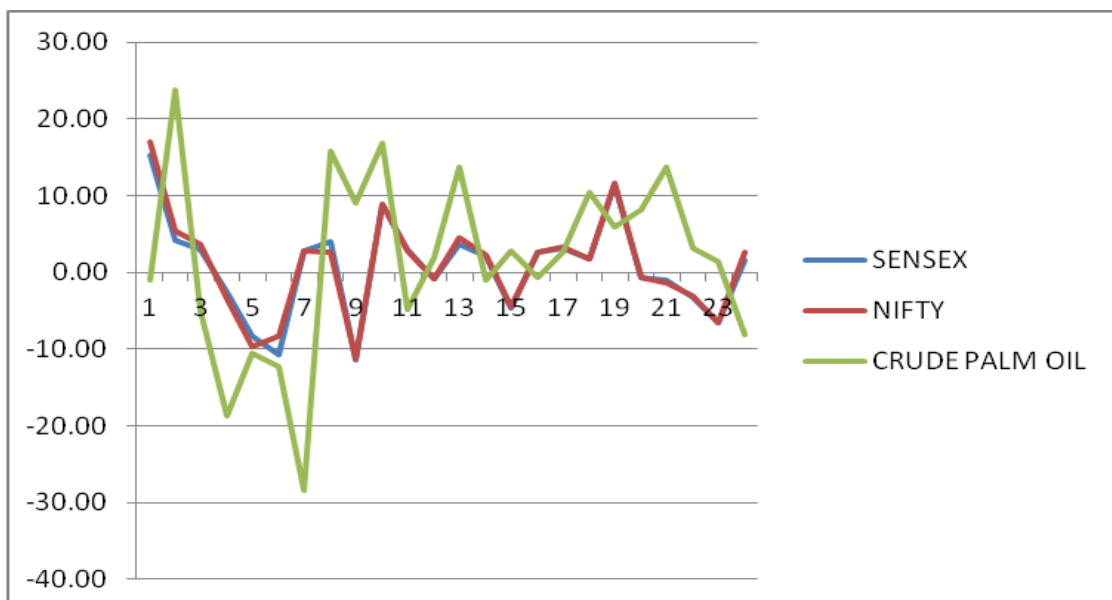
SENSEX				Nifty			
R <sup>2</sup>	α	β	r	R <sup>2</sup>	α	β	r
0.05	1.33	0.43	0.23	0.05	1.27	0.41	0.22

**Regression Line of Crude Palm Oil on SENSEX:** Here Crude Palm Oil is the dependent variable and SENSEX is the independent variable. The value

of  $r$ , i.e. correlation between Crude Palm Oil & SENSEX is just 0.23 which is insignificant. The value of  $R^2$ , the coefficient of Determination has a value of 0.05 which is able to explain hardly 5% variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of 1.33 which is positive and significant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Crude Palm Oil is towards the SENSEX market. In this case  $\beta$  value is 0.43 which suggests that if SENSEX increase by 10% Crude Palm Oil's price will improve by 4.3%.

**Regression Line of Crude Palm Oil on NIFTY:** Here Crude Palm Oil is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Crude Palm Oil & SENSEX. It may be concluded that Crude Palm Oil & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) value is significant where Beta ( $\beta$ ) value is insignificant and in addition  $R^2$  value is also insignificant.

**Graph 7: Variation of the market between SENSEX, Nifty & Crude Palm Oil**





## **8.Guar Gum**

It is derived from endosperm of the guar plant (Cyamopsistetragonoloba). Guar is a legume crop, which grows best in sandy soils and needs moderate, intermittent rainfall with lots of sunshine. Guar Gum is a natural high molecular weight polysaccharide composed of galactose and mannose units combined through glycosidic linkages. It is a white to cream-colored powder, which is available in different viscosities and granulometries depending on the application

Guar gum is used as a thickening and binding agent in the food, textile, paper, pharmaceutical and oil industry. Highly refined guar gum is used in the food industry as a stabilizer in ice creams, as a meat binder and a stabilizer for cheeses, instant puddings and whipped cream substitutes. Guar gum is used in industrial applications including cloth and paper manufacture, oil well drilling, explosives, ore flotation, and many other applications.

### **Scenario**

India exports about 75-80 per cent of its Gum production annually. After India, Pakistan is the major competitor in exports. The consumption pattern of guar seeds is largely influenced by the demands from the petroleum industry of United States of America and the oil fields in the Middle East as the derivative products of these seeds are quite useful in the petroleum drilling industries.

### **Future Prospects**

The use of gum in industry is going to only increase in future. In fact, the US Food & Drug Administration department has approved guar as a replacement to fats in food. Guar is a cheaper substitute to Xanthan gum (pure culture ferment) or locust bean gum. The processed food industry in India is expected to grow at a rate of 10% during 2010-2015. New applications and substantial market growth are expected. The same goes for

the pharma as well as the personal care industry. These industries are not just growing domestically but internationally as well.

**Factor influencing Prices**

- International Demand
- Exchange Rate
- Changes in production due to rainfall fluctuation
- Demand and supply mismatch
- Hoarding and black marketing
- Government policies

**Guar gum future**

Guar gum futures are trading on exchange platform since July,2004. Exchange traded guar seed futures are ideal for price risk management needs of the processors, exporters and end users.

**Table 8: Result of Regression Line comparing Guar gum & SENSEX and Guar gum & Nifty**

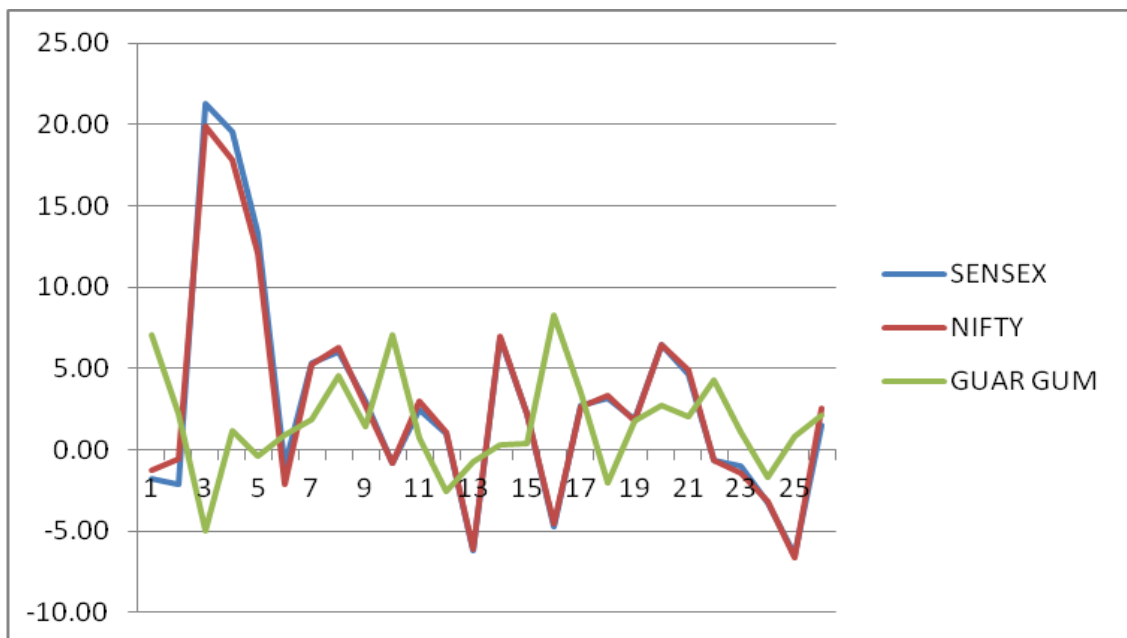
SENSEX				Nifty			
R <sup>2</sup>	α	β	r	R <sup>2</sup>	α	β	r
0.14	2.08	-0.16	0.37	0.13	2.08	-0.17	0.36

**Regression Line of Guar gum on SENSEX:** Here Guar gum is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Guar gum & SENSEX is just 0.37 which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of 0.14 which is able to explain hardly 14% variations in the SENSEX, in other words, it is having insignificant impact. Alpha (α), vertical intercept of the Regression line, has a value of 2.08 which is positive and also significant. Beta (β), slope of the Regression line tells us how sensitive Guar gum is

towards the SENSEX market. In this case  $\beta$  value is -0.16 which suggests that if SENSEX increase by 10% Guar gum's price will decrease by 1.6%.

**Regression Line of Guar gum on NIFTY:** Here Guar gum is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Guar gum & SENSEX. It may be concluded that Guar gum & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) value is significant where Beta ( $\beta$ ) values is insignificant and in addition  $R^2$  value is also insignificant.

**Graph 8: Variation of the market between SENSEX, Nifty & Guar gum**



## **9. Guar Seed**

Guar (*Cyamopsis tetragonoloba*) is a leguminous crop, which grows best in sandy soils and needs moderate, intermittent rainfall. It is a hardy, drought resistant bush and is sown after the first monsoon showers between the second half of July and early August. It is harvested during late October-November. Green pods of Guar are consumed as a vegetable.

## **Scenario**

Guar is grown mainly in India, Pakistan, Sudan and parts of USA. India grows 7 to 9 Lakh MT, or 80% of the world's annual guar production. Rajasthan is the major Guar producing state, accounting for 70% of the production. Gujarat, Haryana, Punjab, U.P. and M.P. are other producing states.

## **Future prospects**

The use of gum in industry is going to only increase in future. In fact, the US Food & Drug Administration department has approved guar as a replacement to fats in food. Guar is a cheaper substitute to Xanthan gum (pure culture ferment) or locust bean gum. The processed food industry in India is expected to grow at a rate of 10% during 2010-2015. New applications and substantial market growth are expected. The same goes for the pharma as well as the personal care industry. These industries are not just growing domestically but internationally as well.

## **Factor influencing prices**

- Changes in domestic production due to rainfall fluctuation
- Carry over stocks
- Surplus available with other exporting countries
- Variation in demand of the importing countries
- Currency Exchange rate: A relatively strong USD is conducive for exports and vice versa
- Government policies: taxes/subsidies etc
- Due to high dependence on Monsoons, Guar supply varies largely between years while the demand is consistently growing. Being very hardy, the commodity can be stored for a long period based on demand and market prices.

## **Guar seed futures**

Given that guar seed have considerable price volatility and that the export realizations have also vacillated between years, Exchange traded guar seed futures are ideal for price risk management needs of the processors, exporters and end users. Those with no natural exposure to guar trade can also benefit by undertaking 'cash-and-carry' arbitrage and 'calendar spread'. Speculators can take directional view on future prices and accordingly take positions in guar seed futures.

**Table 9: Result of Regression Line comparing Guar seed & SENSEX and Guar seed & Nifty**

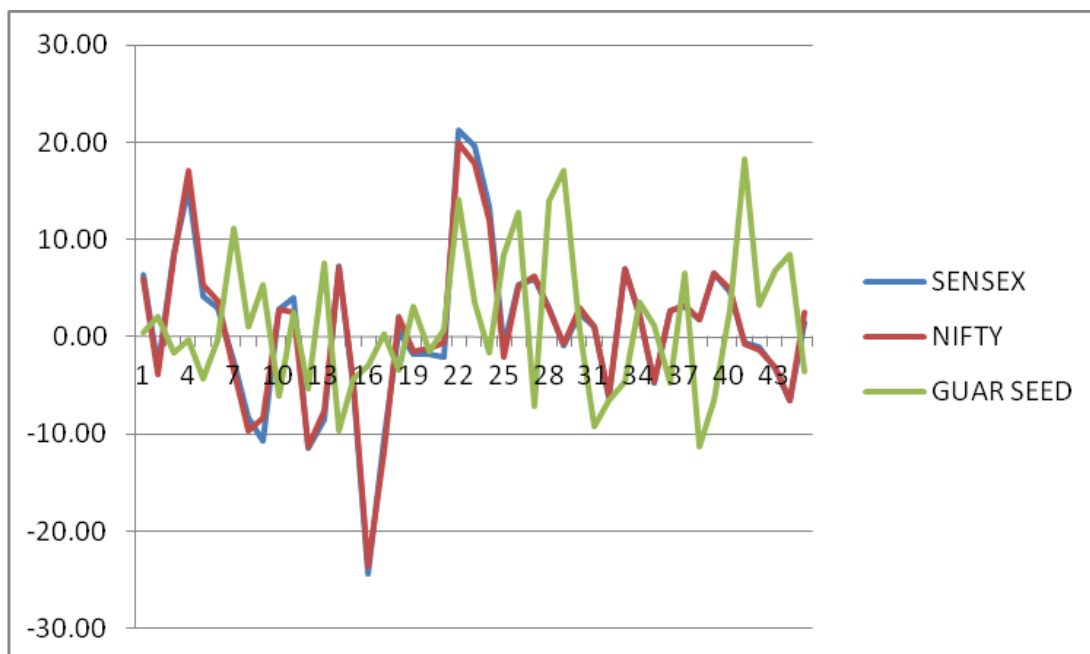
SENSEX				Nifty			
R <sup>2</sup>	$\alpha$	$\beta$	r	R <sup>2</sup>	$\alpha$	$\beta$	r
0.00	1.33	0.02	0.00	0.00	1.34	0.00	0.01

**Regression Line of Guar seed on SENSEX:** Here Guar seed and SENSEX are the independent variable. The value of r, i.e. correlation between Guar seed & SENSEX is Zero which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of zero which is able to explain no variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of 1.33 which is positive and significant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Barley is towards the SENSEX market. In this case  $\beta$  value is 0.02 which suggests that if SENSEX increase by 10% Barley's price will hardly improve by 0.2%.

**Regression Line of Guar seed on NIFTY:** Here Guar seed is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Guar seed & SENSEX. It may be concluded that Guar seed & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) is significant

where Beta ( $\beta$ ) value is insignificant and in addition  $R^2$  value is also insignificant.

**Graph 9: Variation of the market between SENSEX, Nifty & Guar seed**



## **10. Gur:**

GUR is the natural mixture of sugar and molasses. If pure clarified sugarcane juice is boiled, what is left as solid is GUR which is called jaggery also. In Mexico & South America Gur it is also known as panela.

### **Gur making economical**

Sugar making process is very much complicated and very very costly. Producing of sugar is heavily centralized in a giant sugar plant with highly complicated and highly costly machinery running into millions of dollars. So naturally there is a huge exploitation of vested interests in sugar industry. As against this, GUR making process is very simple and very cheap. It can be done on the sugarcane farm itself at very small scale. No complicated machinery required. Any layman can master the art of GUR making process easily. Capital requirement in GUR making is only 5% or less than the capital

requirement for sugar plant of the same capacity. So GUR making plant is extremely cheap.

So we can conclude from the above that GUR is better for health and easier and cheaper to make it. So it is within the reach of common sugarcane farmers. As against this, sugar is harmful for health and is complicated and costly to make it and it is out of reach of common sugarcane farmers.

The manufacture of sugar from sugarcane juice is a process that involves a cocktail of chemicals. Sulphur dioxide, lime, phosphoric acid, formic acid, bleaching agents and viscosity reducers are just some of these. Moreover, the processing of sugar is carried on in mild steel equipment, which leads to a high dosage of Nickel in the mother liquor.

Jaggery (Panela) is a "natural" sweetener made by the concentration of sugarcane juice without the use of any chemicals / synthetic additives or preservatives. It contains an enormous wealth of minerals / protein / vitamins. More importantly, Jaggery (Panela) has great nutritive and medicinal value. It has the reputation of being a medicinal sugar and is prescribed for use in the Ayurvedic system of medicine.

Ancient Medical scriptures dating back to 2500 years state how Jaggery (Panela) purifies the blood, prevents rheumatic afflictions and disorders of bile and possesses nutritive properties of high order.

**Table 10: Result of Regression Line comparing Gur & SENSEX and Gus & Nifty**

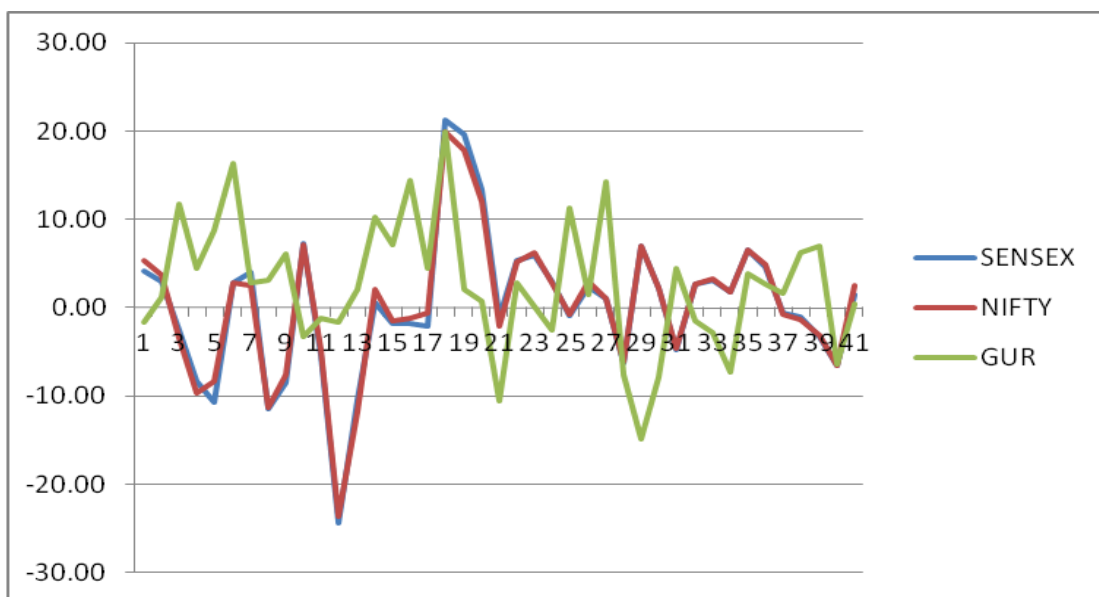
SENSEX				Nifty			
R <sup>2</sup>	$\alpha$	$\beta$	r	R <sup>2</sup>	$\alpha$	$\beta$	r
0.01	2.49	0.07	0.07	0.01	2.49	0.07	0.08

**Regression Line of Gur on SENSEX:** Here Gur is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Gur & SENSEX is just 0.07 which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of 0.01 which is able to explain

hardly 1% variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of 2.49 which is positive and significant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Gur is towards the SENSEX market. In this case  $\beta$  value is 0.07 which suggests that if SENSEX increase by 10% Gur's price will hardly improve by 0.7%.

**Regression Line of Gur on NIFTY:** Here Gur is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Gur & SENSEX. It may be concluded that Gur & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) value is significant where Beta ( $\beta$ ) value is insignificant and in addition  $R^2$  value is also insignificant.

**Graph 10: Variation of the market between SENSEX, Nifty & Gur**



**11.Jeera:**

Cumin (Cuminum cyminum) is a flowering plant from the family Apiaceae. The plant is 15 to 50 cm in height. Its fruit is of commercial importance and is elongated, ovoid, 3-6 mm long. Cumin seed is used in perfumery and as flavouring agent in a variety of cuisines. In India, Jeera is sown from October to November and harvested in February. Fresh crop



generally reaches the markets during March. The plant thrives on rich, well-drained sandy loam soil with day time temperatures of around 30 degrees. Cumin crop takes about 110-115 days to reach maturity. Unjha in Gujarat is the main trading centre for Jeera in the country.

**Current scenario:**

Global output of Jeera is around 2.2 lakh MT per year, of which India produces about 1.5 lakh MT per year. Gujarat and Rajasthan are the major producers of cumin seed in India. Global export demand is about 30,000 MT per year. India exports Jeera mainly to the US, UK, UAE, Japan, Brazil, Bangladesh, Singapore and many other countries. Other Major exporters are Syria and Turkey.

**Future prospects:**

India being the largest producer and consumer, the price of Jeera is mainly determined by domestic factors. In terms of exports India faces stiff competition from Syria which exports about 80% of its produce.

**Factors influencing prices:**

- Domestic Fundamentals
- World production
- International trading price
- Domestic and Export demand
- Carry forward stocks
- Sowing and Harvesting
- Climatic conditions (heavy rains can adversely effect the productivity)

### **About the future contracts:**

Jeera futures contract was launched on NCDEX platform on February 2004 and has witnessed considerable volatility since its launch. Good availability in physical markets provides cash and carry opportunity to arbitragers. It serves as a hedging platform for the Producers and Exporters. The Cumin contract is highly liquid and provides easy entry and exit to a speculator. Thus the Jeera contract provides space for every investor category.

**Table 11: Result of Regression Line comparing Jeera & SENSEX and Jeera & Nifty**

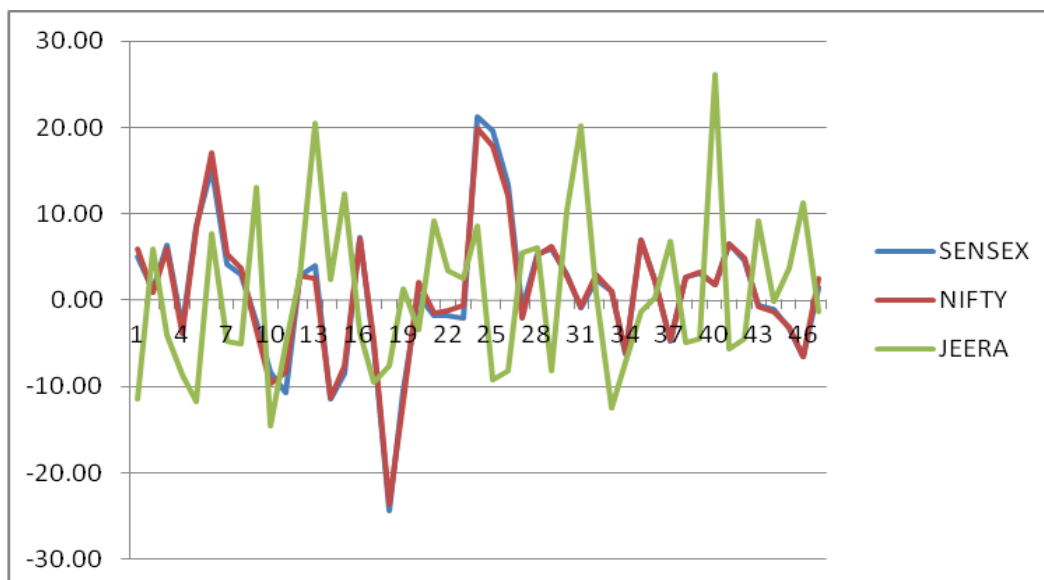
SENSEX				Nifty			
R <sup>2</sup>	$\alpha$	$\beta$	r	R <sup>2</sup>	$\alpha$	$\beta$	r
0.00	0.74	-0.03	0.00	0.00	0.75	-0.04	0.03

**Regression Line of Jeera on SENSEX:** Here Jeera is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Jeera & SENSEX is Zero which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of Zero which is able to explain no variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of 0.74 which is positive but insignificant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Jeera is towards the SENSEX market. In this case  $\beta$  value is -0.03 which suggests that if SENSEX increase by 10% Jeera's price will hardly improve by 0.3%.

**Regression Line of Jeera on NIFTY:** Here Jeera is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Jeera & SENSEX. It may be concluded that Jeera & Nifty are

insignificantly correlated. The Alpha ( $\alpha$ ) and Beta ( $\beta$ ) values are also insignificant and in addition  $R^2$  value is also insignificant.

**Graph 11: Variation of the market between SENSEX, Nifty & Jeera**



## **12. Kapas**

V-797 is grown in the saurashtra region of Gujarat, India. It is a 6 month long crop with a 1 month sowing window, around July last- Mid August. Thus the arrival of the crop is typically seen during January. The crop is very much immune to pest. The seed extracted from such variety lacks in oil content and instead of crushing, it is used directly for cattle feed. Typically raw cotton contains 40% Fiber and 60% seed by weight. Raw cotton is measured and stored in units of maunds (20 kg) bag each.

### **Current Scenario**

Kapas refers to the unginned fibrous substance extracted from the cotton plant (cotton boll), which covers the underlying seed. V-797 is the fine grade short staple (22-24 mm) variety of cotton, with a micronaire of 4.5-5.9. V-797 is an Indigenous hybrid variety of cotton with an annual production of about 4-8 lakh bales in India. Fiber is used for manufacturing of coarse material or used in mixing with medium staple cotton.

## **Future Prospects**

Kapas V-797 is majorly used in mixing with the medium staple cotton, so it has its specific use in the market. Textile industry will always be in demand for this variety of kapas due to its specific nature.

## **Factors influencing prices**

- Production of other varieties of cotton, production and pricing of better variety of cotton has a great impact on the planned production of V-797.
- Export and domestic demand of cotton, global production demand has a direct correlation to the pricing of cotton irrespective of the variety.
- Monsoon plays most crucial factor in the production of cotton.
- Direct procurement by the government agencies and storage in warehouses.
- Prices of Cotton seed oil cake and lint price.

## **V-797 Kapas Futures**

Given that kapas have considerable price volatility and that the export demand has increased between years. Exchange traded Kapas V-797 futures are ideal for price risk management needs of the Ginners, Spinners. Speculators can take directional view on future prices and accordingly take positions in Kapas V-797 futures.

**Table 12: Result of Regression Line comparing Kapas & SENSEX and Kapas & Nifty**

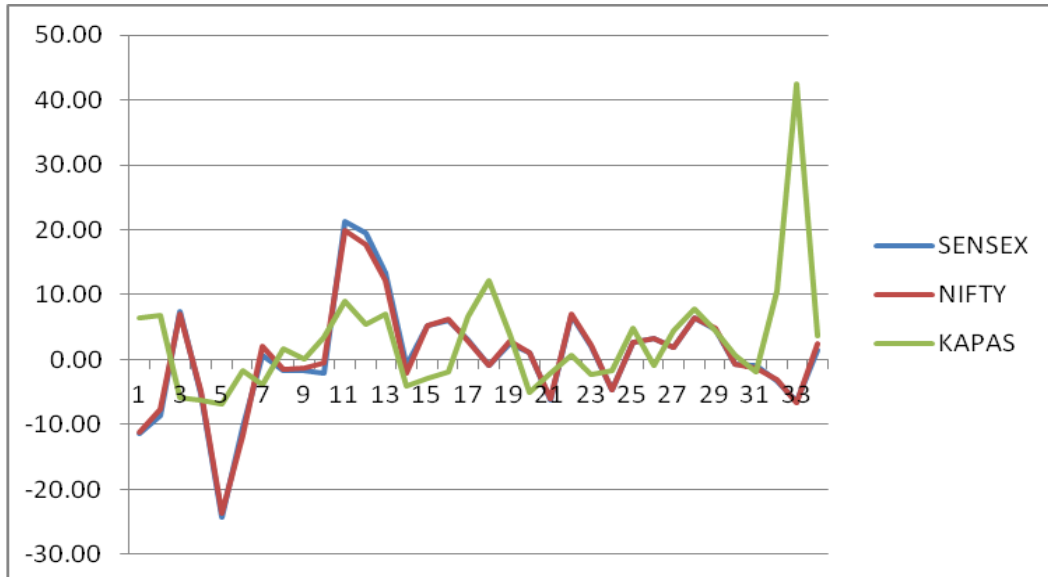
SENSEX				Nifty			
R <sup>2</sup>	$\alpha$	$\beta$	r	R <sup>2</sup>	$\alpha$	$\beta$	r
0.00	2.76	0.07	0.06	0.00	2.76	0.06	0.05

**Regression Line of Kapas on SENSEX:** Here Kapas is the dependent variable and SENSEX is the independent variable. The value of r, i.e.

correlation between Kapas & SENSEX is just 0.06 which is insignificant. The value of  $R^2$ , the coefficient of Determination has a value of zero which is able to explain no variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of 2.76 which is positive and significant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Kapas is towards the SENSEX market. In this case  $\beta$  value is 0.07 which suggests that if SENSEX increase by 10% Kapas's price will hardly improve by 0.7%.

**Regression Line of Kapas on NIFTY:** Here Kapas is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Kapas & SENSEX. It may be concluded that Kapas & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) is significant whereas Beta ( $\beta$ ) value is insignificant and in addition  $R^2$  value is also insignificant.

**Graph 12: Variation of the market between SENSEX, Nifty & Kapas**



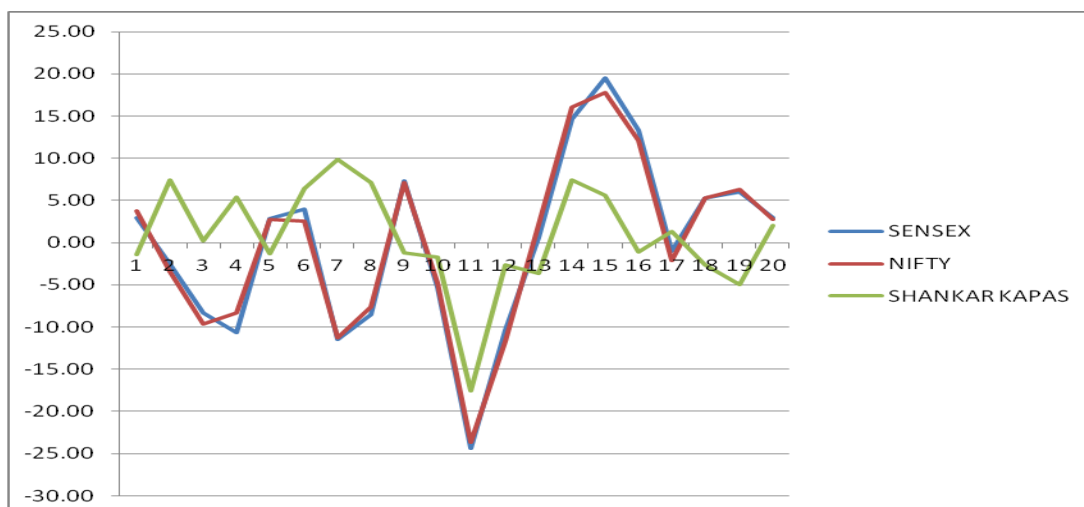
**Table 12a: Result of Regression Line comparing Shankar Kapas & SENSEX and Shankar Kapas & Nifty**

SENSEX				Nifty			
$R^2$	$\alpha$	$\beta$	r	$R^2$	$\alpha$	$\beta$	r
0.10	0.76	0.19	0.31	0.10	0.77	0.19	0.31

**Regression Line of Shankar Kapas on SENSEX:** Here Shankar Kapas is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Shankar Kapas & SENSEX is just 0.31 which is insignificant. The value of  $R^2$ , the coefficient of Determination has a value of 0.10 which is able to explain no variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of 0.76 which is positive but insignificant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Shankar Kapas is towards the SENSEX market. In this case  $\beta$  value is 0.19 which suggests that if SENSEX increase by 10% Shankar Kapas's price will hardly improve by 1.9%.

**Regression Line of Shankar Kapas on NIFTY:** Here Shankar Kapas is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Shankar Kapas & SENSEX. It may be concluded that Shankar Kapas & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) and Beta ( $\beta$ ) values are also insignificant and in addition  $R^2$  value is also insignificant.

**Graph 12a: Variation of the market between SENSEX, Nifty & Shankar Kapas**



### **13.Maize**

Maize (*Zea mays*) belongs to the grains family Graminae and is known as Queen of Cereals due to its diverse uses. Also called corn, maize requires moderate climate for growth, excess or deficient rains adversely affect yields as well quality. It grows well in loamy soils. Maize in India is grown in both kharif (80%) and rabi (20%) seasons. In kharif, it is sown in June-July till mid-August and harvested from mid-September. The arrivals extend from late September to February. The major states are Karnataka, Andhra Pradesh, Maharashtra, Madhya Pradesh and Uttar Pradesh. In rabi, maize is grown in Bihar and coastal region of Andhra Pradesh. The arrivals start from late March and extend upto June.

### **Current Scenario**

USA, Argentina and Brazil are the top three maize producing countries of the world. They are also major exporters. The prominent importing countries include Japan, European Union, Malaysia, Taiwan, Korea etc. India ranks among the top 10 producers and exports to Bangladesh, Nepal, Sri Lanka, Middle East and South East Asian countries. World over, maize is used

predominantly for feed purposes. It is used for fuel (bio ethanol), food and industrial purposes.

### **Future Prospects**

Maize production and consumption has been rising consistently in India. The feed uses of maize are projected to increase by 10% annually. Starch companies are also in expansion mode with several existing players adding new capacity. Starch derivatives are used in textiles, pharmaceutical industries, confectionery etc. and all these industries are poised to grow substantially in future. Increased production of maize caters to export markets and offers distinct freight advantage to Indian exporters to Middle East and South East Asian countries. Maize usage is bound to grow as its consumption is linked to economic growth.

### **Factors influencing prices**

- Changes in production
- Seasonality of demand of poultry products
- Export and import regulations
- Carryover stocks
- International prices of maize

### **Maize Futures**

Maize production and consumption are largely stable, but price volatility is intricately linked to seasonal changes in consumer preferences of poultry products, export demand and demand for starch derivatives. Exchange traded maize futures are ideal for price risk management needs of the poultry farmers, exporters and starch manufacturers. Those with no direct exposure to maize trade or consumption can also benefit by undertaking 'cash-and-



carry' arbitrage and 'calendar spread'. Speculators can take directional view on future prices and accordingly take positions in maize futures.

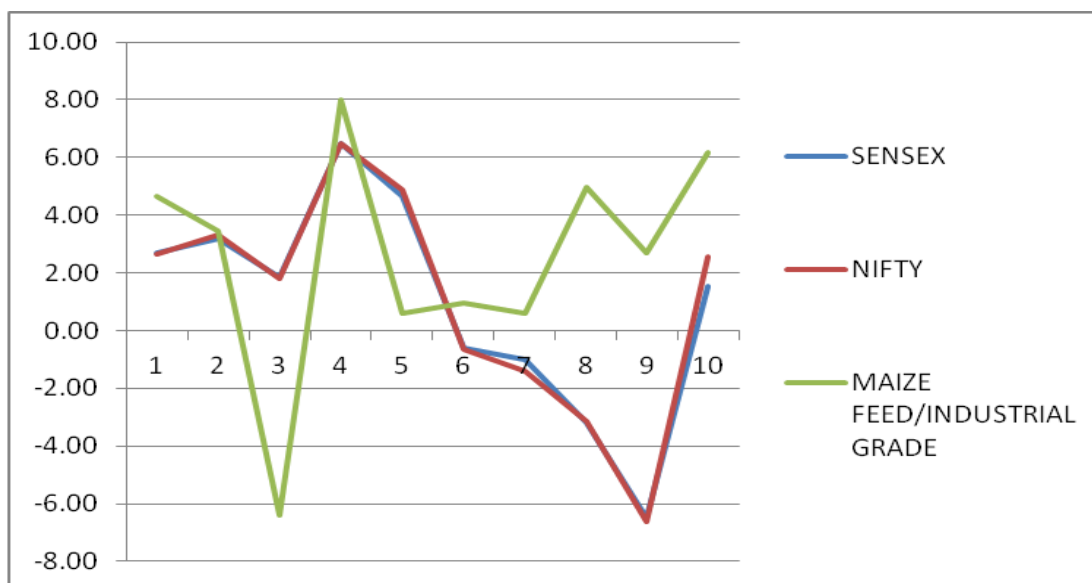
**Table 13: Result of Regression Line comparing Maize & SENSEX and Maize & Nifty**

SENSEX				Nifty			
R <sup>2</sup>	α	β	r	R <sup>2</sup>	α	β	r
0.02	2.45	0.13	0.13	0.02	2.41	0.16	0.15

**Regression Line of Maize on SENSEX:** Here Maize is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Maize & SENSEX is just 0.13 which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of 0.02 which is able to explain hardly 2% variations in the SENSEX, in other words, it is having insignificant impact. Alpha (α), vertical intercept of the Regression line, has a value of 2.45 which is positive and significant. Beta (β), slope of the Regression line tells us how sensitive Maize is towards the SENSEX market. In this case β value is 0.13 which suggests that if SENSEX increase by 10% Maize's price will hardly improve by 1.3%.

**Regression Line of Maize on NIFTY:** Here Maize is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Maize & SENSEX. It may be concluded that Maize & Nifty are insignificantly correlated. The Alpha (α) value is significant whereas Beta (β) value is insignificant and in addition R<sup>2</sup> value is also insignificant.

**Graph 13: Variation of the market between SENSEX, Nifty & Maize**



#### **14. Mustard seeds:**

Mustard seeds (*Brassica Napus*) also known as Rape, Oilseed rape, Rapeseeds and Canola are very widely cultivated throughout the world. Mustard seed is the third leading source of vegetable oil in the world after Soya bean oil and palm oil. It is world's second leading sources of protein meal after soybean meal. Mustard seeds oil content varies from 33% to 46% and average oil recovery is around 32% to 38%. After oil extraction, the remaining part of the seed is used to produce rapeseed/mustard meal, an important sources of cattle and poultry feed. It is basically a winter crop and it requires a temperate climate to prosper. The planting season or the sowing period in India is during the Rabi season i.e. October to November. The crop starts flowering in the months of November, December, January and February. The harvesting period is from February to March. It needs a right proportion of rainfall during the sowing seasons of the crop.

#### **Scenario**

EU-27 accounts to about 34% of worlds RM seed production, others major producers are China (23%), Canada (19%), India (14%), Australia (3%),

Ukraine (2%). India produces 5.5 million MT to 7 million MT annually. About 0.15 million MT is retained for sowing and direct consumption as seed, leaving about 4.8-5.1 million MT for crushing and extracting oil. Domestically, Rajasthan produces 50% of RM seed, followed by Uttar Pradesh, Punjab & Haryana, Madhya Pradesh, West Bengal, Gujarat. The consumption of Mustard seed as a condiment is higher in India compared to that of the world. In India, mustard oil is consumed largely in Northern States as cooking oil and in Southern India it is used for preservation of food products.

### **Future prospects**

India is self-sufficient in mustard seed and oil as import and export of the commodity is almost non-existent. However India exports around 10 million MT of RM seed meal. Being an important source of edible oil and feed meal to the country, rapeseed is undoubtedly the focus of Indian oilseed industry. Efforts are being made both by the Government of India and the industry associations to increase production of this vital source of edible oil and meal.

### **Factor influencing prices**

- Various supply-demand factors revolving around the global edible oil scenario
- The seasonal nature of the production
- Wide consumption of its derivatives (oil and meal)
- The nature of the existing supply
- Value chain participant's activities
- The present dependence on the other edible oils (Palm Oil, Soy Oil)
- Prices of Oilseeds traded in the country and abroad
- The ups and downs in production estimates declared by Govt., SEA, MO

- International prices of other oilseeds and oils
- Import duty on edible oils
- Heavy presence of speculators and stockiest
- The presence of a large unorganized crushing sector
- Stocks available at Exchange Warehouse

### **Seed futures**

RMSEED have considerable price volatility in the physical market as well as futures. Exchange traded RMSEED futures are ideal for price risk management needs of the processors, traders, physical participants and end users. Those with no physical exposure to RMSEED trade can also benefited by undertaking 'cash-and-carry' arbitrage and 'calendar spread'. Speculators can take directional view on future prices and accordingly take positions in RMSEED seed futures. Jaipur is the basis centre for RMSEED. Alwar, Kota, Sriganga Nagar, Bikaner, Agra & Hapur as a additional delivery centres.

**Table 14: Result of Regression Line comparing Mustard seed RMseed & SENSEX and Mustard seed RMseed & Nifty**

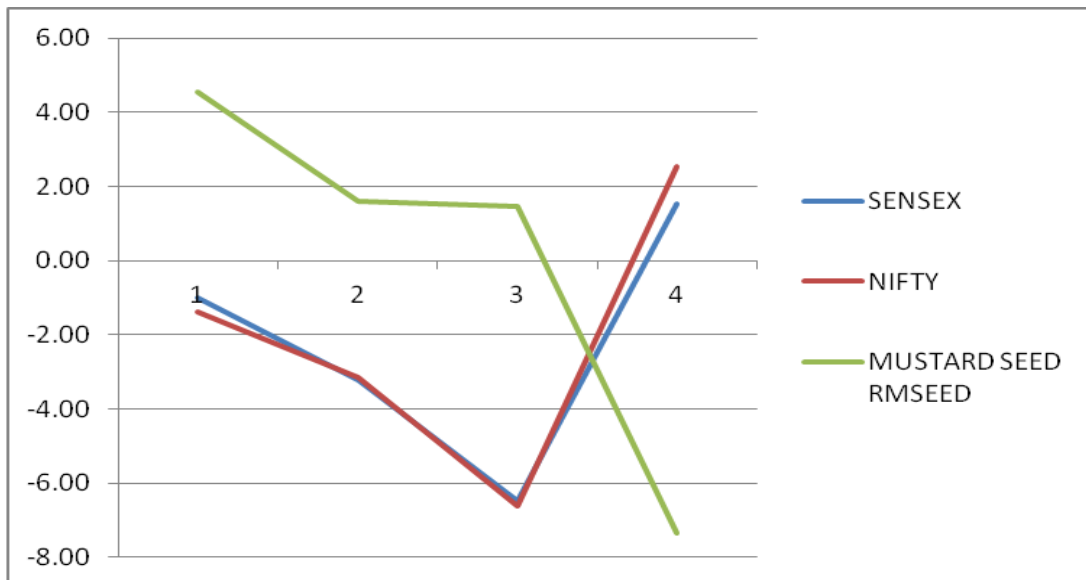
SENSEX				Nifty			
R <sup>2</sup>	α	β	r	R <sup>2</sup>	α	β	r
0.32	-1.91	-0.86	0.57	0.45	-1.88	-0.90	0.67

**Regression Line of Mustard seed RMseed on SENSEX:** Here Mustard seed is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Mustard seed & SENSEX is just 0.57 which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of 0.32 which is able to explain hardly 32% variations in the SENSEX, in other words, it is having insignificant impact. Alpha (α), vertical intercept of the Regression line, has a value of -1.91 which is negative and insignificant. Beta (β), slope of the Regression line tells us how sensitive Mustard seed is

towards the SENSEX market. In this case  $\beta$  value is -0.86 which suggests that if SENSEX increase by 10% Mustard seed's price will decrease by 8.6%.

**Regression Line of Mustard seed RMseed on NIFTY:** Here Mustard seed is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Mustard seed & SENSEX. It may be concluded that Mustard seed & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) and Beta ( $\beta$ ) values are also insignificant and in addition  $R^2$  value is also insignificant.

**Graph 14: Variation of the market between SENSEX, Nifty & Mustard seed RMseed**



**Table 14a: Result of Regression Line comparing Mustard seed RMseedJPR & SENSEX and Mustard seed RMseedJPR & Nifty**

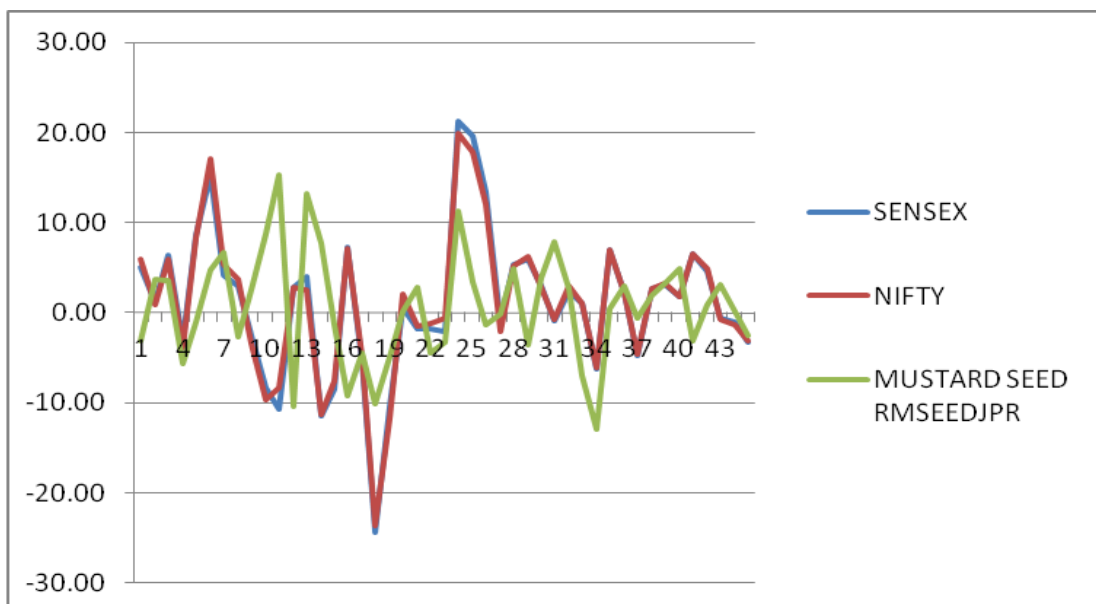
SENSEX				Nifty			
$R^2$	$\alpha$	$\beta$	$r$	$R^2$	$\alpha$	$\beta$	$r$
0.04	0.47	0.16	0.21	0.04	0.46	0.16	0.21

**Regression Line of Mustard seed RMseedJPR on SENSEX:** Here Mustard seed is the dependent variable and SENSEX is the independent variable. The

value of  $r$ , i.e. correlation between Mustard seed & SENSEX is just 0.21 which is insignificant. The value of  $R^2$ , the coefficient of Determination has a value of 0.04 which is able to explain hardly 4% variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of 0.47 which is positive but insignificant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Mustard seed is towards the SENSEX market. In this case  $\beta$  value is 0.16 which suggests that if SENSEX increase by 10% Mustard seed's price will hardly improve by 1.6%.

**Regression Line of Mustard seed RMseedJPR on NIFTY:** Here Mustard seed is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Mustard seed & SENSEX. It may be concluded that Mustard seed & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) and Beta ( $\beta$ ) values are also insignificant and in addition  $R^2$  value is also insignificant.

**Graph 14a: Variation of the market between SENSEX, Nifty & Mustard seed RM seed JPR**



## **15. Pepper**

Black pepper (*Piper nigrum*) is a flowering vine in the family Piperaceae. Hot and pungent black pepper is one of the most popular spices in the world. The fruit, when dried, is approximately 5 mm in diameter. Black pepper is used for both its flavour and medicinal properties. In India harvesting starts from December and extends till March whereas the arrivals in the physical markets start from February.

### **Current scenario:**

World pepper production is around 2.6 MT to 3.1 MT per year. Vietnam is the world's largest producer and exporter of pepper, producing almost one-third of the world's Pepper crop. Other major producers include India (19%), Brazil (13%), Indonesia (9%), Malaysia (8%), Sri Lanka (6%), China (6%), and Thailand (4%). India produces about 50.000 MT of pepper every year with Kerala & Karnataka accounting to more than 95% of the domestic production. Indian pepper is traded at a premium in international markets owing to its superior quality.

### **Future prospects:**

Black pepper is consumed throughout the world more than any other spice. The major importing nations like USA, EU are creating higher demand every year, thus there is increased international competition. Indian origin pepper is considered to be of best quality which attracts these importers. Also, India is the largest consumer. Developments in the spice industry in India have further increased the domestic demand.

### **Factors influencing price:**

- Domestic Fundamentals
- World production & Exports
- International trading price

- Domestic and Export demand
- Year ending stocks and stocks-to-consumption ratio
- Sowing and Harvesting of all producing nations
- Climatic conditions
- Government policies with regard to imports and exports
- Soil Moisture and Rainfall

**About the future contracts:**

Pepper futures contract was launched on April 2004 and since then this contract has witnessed considerable volatility. Using futures platform producers can minimize their price risk .Wide range of Market participants ensure good price discovery. With ever increasing export demand, exporters can insure themselves against price risk. Good stocks of Pepper provide good arbitrage opportunities to the various market participants. Being amongst the most liquid contract speculators can easily enter or exit the market. Thus the Pepper contract provides space for every investor category.

**Table 15: Result of Regression Line comparing Pepper & SENSEX and Pepper & Nifty**

SENSEX				Nifty			
R <sup>2</sup>	α	β	r	R <sup>2</sup>	α	β	r
0.02	1.10	0.09	0.15	0.02	1.09	0.10	0.15

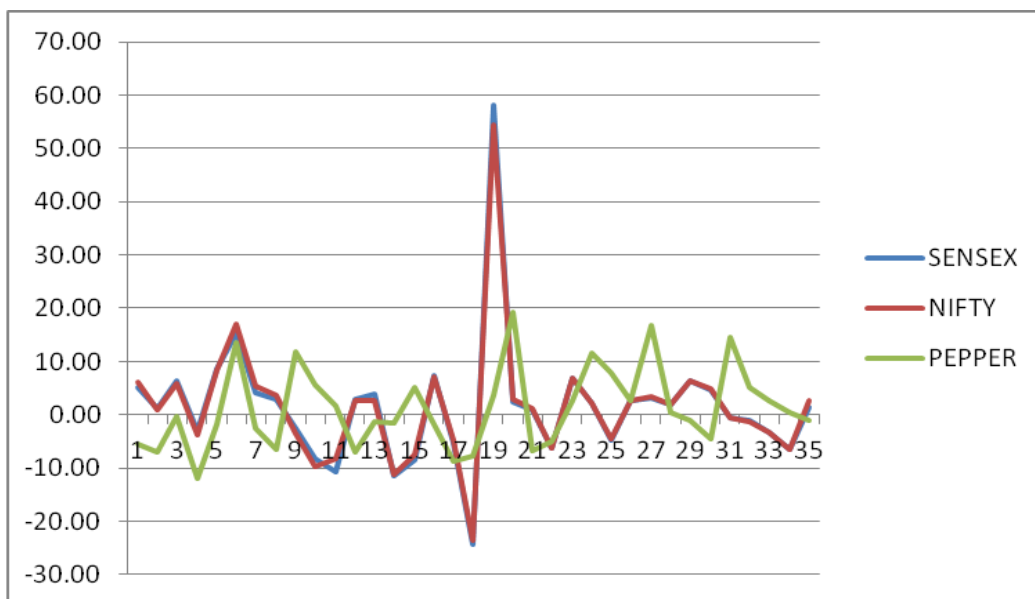
**Regression Line of Pepper on SENSEX:** Here Pepper is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Pepper & SENSEX is just 0.15 which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of 0.02 which is able to explain hardly 2% variations in the SENSEX, in other words, it is having



insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of 1.10 which is positive and significant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Pepper is towards the SENSEX market. In this case  $\beta$  value is 0.09 which suggests that if SENSEX increase by 10% Pepper's price will hardly improve by 0.9%.

**Regression Line of Pepper on NIFTY:** Here Pepper is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Pepper & SENSEX. It may be concluded that Pepper & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) value is significant whereas Beta ( $\beta$ ) value is insignificant and in addition  $R^2$  value is also insignificant.

**Graph 15: Variation of the market between SENSEX, Nifty & Pepper**



## **16. Potato**

Potato, popularly known as the king of vegetables and a native of South America, has now become an indispensable part of Indian cuisine. It ranks 4th among important staple food after wheat, rice and maize.

Potato is rich in carbohydrates, constituting 22-24% of its weight. It contains 2.1% to 2.7% protein, less than 0.5% of fat and the rest is water. Being a short duration crop, it produces more quantity of dry matter, edible energy, and edible protein in lesser duration, compared to cereals like rice and wheat. Hence, potatoes are useful tool to achieve the nutritional security of the nation.

Potato is a temperate or cool season crop which needs a low temperature, low humidity, less windy, and bright sunny days. It does well under well-distributed rains or moist weather situations to high temperatures. Humidity and rains are not conducive to potatoes as these lead to insect pests and disease attacks.

### **Scenario**

India produces around 8% of the world's total produce. India ranks fourth in terms of area and third in terms of production of potato across the globe. China and Russia are ahead of India in terms of potato production. Uttar Pradesh produces the highest quantity of potatoes for India followed by West Bengal. There has been an increase of 12.5% in the production of Potato than last year (2010). Uttar Pradesh, the state which houses our basis i.e. Agra, saw an increase of 22% in their production levels.

### **Future prospects**

There has been a constant growth in production of Potato in India in the last 5 years. The productivity level in India is below the world average level. The production of potato has gone up during the previous years due to better varieties and larger acreage under potato. There is usually very little quantity left for exports, making Indias share in world exports insignificant and inconsistent. India exports just around 1-0.5% of the worlds total potato exports.

### **Factor influencing prices**

- Fluctuations in area, weather, production and yield
- Irrigation facility
- Demand for potato in cities and from food-processing industries
- Input cost for potato cultivation
- Transportation charges
- Labour availability during planting and harvesting
- Storage capacity and stock position in cold storage. Potato can be stored in cold storage for 5-6 months
- Outbreak of pest attack or disease in key growing areas
- Price of other vegetables

### **Potato future**

NCDEX Potato futures provide a hedging platform to those who are natural physical traders of the commodity. Speculators who have knowledge & a view about the commodity can take positions in the Potato futures. Even arbitrages in calendar spread as well as cash & carry, can be done in Potato futures.

**Table 16: Result of Regression Line comparing Potato & SENSEX and Potato & Nifty**

SENSEX				Nifty			
R <sup>2</sup>	$\alpha$	$\beta$	r	R <sup>2</sup>	$\alpha$	$\beta$	r
0.11	-0.15	0.85	0.33	0.11	-0.23	0.89	0.33

**Regression Line of Potato on SENSEX:** Here Potato is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Potato & SENSEX is just 0.33 which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of 0.11 which is able

to explain hardly 11% variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of -0.15 which is negative and insignificant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Potato is towards the SENSEX market. In this case  $\beta$  value is 0.85 which suggests that if SENSEX increase by 10% Potato's price will hardly improve by 8.5%.

**Regression Line of Potato on NIFTY:** Here Potato is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Potato & SENSEX. It may be concluded that Potato & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) and Beta ( $\beta$ ) values are also insignificant and in addition  $R^2$  value is also insignificant.

**Graph 16: Variation of the market between SENSEX, Nifty & Potato**



## **17. Refined Soy oil**

Soy oil is the oil extracted from soybeans. Crude soybean oil undergoes further refinement- degumming, refining, bleaching, and deodorizing and forms refined soy oil. Soybean oil is the leading vegetable oil traded in the international markets, next only to palm oil. It has share of 24%

in the total vegetable oil consumption. Soy oil accounts nearly 75% out of total vegetable oil in-take in US. Soy oil is cholesterol-free and high in polyunsaturated fat. Soy oil is light in flavor and has almost no odor.

### **Scenario:**

Soy oil prices in India are largely influenced by the international edible oil price movements (especially palm oil at BMD and soy oil at CBOT) and spot markets of Indore and Mumbai serve as the 'reference' market for Soy oil prices. While the Indore price reflects the domestically crushed soybean oil (refined and solvent extracted), Mumbai price indicates the imported soy oil price.

### **Future prospects**

Refined soy oil is one of the major consuming edible oil in India with market share of 15 -18% after palm oil (46%). Oilseeds contributed 7% of GDP and around 14 million farmers involved in oilseed cultivation. India is the world's fifth largest edible oil economy after USA, China, Brazil and Argentina and largest importer of palm oil in the world. The total market size is at Rs. 600 billion and import-export trade is worth Rs. 130 billion. India mainly imports crude oil, Soybean oil mainly imported from Argentina, whereas palm oil is imported from Malaysia and Indonesia.

### **Factor influencing prices**

#### **Domestic Factors:**

##### **Demand and Supply:**

- Domestic oilseed production
- Pattern of consumption, Market share of Soy oil is around 24%
- From oil extractors and farmers
- The crush margin between meal, oil and seed
- Affect because prices of competitive oils, viz. Palm oil
- If Soy meal export parity

- Weather at all producing centers. The pod bearing period, being the most crucial.
- Demand of FMCG companies

**Government Policies:**

- Import Export Policy
- Minimum Support Prices (MSP)
- Stock Limit

**Global Factors:**

- Global oilseed production US, Argentina and Brazil are major Exporters
- International soy price movement at CBOT, being the major international reference market
- International market price for soy meal export
- International Soy oil price movement
- Import demand from china and EU- 25

**Table 17: Result of Regression Line comparing Refined Soy oil & SENSEX and Refined Soy oil & Nifty**

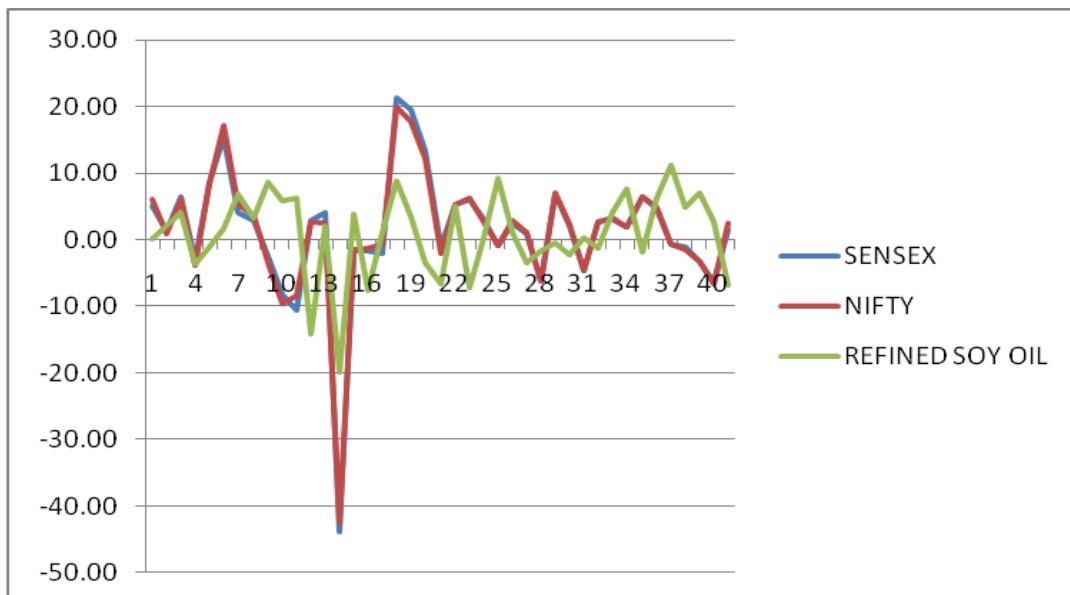
SENSEX				Nifty			
R <sup>2</sup>	α	β	r	R <sup>2</sup>	α	β	r
0.14	0.50	0.24	0.37	0.14	0.49	0.25	0.37

**Regression Line of Refined Soy oil on SENSEX:** Here Refined Soy oil is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Refined Soy oil & SENSEX is just 0.37 which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of 0.14 which is able to explain hardly 14% variations in the SENSEX, in other words, it is having insignificant impact. Alpha (α), vertical intercept of the Regression line, has a value of 0.50 which is positive but insignificant. Beta (β), slope of the Regression line tells us how sensitive Refined Soy oil is

towards the SENSEX market. In this case  $\beta$  value is 0.24 which suggests that if SENSEX increase by 10% Refined Soy oil's price will hardly improve by 2.4%.

**Regression Line of Refined Soy oil on NIFTY:** Here Refined Soy oil is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Refined Soy oil & SENSEX. It may be concluded that Refined Soy oil & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) and Beta ( $\beta$ ) values are also insignificant and in addition  $R^2$  value is also insignificant.

**Graph 17: Variation of the market between SENSEX, Nifty & Refined Soy oil**



## **18. Soybean**

Soybean (*Glycine max*) is called as Golden Bean. The plant is classed as an oilseed and is an important global crop. The processed soybean is the largest source of protein feed and second largest source of vegetable oil in

the world. The major portion of the global and domestic crop is solvent-extracted with hexane to yield soy oil and obtain Soymeal, which is widely used in the animal feed industry.

### **Scenario:**

USA, Brazil, Argentina, China and India are the largest soybean producing countries in the world. Soybean is largest grown oilseeds in the world and other major source of oilseeds are Rapeseed (13%), Cottonseed (10%), Peanut(8%), Sunflower (7%) seed and Palm kernels. Among major oilseeds, higher percentage of meal extracted from Soybean 82%. The Prices of soybean determined by demand and supply of oil and meal.

### **Future prospects:**

It is estimated that above 75% of the global output is crushed worldwide. A very small proportion of the crop is consumed directly by humans, soybean products appear in a large variety of processed foods. The cultivation of soybean is successful in climates with hot summers, with temperatures between 20°C to 30°C being optimum. It can grow in a wide range of soils, with optimum growth in moist alluvial soils with a good organic content. Soybeans derivatives are found in hundreds of human foods, animal feeds and industrial products.

### **Factor influencing prices:**

- Weather at all the producing centers, domestic and international. The pod bearing period, being the most crucial
- The area planted, determined by the price of soybean against that of competitive crops used for animal feed, viz., maize, jowar, bajra
- Government policies such as Minimum Support Price (MSP) fixed for the crop, import duty & export of its derivatives and stock limits
- Pests and diseases
- Infections affecting poultry and cattle like bird flu
- Demand for Soybean from Oil extractors and Farmers



- The crush margin between meal, oil and seed
- The supply-demand and price scenario of competitive oils, viz. palm oil
- International soy price movement at CBOT, being the major international reference market
- International market price for soy meal export

**Table 18: Result of Regression Line comparing Soybean & SENSEX and Soybean & Nifty**

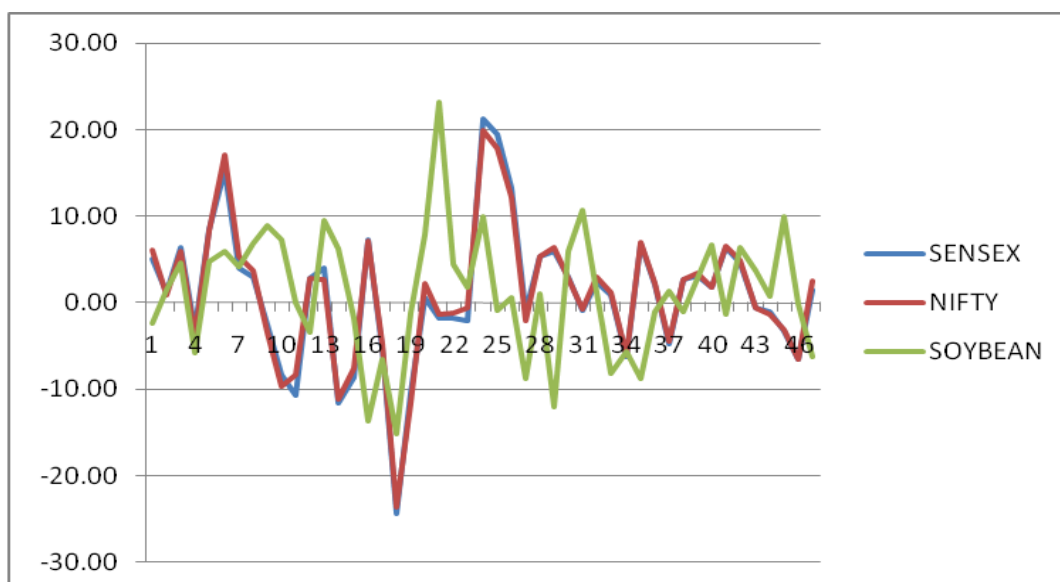
SENSEX				Nifty			
R <sup>2</sup>	α	β	r	R <sup>2</sup>	α	β	r
0.03	0.98	0.15	0.16	0.03	0.97	0.15	0.16

**Regression Line of Soybean on SENSEX:** Here Soybean is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Soybean & SENSEX is just 0.16 which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of 0.03 which is able to explain hardly 3% variations in the SENSEX, in other words, it is having insignificant impact. Alpha (α), vertical intercept of the Regression line, has a value of 0.98 which is positive but insignificant. Beta (β), slope of the Regression line tells us how sensitive Soybean is towards the SENSEX market. In this case β value is 0.15 which suggests that if SENSEX increase by 10% Soybean's price will hardly improve by 1.5%.

**Regression Line of Soybean on NIFTY:** Here Soybean is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Soybean & SENSEX. It may be concluded that

Soybean & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) and Beta ( $\beta$ ) values are also insignificant and in addition  $R^2$  value is also insignificant.

**Graph 18: Variation of the market between SENSEX, Nifty & Soybean**



## **19. Soybean Meal**

Soybean meal also known as Soyabean Oil Cake is a flour made by grinding the solid residue of soybean oil production. It is widely used as a filler and source of protein in animal diets, including pig, chicken, cattle, horse, sheep, and fish feed.

Soybean meal is preferably made from high quality, sound, clean, dehulled yellow beans, since beans with a dark colored seed coat, or even beans with a dark hilum will inadvertently leave undesirable dark specks in the flour. All commercial soybeans in the United States are yellow or yellow brown.

Soybean meal is the product remaining after extracting most of the oil from whole soybeans. The oil may be removed by solvent extraction or by an

expeller process in which the beans are heated and squeezed. The nutrient composition of the oil extracted soybean meal 48 is shown in the table below.

Soybean meal is high in protein and energy and is one of the most commonly used protein supplements in North America. It is a palatable feedstuff and may be used as the major protein supplement in rations for dairy cattle.

### **Soybean Meal Futures**

Soybean Meal futures are traded on the Chicago Board of Trade under ticker symbol **SM** in dollars and cents per short ton. For electronic trading sessions, the symbol **ZM** is used.

One Soybean Meal futures contract on the Chicago Board of Trade is 100 short tons. Deliverable Soybean Meal grades for futures contracts on the Chicago Board of Trade are: 48% Protein Soybean Meal, meeting the requirements listed in the CBOT Rules and Regulations

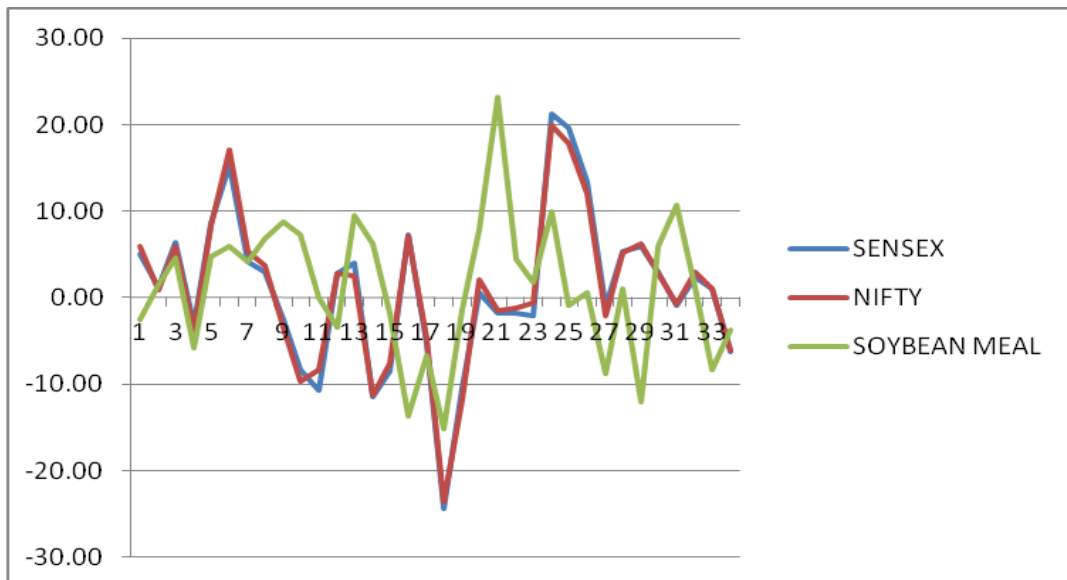
**Table 19: Result of Regression Line comparing Soybean Meal & SENSEX and Soybean Meal & Nifty**

SENSEX				Nifty			
R <sup>2</sup>	α	β	r	R <sup>2</sup>	α	β	r
0.04	1.07	0.18	0.21	0.05	1.05	0.19	0.21

**Regression Line of Soybean Meal on SENSEX:** Here Soybean Meal is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Soybean Meal & SENSEX is just 0.21 which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of 0.04 which is able to explain hardly 4% variations in the SENSEX, in other words, it is having insignificant impact. Alpha (α), vertical intercept of the Regression line, has a value of 1.07 which is positive and significant. Beta (β), slope of the Regression line tells us how sensitive Soybean Meal is towards the SENSEX market. In this case β value is 0.18 which suggests that if SENSEX increase by 10% Soybean Meal's price will hardly improve by 1.8%.

**Regression Line of Soybean Meal on NIFTY:** Here Soybean Meal is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Soybean Meal & SENSEX. It may be concluded that Soybean Meal & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) value is significant and Beta ( $\beta$ ) value is insignificant and in addition  $R^2$  value is also insignificant.

**Graph 19: Variation of the market between SENSEX, Nifty & Soybean Meal**



## **20. Sugar M Grade**

Sugarcane is the main sugar producing crop that contributes nearly 75% to the total sugar pool at the global level. It, *Saccharum spp. Complex*, is the prime source of sugar in India. Sugar is a commodity of mass consumption and the cheapest source of energy in India, supplying around 10% of the daily calorie intake. India is the second largest producer of sugar, falling marginally behind Brazil, and also the largest consumer of sugar in the world, with the demand nearly equalling the supply in most cases.

Depending upon the variety and sowing time it takes about 12 to 18 months to mature. In general January to March is the period of planting and November to March is the period of harvesting. In some states sugarcane, is grown around the year. Crushing usually begins within a month after the harvesting begins and continues throughout the year. Sugar comes in three forms: Large crystals (L-grade), Medium crystals (M-grade) and Small crystals (S grade). M and S grades form about 80% of total sugar production and are traded on the NCDEX platform. The quality of sugar is gauged using a parameter known as the ICUMSA number, which assesses the chemical properties of sugar for grading. The lower the ICUMSA number, the better the quality.

### **Scenario**

India is the largest consumer and second largest producer of sugar in World. Sugar is produced in 115 countries. It is extracted from different raw materials, sugarcane and sugar beet. Sugarcane is cultivated under tropical climates, while sugar beet is grown in temperate regions. Of the 115 sugar producing countries, 67 produce sugar from cane only, 39 from beet only and 9 from both cane and beet. Brazil, India, Thailand, Australia and Cuba are the largest sugarcane producer. Other beet sugar producing countries include the US, Turkey, Ukraine, Poland and Russia.

### **Future prospects**

Sugar production is effected by acreage and yield, sugarcane availability, recovery percentage and duration of crushing. Of these, area is highest in Uttar Pradesh followed by Maharashtra, yield is highest in Tamil Nadu, and average recovery is highest in Maharashtra. Average duration of crushing is almost equal in Maharashtra, Gujarat and Tamil Nadu (about 150 days) while in Uttar Pradesh it is about 100 days only. Maharashtra is the largest producer of sugar in the country followed by Uttar Pradesh. Together these two states account for over 60% of the total sugar production in the

country. Total production for marketing year 2011-12 is estimated at 26 million tonnes, with the consumption at 22 million tonnes

### **Factor influencing prices**

- **Sugarcane Pricing:** The Central Government fixes the Fair and Remunerative Price (FRP) for sugarcane. Some of the State Governments announce State Advised Prices (SAPs) for sugarcane, generally higher than the FRP.
- **Monthly Sugar Quota:** Ministry of Food and Consumer Affairs, every month give monthly quota for sugar mills to release amount of sugar for sale for that particular month. Mills' have to sell 10% of the quota to government for PDS (Public Distribution system) known as Levy Quota and rest for sale in the open market as Non Levy Quota.
- **Foreign Trade Policy:** Government controls over import and export of sugar under Open General License (OGL) and Advance License Scheme (ALS).
- **By-Products:** Government policies for ethanol and other by-products
- Stock holding and Turnover Limits
- Command Area
- Recovery
- Acreage
- International Markets

Apart from demand and supply, there are other major factors which influence and determine the sugar prices. The commodity falls under the purview of the Essential Commodities Act, 1955. Market participants trading in Sugar Futures should track the market by tracking and analyzing demand and supply position including Beginning stock, Production, Imports, Consumption, Exports and

Ending stocks and government policies such as Sugarcane pricing, Monthly Levy and Non Levy sugar quota, Stock holding limit, Turnover limit and Export policy.

### **Sugar M grade future**

Sugar futures at NCDEX platform was introduced on July 27, 2004 with contracts for October 2004, November 2004, December 2004 and April 2005. Sugar Futures contract at NCDEX is compulsory delivery contract with trading unit and delivery unit of 10 MT and tick size of Re 1 with Kolhapur as basis centre. The contract also provides for deliveries at the additional delivery centres- Belgaum, Delhi, Kolkata, Pune, Sangli and Solapur.

In the 2009-10 seasons, sugar production fell to 18.9 million tonnes, causing a sudden jump in the prices. Average open interest before delisting of sugar contracts was close to 125000 with average daily trading volume of about 50000 MT. After relisting on December 27, 2011, even with the restrictions imposed by the Government; the contract has witnessed a cumulative daily traded volume of over 20,000 tonnes. The open interest is also fairly high with the average open interest close to 50,000 tonnes, which suggests good depth in participation. Sugar contract is high delivery contract with very less defaults, which suggests interest of cash & carry arbitrage as well. After announcement of removal of sugar stock limit on 22nd November, open interest and trading volume has increased drastically in NCDEX.

**Table 20: Result of Regression Line comparing Sugar M Grade & SENSEX and Sugar M Grade & Nifty**

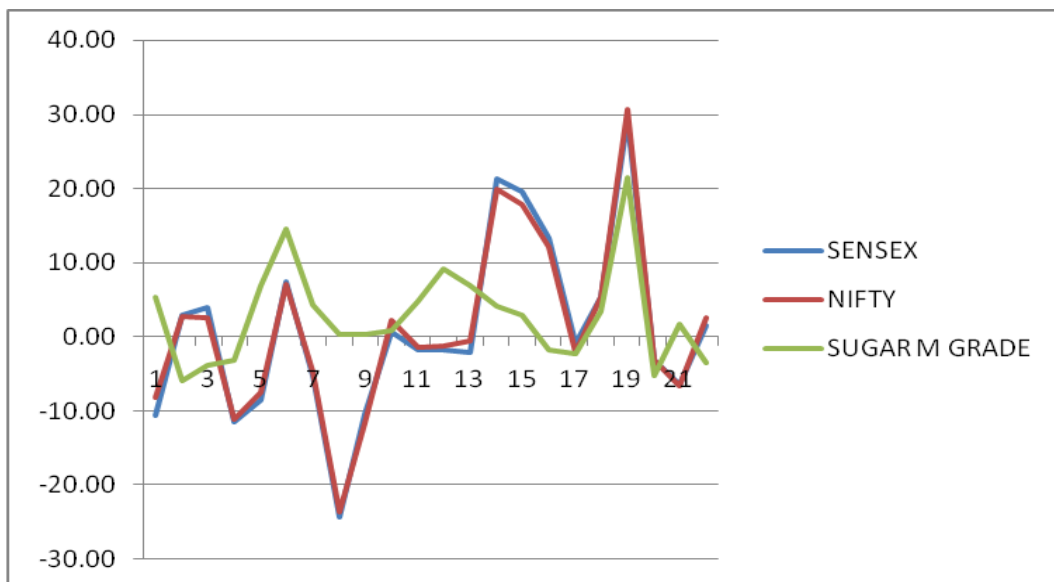
SENSEX				Nifty			
R <sup>2</sup>	α	β	r	R <sup>2</sup>	α	β	r
0.15	2.55	0.21	0.39	0.19	2.50	0.24	0.43

**Regression Line of Sugar M Grade on SENSEX:** Here Sugar M Grade is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Sugar M Grade & SENSEX is just 0.39 which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of

0.15 which is able to explain hardly 15% variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of 2.55 which is positive and considered as significant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Sugar M Grade is towards the SENSEX market. In this case  $\beta$  value is 0.21 which suggests that if SENSEX increase by 10% Sugar M Grade's price will hardly improve by 2.1%.

**Regression Line of Sugar M Grade on NIFTY:** Here Sugar M Grade is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Sugar M Grade & SENSEX. It may be concluded that Sugar M Grade & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) value can be considered significant where Beta ( $\beta$ ) value is insignificant and in addition  $R^2$  value is also insignificant.

**Graph 20: Variation of the market between SENSEX, Nifty & Sugar M Grade**





## **21. Turmeric**

Turmeric (*Curcuma longa*) belongs to the Zingiberaceae family. The commercial part of the plant is its rhizome. It grows in light black, black clayey loams and red soils in irrigated and rainfed conditions with temperature ranging between 20 to 30 degrees. The crop cannot stand water logging or alkalinity. Turmeric is used to flavour and to colour foodstuffs. It is used in cosmetics and in medicines. Turmeric is ready for harvesting in 7-9 months. Sowings start from may end and extend till august whereas arrivals start from December and extend up to March. , arrivals start from February and extend up to May.

### **Current scenario:**

India is the world's largest producer of turmeric and produces nearly 80-85% of world's total production, which stands at around 6.0 lakh MT to 7.0 lakh MT per year. Major producers in India are Andhra Pradesh, Tamilnadu, Orissa, West Bengal , Karnataka ,Maharashtra. India is the worlds leading exporter, prime export destinations being UAE, USA, Bangladesh, Sri Lanka, Japan, Malaysia, UK. Major trading centres in India are Nizamabad, Duggirala, Sangli, Salem, Erode, Dharmapuri.

### **Future prospects:**

India is the largest Producer, Consumer and Exporter of turmeric. Indian Turmeric is considered to be of best quality due to its high curcumin content and is increasingly getting known for its medicinal and cosmetic applications. As it is a naturally occurring product, it is finding increasing acceptance in the global markets because of which exports have increased exponentially in recent years and this trend is most likely to continue in future. Majority of the Turmeric produced is consumed locally which reflects a healthy local demand.

### **Factors influencing prices:**

- Domestic Fundamentals
- World production
- International trading price
- Domestic and Export demand
- Carry forward stocks
- Sowing and Harvesting
- Climatic conditions

### **About the future contracts:**

Turmeric futures contract was launched on NCDEX platform in April 2004 and since then it has witnessed considerable participation from various supply chain participants. Using futures platform producers can minimize their price risk. With ever increasing export demand, exporters can insure themselves against price risk. Good stocks of Turmeric provide good arbitrage opportunities to the various market participants. Being highly liquid contract speculators can easily enter or exit the market. Thus the Turmeric contract provides space for every investor category.

**Table 21: Result of Regression Line comparing Turmeric & SENSEX and Turmeric & Nifty**

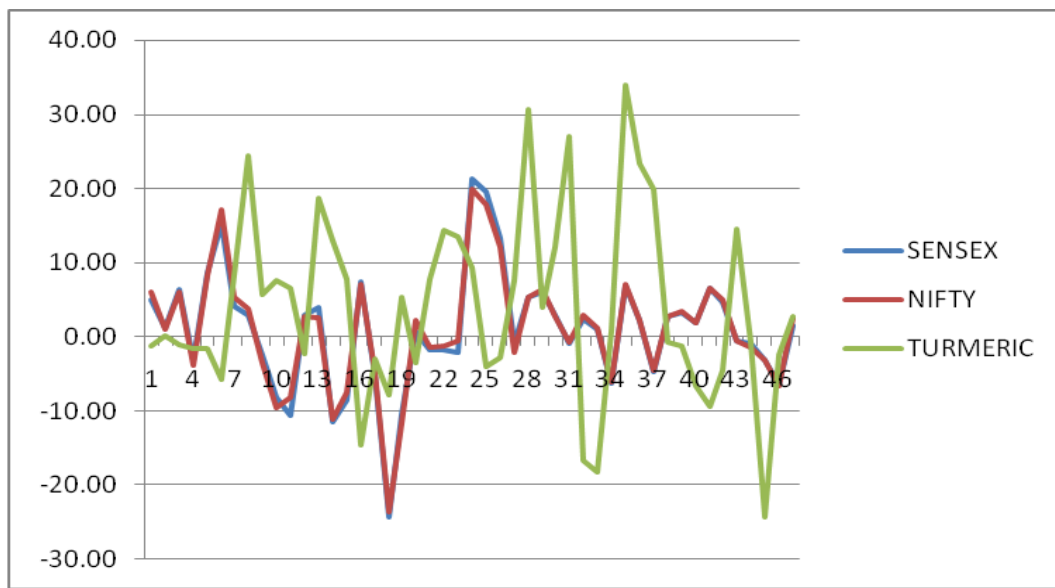
SENSEX				Nifty			
$R^2$	$\alpha$	$\beta$	r	$R^2$	$\alpha$	$\beta$	r
0.00	4.00	-0.04	0.00	0.00	4.01	-0.04	0.00

**Regression Line of Turmeric on SENSEX:** Here Turmeric is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Turmeric & SENSEX is zero which is insignificant. The value of  $R^2$ , the coefficient of Determination has a value of zero which is able to explain no variation in the SENSEX, in other words, it is having insignificant

impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of 4.00 which is positive and significant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Turmeric is towards the SENSEX market. In this case  $\beta$  value is -0.04 which suggests that if SENSEX increase by 10% Turmeric's price will decline by 0.4%.

**Regression Line of Turmeric on NIFTY:** Here Turmeric is the dependent variable and SENSEX is the independent variable. The results are quite similar with the results between Turmeric & SENSEX. It may be concluded that Turmeric & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) value is significant whereas Beta ( $\beta$ ) value is insignificant and in addition  $R^2$  value is also insignificant.

**Graph 21: Variation of the market between SENSEX, Nifty & Turmeric**



## **22. Wheat**

Wheat is a cereal grain that belongs to the grass family of the genus Triticum. A dry, one seeded fruit named kernel is obtained from this spiky grass like grain, which is ground to make flour and is consumed throughout the world as one of the most important staple food. It is the second largest cereal grain consumed on earth. Wheat is important especially for making

bread and other bakery products as it has got the maximum number of glutens as compared to any other grain. This crop is also grown as a forage crop for the livestock.

Wheat requires a cooler weather and a good level of moisture in the early plantation period and once the grain is formed, it needs a warmer weather to dry up. That is why the best-suited climate needed for the wheat crop to prosper is the temperate climate. In India, wheat is cultivated as a Rabi crop and it is planted in the month of October. It is harvested in the months of April and May.

### **Current Scenario**

The world production of wheat figures over 680 million tons (2009-10 figures) annually. The largest producer of wheat in the world is the European Union followed by China, India and United States of America. These four producers contribute to around 60% of the total production. The consumption of wheat in the world is a huge 650 million tons (2009-10 figures) but is successfully kept satisfied with an equally high production figures.

India produces around 75-80 million tons of wheat every year. India also stands at the top in the world in terms of area covered in production of wheat. Uttar Pradesh is the leading producer state in India followed by Punjab and Haryana. Wheat occupies a major share of 35% production in the total production of crops cultivated and 65% of total cropped area in the country. This share in production and area covered of the crop has increased since independence and is also constantly rising. The yield of wheat in kilograms per hectare has also risen significantly from 522 kg/ha in 1950/51 to 1620kg/ha in 1998/99.

Indian wheat is generally medium hard bread wheat. It is a staple food of this country. The demand-supply flows within the country are largely interfered by the government of the country so as to make sure that the grain supplies be stable and prices do not get affected.

### **Future Prospects**

Wheat is a stable crop in many countries and hence its consumption is directly proportional to the population growth. Consumption has been constantly increasing during the last 10 years with the increase in population, and alarmingly, the consumption is prepared to shoot up further and is expected to reach up to 775 million tons in 2020.

### **Factors influencing prices**

- Weather conditions
- Government policies and regulations
- Prices fluctuations of the competitive and substitute products
- Season of harvesting and peak season
- Technological improvements
- Crop size
- World demand for wheat

### **Wheat Futures**

NCDEX wheat futures provide a hedging platform to those who are natural traders of the commodity. Even an arbitrageur can trade using strategies like cash and carry and calendar spread. Speculators can take directional view on future prices and accordingly take position in Wheat futures.

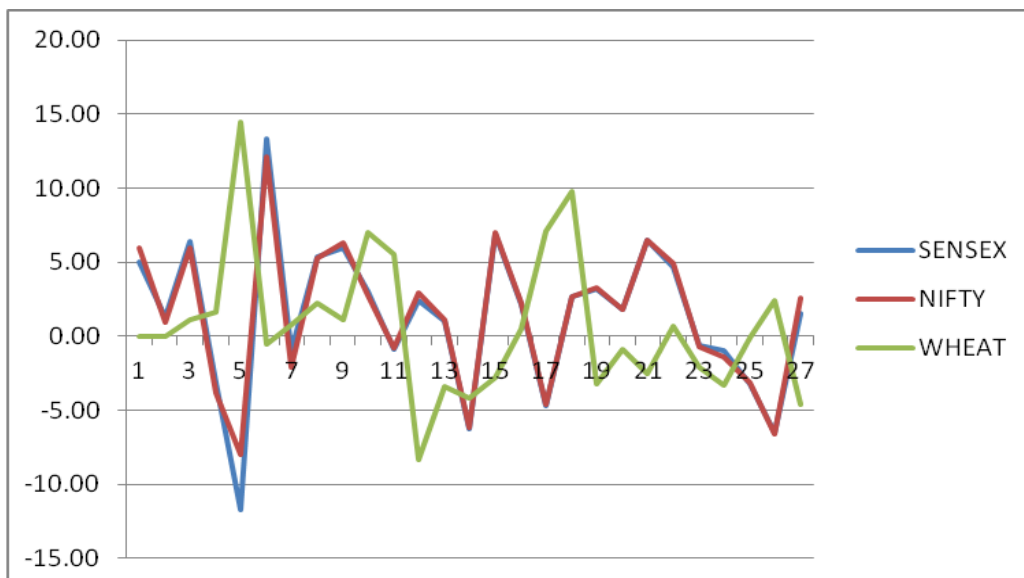
**Table 22: Result of Regression Line comparing Wheat & SENSEX and Wheat & Nifty**

SENSEX				Nifty			
$R^2$	$\alpha$	$\beta$	$r$	$R^2$	A	$\beta$	$r$
0.15	2.55	0.21	0.39	0.19	2.50	0.24	0.43

**Regression Line of Wheat on SENSEX:** Here Wheat is the dependent variable and SENSEX is the independent variable. The value of  $r$ , i.e. correlation between Wheat & SENSEX is just 0.39 which is insignificant. The value of  $R^2$ , the coefficient of Determination has a value of 0.15 which is able to explain hardly 15% variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of 2.55 which is positive and significant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Wheat is towards the SENSEX market. In this case  $\beta$  value is 0.21 which suggests that if SENSEX increase by 10% Wheat's price will hardly improve by 2.1%.

**Regression Line of Wheat on NIFTY:** Here Wheat is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Wheat & SENSEX. It may be concluded that Wheat & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) value is significant whereas Beta ( $\beta$ ) value is insignificant and in addition  $R^2$  value is also insignificant.

**Graph 22: Variation of the market between SENSEX, Nifty & Wheat**



The above discussions on Agricultural Products concludes that there is insignificant correlation between each of the 22 agricultural commodities and stock indices namely SENSEX and Nifty. In addition all 22 commodities individually not able to explain the variations in SENSEX and Nifty. Thus, first hypothesis of the study is accepted.

## **Non-Agricultural Products**

### **23. Brent Crude Oil**

Crude oil is a mixture of chemical compounds, extracted from the earth's crust. It is refined into a variety of usable petroleum products. Crude's qualities vary widely, as does price, depending on the type and source. Individual crude types are given names which often derive from the source location.

Crude oils are often evaluated (by traders, analysts etc.) on the basis of their

\* API gravity and

\* Sulphur content.

Brent Crude Oil is sourced from the North Sea and the Brent field, located in the U.K. sector of the North Sea, is the namesake of the Brent futures market. It is used to price two thirds of the world's internationally traded crude oil supplies. Brent Crude Oil futures are predominantly traded internationally on the Intercontinental Exchange (ICE). Brent Crude is used as pricing benchmark for deliveries from Europe or bound to Europe. Brent linked pricing is also used for African Crude Oil sales. In fact the Indian Crude Oil Basket consists of Brent Crude Oil along with Dubai-Oman Crude Oil since quite some Crude imported into India is priced against Brent, making Brent Crude Oil an extremely relevant variety for India.

The geographic location of the North Sea which is close to the refining centres in Europe and the US gives it an advantage over others. Brent is waterborne crude and is transferred by tankers to European refiners or, when arbitrage allows, across the Atlantic Ocean to the US. This allows Brent crude to react quickly to international demand / supply changes making it an important benchmark for crude oil.

## **Scenario**

According to Oil & Gas Journal (OGJ), India had approximately 5.6 billion barrels of proven oil reserves as of January 2010, the second-largest amount in the Asia-Pacific region after China. India's crude oil reserves tend to be light and sweet. India produced roughly 880 thousand barrels per day (bbl/d) of total oil in 2009 from over 3,600 operating oil wells. Approximately 680 thousand bbl/d was crude oil, the remainder was other liquids and refinery gain. In 2009, India consumed nearly 3 million bbl/d, making it the fourth largest consumer of oil in the world.

## **Future prospects**

The combination of rising oil consumption and relatively flat production has left India increasingly dependent on imports to meet its petroleum demand. In 2009, India was the sixth largest net importer of oil in the world, importing nearly 2.1 million bbl/d, or about 70 percent, of its oil needs. The EIA expects India to become the fourth largest net importer of oil in the world by 2025, behind the United States, China, and Japan.

## **Factor influencing prices**

- Geopolitical Situation, particularly in the Middle East and Africa
- Economic data / indicators of USA, China and other big consuming nations
- Natural factors like Hurricanes
- Transportation / Logistical issues like Destruction of Pipelines, Shipping issues etc.

## **Brent crude oil future**

The NCDEX Brent Crude contract is based on the ICE Brent contract. The Final Settlement Price (FSP) in Indian Rupees (INR) is determined by the Exchange on maturity of the contract. The FSP is the value of Brent Index



published by Intercontinental Exchange (ICE) for a similar corresponding contract expiring on ICE. The exchange rate to be used as the conversion factor is the RBI reference spot exchange rate on that day (as obtained from Reserve Bank of India website [www.rbi.org.in](http://www.rbi.org.in)). There are three months contracts available for trading at any given point of time. The Lot Size is 100 barrels and the contract is an Intention Matching Contract.

**Table 23: Result of Regression Line comparing Brent Crude Oil & SENSEX and Brent Crude Oil & Nifty**

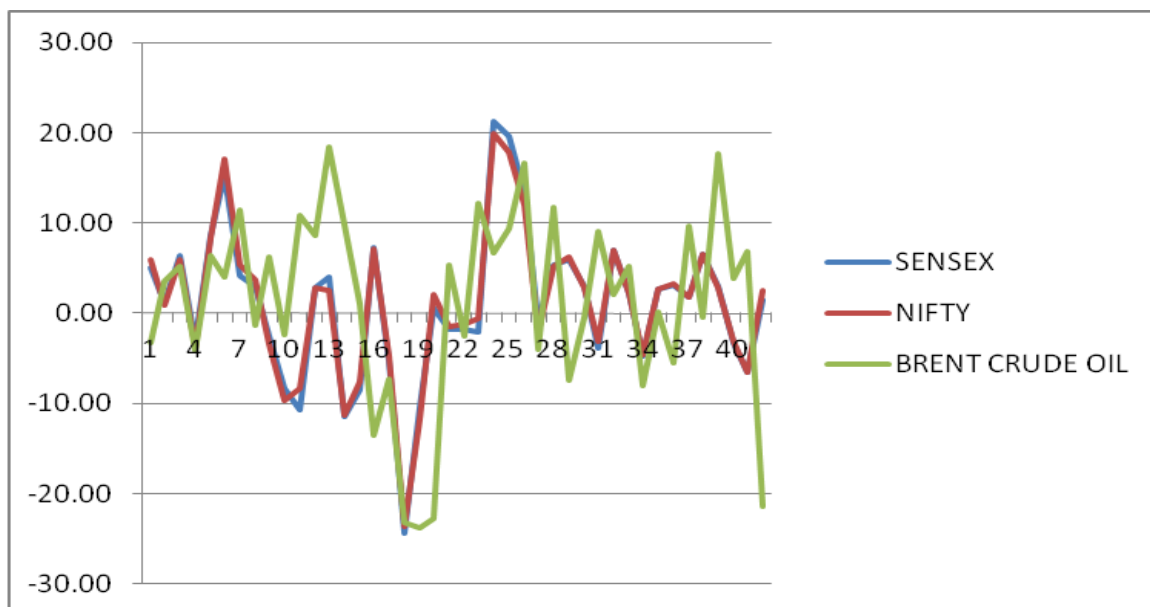
SENSEX				Nifty			
R <sup>2</sup>	$\alpha$	$\beta$	r	R <sup>2</sup>	A	$\beta$	r
0.12	0.73	0.44	0.34	0.11	0.70	0.44	0.34

**Regression Line of Brent Crude Oil on SENSEX:** Here Brent Crude Oil is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Brent Crude Oil & SENSEX is just 0.34 which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of 0.12 which is able to explain hardly 12% variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of 0.74 which is positive but insignificant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Brent Crude Oil is towards the SENSEX market. In this case  $\beta$  value is 0.44 which suggests that if SENSEX increase by 10% Brent Crude Oil's price will hardly improve by 4.4%.

**Regression Line of Brent Crude Oil on NIFTY:** Here Brent Crude Oil is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Brent Crude Oil & SENSEX. It may be concluded that Brent Crude Oil & Nifty are insignificantly correlated. The

Alpha ( $\alpha$ ) and Beta ( $\beta$ ) values are also insignificant and in addition  $R^2$  value is also insignificant.

**Graph 23: Variation of the market between SENSEX, Nifty & Brent Crude Oil**



## **24. Copper**

Copper is a special metal used for industrial applications due to its properties such as electrical conductivity, ductility, corrosion resistance, malleability and rigidity. Copper is mainly used for industrial purpose such as power cables and wires, jelly filled cables, air conditioning and refrigeration, Telecom, Power, Construction, Transportation, Engineering, Consumer Durable.

Copper just like other metals comes through mining from the earths crust, collected Ore is then collected & goes through smelting & refining process from which pure copper is collected. Amongst the top Copper refined producers Chile is the worlds biggest producer followed by USA, China, Japan etc. Further China & USA are worlds biggest consumer of the red metal.

## **Scenario**

Indian Copper market is majorly a Copper ore import market, dominated by 3 producers Hindustan Copper, Sterlite & Birla Copper. Whereas on the consumption end Wire & Cable industry is the biggest consumer, followed by telecom, consumer durables, construction etc.

## **Future prospects**

Indian per capita copper consumption is very low as compared to other developing countries, with increased economic activity & development, huge scope of copper consumption does exist, as change in copper consumption pattern has shifted from Eastern countries to Asian countries.

## **Factor influencing prices**

- Demand & Supply dynamics
- External Factors such as Currency, Macro Economic factors
- Stocks Movements at designates exchange warehouses
- Relevant periodical data, estimates & facts published by various agencies

## **Copper futures**

Copper Future started trading on NCDEX platform from 2005 onwards.

**Table 24: Result of Regression Line comparing Copper & SENSEX and Copper & Nifty**

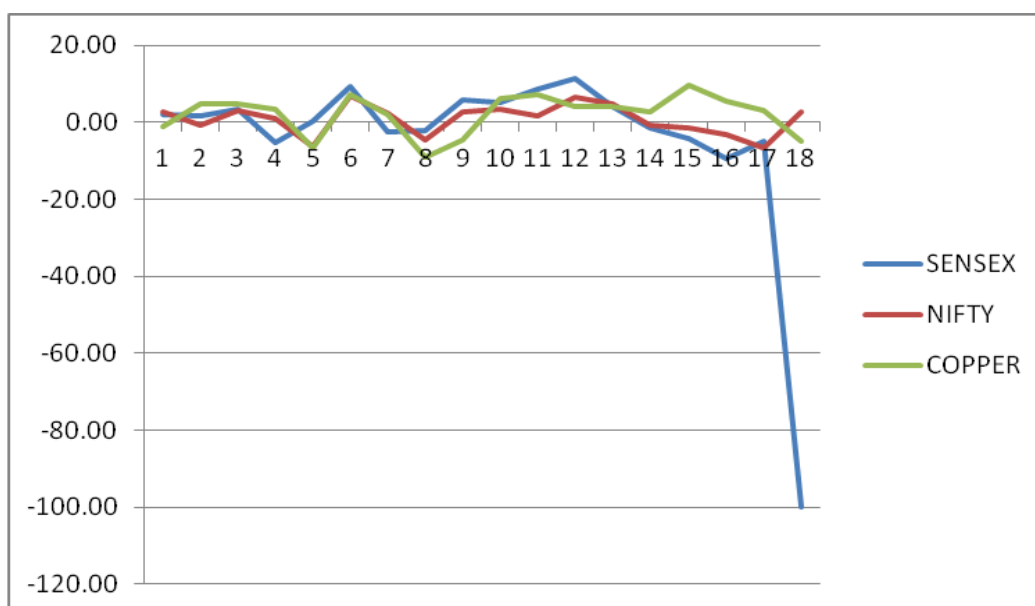
SENSEX				Nifty			
R <sup>2</sup>	$\alpha$	$\beta$	r	R <sup>2</sup>	$\alpha$	$\beta$	r
0.12	2.45	0.07	0.35	0.11	1.77	0.44	0.34

**Regression Line of Copper on SENSEX:** Here Copper is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Copper & SENSEX is just 0.35 which is insignificant. The

value of  $R^2$ , the coefficient of Determination has a value of 0.12 which is able to explain hardly 12% variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of 2.45 which is positive and significant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Copper is towards the SENSEX market. In this case  $\beta$  value is 0.07 which suggests that if SENSEX increase by 10% Copper's price will hardly improve by 0.7%.

**Regression Line of Copper on NIFTY:** Here Copper is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Copper & SENSEX. It may be concluded that Copper & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) value is significant and Beta ( $\beta$ ) value is insignificant and in addition  $R^2$  value is also insignificant.

**Graph 24: Variation of the market between SENSEX, Nifty & Copper**



## **25. Crude Oil**

Crude oil is a mixture of chemical compounds, extracted from the earth's crust. It is refined into a variety of usable petroleum products. Crude qualities vary widely, as does price, depending on the type and source. Individual crude types are given names which often derive from the source location.

Crude oils are often evaluated (by traders, analysts etc.) on the basis of their

\* API gravity and

\* Sulphur content.

The Light Sweet Crude Oil also known as West Texas Intermediate (WTI) is the benchmark used for pricing oil imports into the US, the worlds largest oil consumer. WTI is a blend of crude oil produced in the fields of Texas, New Mexico, Oklahoma and Kansas. It is a pipeline crude and deliveries are made at the end of the pipeline system in Cushing, Oklahoma. As in the case of Brent, the WTI market is also characterized by a large number of independent producers who sell their crude oil to large number of gatherers.

Light Sweet Crude Oil futures are traded internationally on New York Mercantile Exchange (NYMEX) as well as on Intercontinental Exchange (ICE).

### **Scenario**

According to Oil & Gas Journal (OGJ), India had approximately 5.6 billion barrels of proven oil reserves as of January 2010, the second-largest amount in the Asia-Pacific region after China. Indias crude oil reserves tend to be light and sweet.

India produced roughly 880 thousand barrels per day (bbl/d) of total oil in 2009 from over 3,600 operating oil wells. Approximately 680 thousand bbl/d was crude oil, the remainder was other liquids and refinery gain. In 2009, India consumed nearly 3 million bbl/d, making it the fourth largest consumer of oil in the world.

### **Future prospects**

The combination of rising oil consumption and relatively flat production has left India increasingly dependent on imports to meet its petroleum

demand. In 2009, India was the sixth largest net importer of oil in the world, importing nearly 2.1 million bbl/d, or about 70 percent, of its oil needs. The EIA expects India to become the fourth largest net importer of oil in the world by 2025, behind the United States, China, and Japan.

### **Factor influencing prices**

- Geopolitical Situation, particularly in the Middle East and Africa
- Economic data / indicators of USA, China and other big consuming nations
- Natural factors like Hurricanes
- Transportation / Logistical issues like Destruction of Pipelines, Shipping issues etc.

### **WTI crude future**

The NCDEX WTI Crude contract is based on the ICE WTI contract. The Final Settlement Price (FSP) in Indian Rupees (INR) is determined by the Exchange on maturity of the contract. The FSP is the daily settlement price published as on that day (i.e. expiry day of the contract on NCDEX) by ICE Futures, London for a similar corresponding contract on ICE called the ICE WTI contracts. The exchange rate to be used as the conversion factor shall be the RBI reference spot exchange rate on that day i.e. Expiry day of contract (as obtained from Reserve Bank of India website ([www.rbi.org.in](http://www.rbi.org.in))). There are three months contracts available for trading at any given point of time. The Lot Size is 100 barrels and the contract is an Intention Matching Contract.

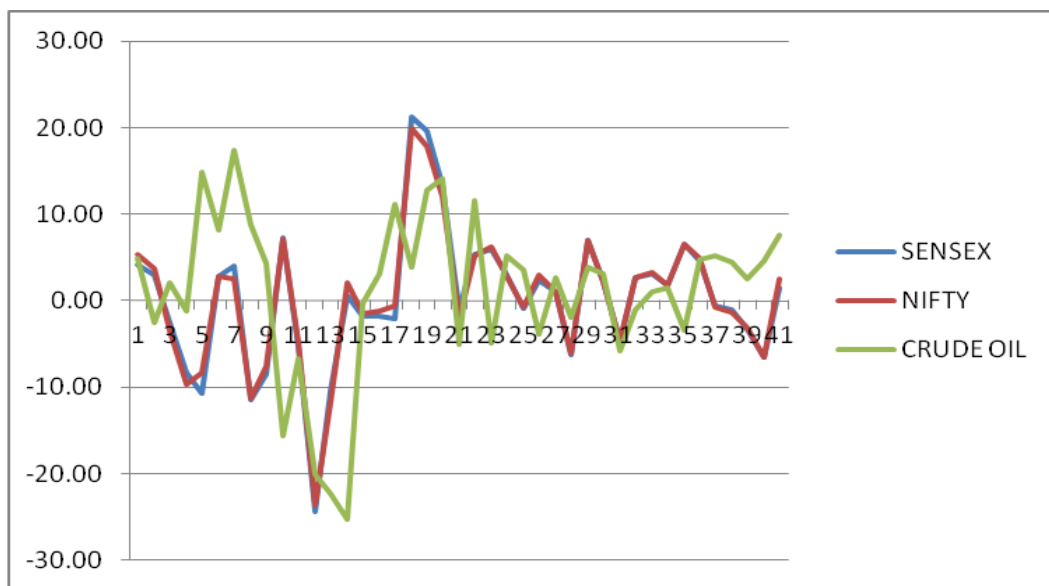
**Table 25: Result of Regression Line comparing Crude Oil & SENSEX and Crude Oil & Nifty**

SENSEX				Nifty			
R <sup>2</sup>	$\alpha$	$\beta$	r	R <sup>2</sup>	$\alpha$	$\beta$	r
0.11	1.04	0.39	0.33	0.12	1.02	0.41	0.34

**Regression Line of Crude Oil on SENSEX:** Here Crude Oil is the dependent variable and SENSEX is the independent variable. The value of  $r$ , i.e. correlation between Crude Oil & SENSEX is just 0.33 which is insignificant. The value of  $R^2$ , the coefficient of Determination has a value of 0.11 which is able to explain hardly 11% variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of 1.04 which is positive and significant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Crude Oil is towards the SENSEX market. In this case  $\beta$  value is 0.39 which suggests that if SENSEX increase by 10% Crude Oil's price will hardly improve by 3.9%.

**Regression Line of Crude Oil on NIFTY:** Here Crude Oil is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Crude Oil & SENSEX. It may be concluded that Crude Oil & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) value is significant and Beta ( $\beta$ ) value is insignificant and in addition  $R^2$  value is also insignificant.

**Graph 25: Variation of the market between SENSEX, Nifty & Crude Oil**



## **26.Gold**

Gold, the first metal used by humans, remains one of the most valued metals since prehistoric times. Egyptian hieroglyphs dating 2600 BCE describe gold as something King Tushratta of the Mitanni claimed was as "common as dust" in Egypt. Egypt and Nubia had the resources to make them major gold-producing areas for much of history. Gold is also mentioned several times in the Old Testament.

Gold has been considered for ages as one of the most precious metals, and its value has been used as the standard for many currencies in history. Gold has been used as a symbol for purity, value, royalty, and particularly roles that combine these properties. Like other precious metals, gold is measured by troy weight and by grams. When it is alloyed with other metals the term carat or karat is used to indicate the amount of gold present, with 24 carats being pure gold and lower ratings proportionally less. The purity of a gold bar can also be expressed as a decimal figure ranging from 0 to 1, known as the millesimal fineness, such as 0.995 and 0.999.

The price of gold is determined on the open market, but a procedure known as the Gold Fixing in London, originating in 1919, provides a twice-daily benchmark figure to the industry

### **Scenario:**

#### **Domestic Market**

India is the largest consumer of Gold in the world accounting for nearly 25% of the total gold consumption in the world. Most of India's gold consumption is in the form of jewellery and as investment demand. Indian gold demand is supported by cultural and religious traditions which are not directly linked to global economic trends as a result of which demand remains steady even during high prices.



## **International Market**

Gold demand in 2010 reached a 10 year high of 3,812.2 tonnes. Demand was up 9% year-on-year, and marginally above the previous peak of 2008 despite a 40% increase in the annual average price level between 2008 and 2010. In value terms, total annual gold demand surged 38% to a record of US\$150 billion. China is currently the largest producer of Gold in the world having overtaken US in the last couple of years. Asian consumers led demand with the revival of the Indian market and strong momentum in Chinese gold demand, which together constituted 51% of total jewellery and investment demand during the year 2010

## **Future prospects**

The steadily rising prices of Gold reinforces the inherent value of gold jewellery, an intrinsic part of its desirability and also as a means of investment. The growth in investment demand has sparked numerous innovations in gold investment, ranging from online bullion sales to gold ETFs. Recent research has uncovered a number of new practical uses for gold, including its function as a catalyst in fuel cells, as well as chemical processing and pollution control. The potential to use nanoparticles of gold in advanced electronics, glazing coatings, and cancer treatments offers promising new areas of scientific research.

## **Factor influencing prices**

- Rise in Investor demand.
- Robust Jewelry off take.
- Geo-political concerns
- US dollar movement against other currencies
- Indian rupee movement against the US dollar
- Central Banks diversifying into bullion

- Fall in Supply
- Central Bank Sales Slowing and Massive De-Hedging
- Gold Mine Production

**Gold future**

Gold Futures contract started trading on NCDEX platform from 2004 onwards has witnessed considerable volatility. Using futures platform importers & domestic buyers can minimize their price risk. Wide range of Market participants ensure good price discovery. With ever increasing import demand, importers can insure themselves against price risk. Disparity between import prices provide good arbitrage opportunities to the various market participants.

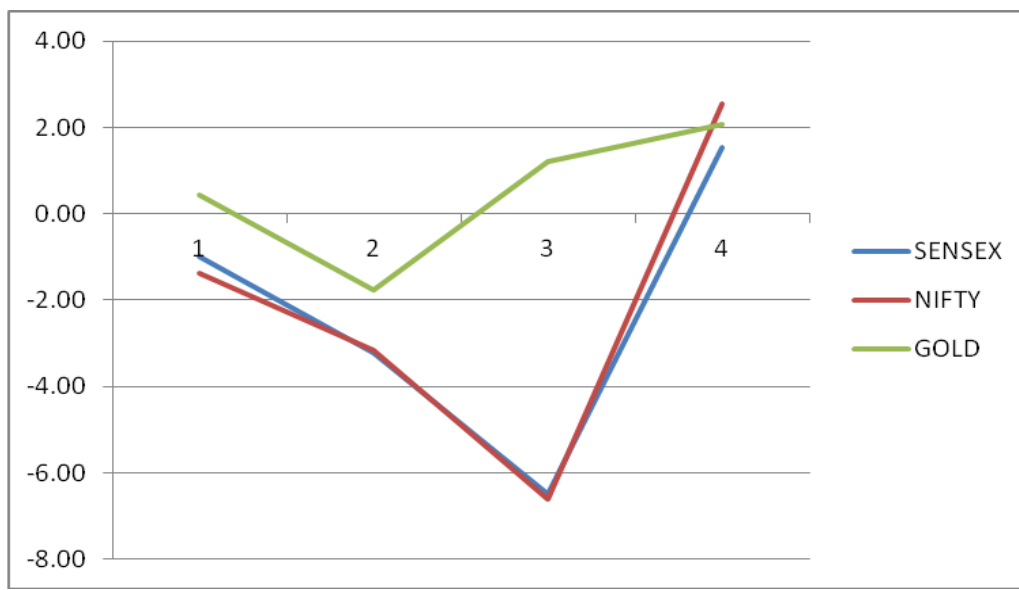
**Table 26: Result of Regression Line comparing Gold & SENSEX and Gold & Nifty**

SENSEX				Nifty			
R <sup>2</sup>	α	β	r	R <sup>2</sup>	α	β	r
0.09	0.81	0.14	0.30	0.12	0.80	0.15	0.34

**Regression Line of Gold on SENSEX:** Here Gold is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Gold & SENSEX is just 0.30 which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of 0.09 which is able to explain hardly 9% variations in the SENSEX, in other words, it is having insignificant impact. Alpha (α), vertical intercept of the Regression line, has a value of 0.81 which is positive but insignificant. Beta (β), slope of the Regression line tells us how sensitive Gold is towards the SENSEX market. In this case β value is 0.14 which suggests that if SENSEX increase by 10% Gold’s price will hardly improve by 1.4%.

**Regression Line of Gold on NIFTY:** Here Gold is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Gold & SENSEX. It may be concluded that Gold & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) and Beta ( $\beta$ ) values are also insignificant and in addition  $R^2$  value is also insignificant.

**Graph 26: Variation of the market between SENSEX, Nifty & Gold**



## **27. Gold 100gms**

Gold, the first metal used by humans, remains one of the most valued metals since prehistoric times. Egyptian hieroglyphs dating 2600 BCE describe gold as something king Tushratta of the Mitanni claimed was as "common as dust" in Egypt. Egypt and Nubia had the resources to make them major gold-producing areas for much of history. Gold is also mentioned several times in the Old Testament. Gold has been considered for ages as one of the most precious metals, and its value has been used as the standard for many currencies in history. Gold has been used as a symbol for purity, value, royalty, and particularly roles that combine these properties. Like other precious metals, gold is measured by troy weight and by grams. When it is alloyed with other metals the term carat or karat is used to indicate the

amount of gold present, with 24 carats being pure gold and lower ratings proportionally less. The purity of a gold bar can also be expressed as a decimal figure ranging from 0 to 1, known as the millesimal fineness, such as 0.995 and 0.999. The price of gold is determined on the open market, but a procedure known as the Gold Fixing in London, originating in 1919, provides a twice-daily benchmark figure to the industry.

## **Scenario**

### **Domestic Market**

India is the largest consumer of Gold in the world accounting for nearly 25% of the total gold consumption in the world. Most of India's gold consumption is in the form of jewellery and as investment demand. Indian gold demand is supported by cultural and religious traditions which are not directly linked to global economic trends as a result of which demand remains steady even during high prices.

### **International Market**

Gold demand in 2010 reached a 10 year high of 3,812.2 tonnes. Demand was up 9% year-on-year, and marginally above the previous peak of 2008 despite a 40% increase in the annual average price level between 2008 and 2010. In value terms, total annual gold demand surged 38% to a record of US\$150 billion. China is currently the largest producer of Gold in the world having overtaken US in the last couple of years. Asian consumers led demand with the revival of the Indian market and strong momentum in Chinese gold demand, which together constituted 51% of total jewellery and investment demand during the year 2010

### **Future prospects**

The steadily rising prices of Gold reinforces the inherent value of gold jewellery, an intrinsic part of its desirability and also as a means of

investment. The growth in investment demand has sparked numerous innovations in gold investment, ranging from online bullion sales to gold ETFs. Recent research has uncovered a number of new practical uses for gold, including its function as a catalyst in fuel cells, as well as chemical processing and pollution control. The potential to use nanoparticles of gold in advanced electronics, glazing coatings, and cancer treatments offers promising new areas of scientific research.

### Factor influencing prices

- \* Rise in Investor demand.
- \* Robust Jewellery off take.
- \* Geo-political concerns
- \* US dollar movement against other currencies
- \* Indian rupee movement against the US dollar
- \* Central Banks diversifying into bullion
- \* Fall in Supply
- \* Central Bank Sales Slowing and Massive De-Hedging
- \* Gold Mine Production

### Gold (100gms) future

Gold 100 gms Futures Contract started trading on NCDEX platform from November 2006 onwards and has witnessed considerable volatility. Using futures platform importers & domestic buyers can minimize their price risk. Wide range of Market participants ensure good price discovery. With ever increasing import demand, importers can insure themselves against price risk. Disparity between import prices provide good arbitrage opportunities to the various market participants.

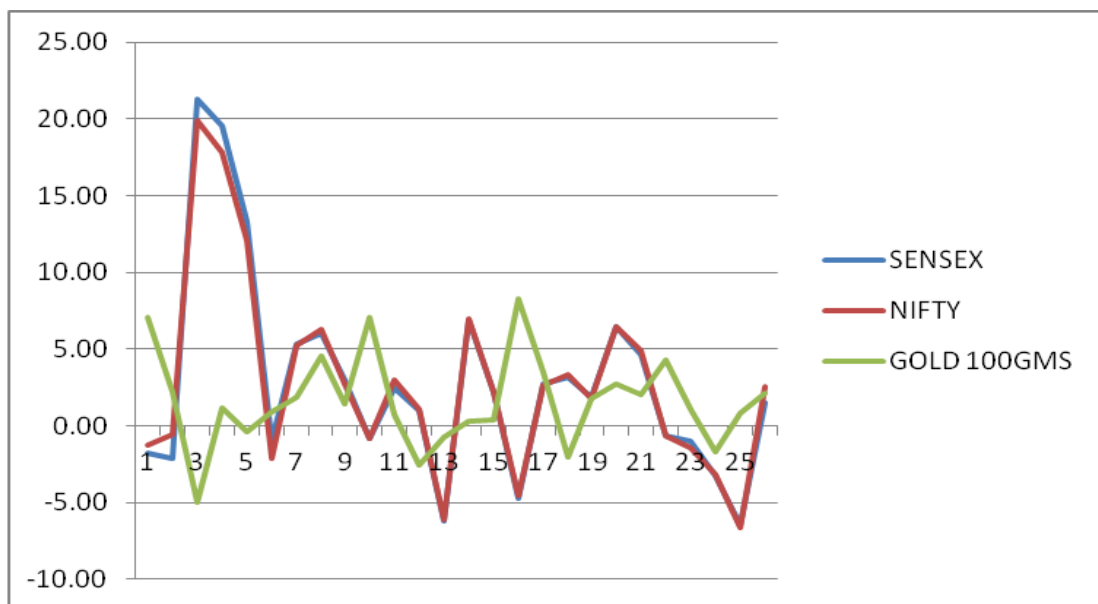
**Table 27: Result of Regression Line comparing Gold 100GMS & SENSEX and Gold 100GMS & Nifty**

SENSEX				Nifty			
R <sup>2</sup>	$\alpha$	$\beta$	r	R <sup>2</sup>	$\alpha$	$\beta$	r
0.14	2.08	-0.16	0.37	0.13	2.08	-0.17	0.36

**Regression Line of Gold 100gms on SENSEX:** Here Gold is the dependent variable and SENSEX is the independent variable. The value of  $r$ , i.e. correlation between Gold & SENSEX is just 0.37 which is insignificant. The value of  $R^2$ , the coefficient of Determination has a value of 0.14 which is able to explain hardly 1.4% variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of 2.08 which is positive and significant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Gold is towards the SENSEX market. In this case  $\beta$  value is -0.16 which suggests that if SENSEX increase by 10% Gold's price will decline by 1.6%.

**Regression Line of Gold 100gms on NIFTY:** Here Gold is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Gold & SENSEX. It may be concluded that Gold & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) value is significant and Beta ( $\beta$ ) value is insignificant and in addition  $R^2$  value is also insignificant.

**Graph 27: Variation of the market between SENSEX, Nifty & Gold 100gms**



## **28. Natural Gas**

Natural gas is a combustible mixture of hydrocarbon gases. While natural gas is formed primarily of methane, it can also include ethane, propane, butane and pentane. Natural Gas is a colorless, shapeless, and odorless in its pure form. Unlike other fossil fuels, natural gas is clean burning and emits lower levels of potentially harmful byproducts into the air. The distinctive rotten egg smell, actually an odorant called Mercaptan is added to natural gas before it is delivered to the end-user. Mercaptan helps in detecting any leaks. Natural gas is used for heating, cooking, generation of electricity and also used as a fuel for air conditioners, boilers, etc. It has also been used as an automotive fuel in the form of Compressed Natural Gas (CNG). Usually, Natural gas is expressed by British thermal units (Btu).

### **Formation of Natural gas**

Natural gas is essentially, the remains of plants and animals and microorganisms that lived millions and millions of years ago. Although there are several ways that methane, and thus natural gas, may be formed, it is usually found underneath the surface of the earth. As natural gas has a low density, once formed it will rise toward the surface of the earth through loose, shale type rock and other material. Some of this methane will simply rise to the surface and dissipate into the air. These formations are made up of layers of porous, sedimentary rock (kind of like a sponge that soaks up and contains the gas), with a denser, impermeable layer of rock on top.

### **Global scenario**

Five producers of Natural gas in the world are US, Russia, Canada, Iran and Norway which accounts for 50.7 % of Worlds Natural gas production. US, being the top producer contribute 20% alone. However, Russia is the biggest consumer of Natural gas in the world followed by US.

## **Indian scenario**

- Most of the production of gas comes from the Western offshore area. The on-shore fields in Assam, Andhra Pradesh and Gujarat States are other major producers of gas. Smaller quantities of gas are also produced in Tripura, Tamil Nadu and Rajasthan States.
- India consumption of natural gas stands 51.27 billion cu m in 2010 which makes her 15th in the world in terms of Consumption. There has been 23% increase in the consumption from the 2009 year.
- Natural Gas imports to India are done through three transitional gas pipelines viz. Iran-Pakistan-India (IPI) Pipeline Project, Myanmar-Bangladesh-India Gas Pipeline Project, Turkmenistan-Afghanistan-Pakistan (TAP) pipeline.
- In India, The Ministry of Petroleum & Natural Gas (MOP&NG) regulates the allocation and pricing of gas produced by ONGC and OIL by issuing administrative orders from time to time
- Natural Gas is currently the source of half of the LPG produced in the country.

## **Natural gas driver:**

### **Drivers affecting the supply of natural gas:**

- Availability of Skilled Workers at the times of increased demand
- Availability of Equipment like drilling rig as it has to be ordered in advance time elapsed between exploring the location of natural gas deposits and beginning of production
- Weather and Delivery Disruptions
- Onshore and Offshore Access
- Ability to transport natural gas from producing regions to consumption regions



- Capital required for exploring and producing natural gas

**Drivers affecting demand for natural gas:**

- Natural gas demand typically peaks during the coldest months and tapers off during the warmest months
- Industrial & electric generation consumers may switch between fuels esp. when natural gas becomes costlier
- Any recession or boost up in economy
- Changes in Electric Industry structure
- Changes in Natural Gas Industry structure
- Demographics and Population Centers
- Energy Efficiency Regulations
- Technological Advancements
- Environmental concerns, etc

**Natural gas future:**

On NCDEX, Natural gas futures was launched on 21st December 2009. NYMEX which comes under CME Group umbrella has the most liquid and traded natural gas contract in the world. Besides basic trading strategies, spark spreads and Frac spreads are very common among commercial operators who are into the generation of electricity and production of propane respectively.

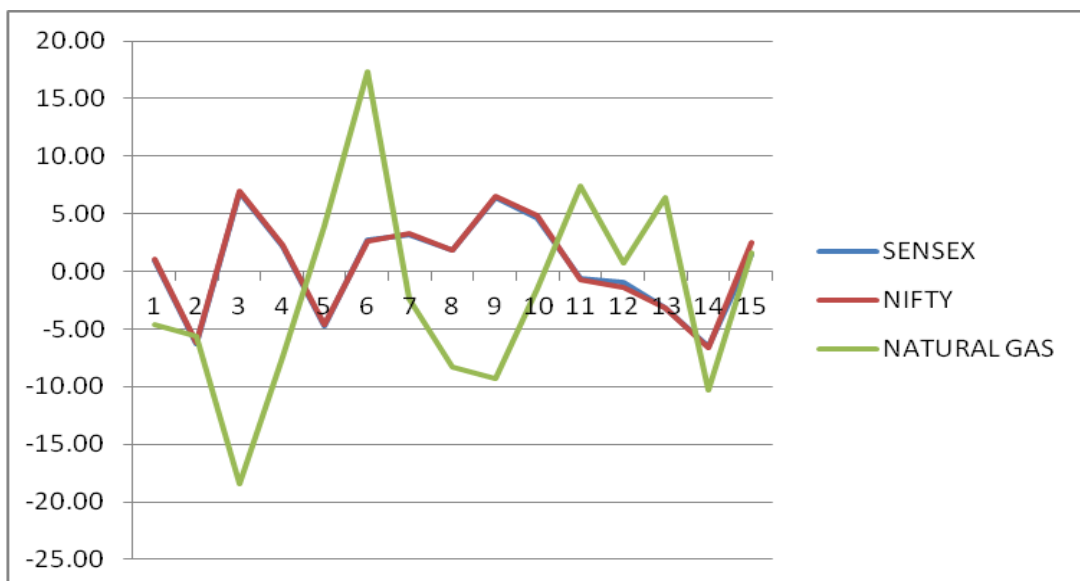
**Table 28: Result of Regression Line comparing Natural Gas & SENSEX and Natural Gas & Nifty**

SENSEX				Nifty			
R <sup>2</sup>	α	β	r	R <sup>2</sup>	α	β	r
0.05	-1.79	-0.46	0.22	0.05	-1.76	-0.44	0.21

**Regression Line of Natural Gas on SENSEX:** Here Natural Gas is the dependent variable and SENSEX is the independent variable. The value of  $r$ , i.e. correlation between Natural Gas & SENSEX is just 0.22 which is insignificant. The value of  $R^2$ , the coefficient of Determination has a value of 0.05 which is able to explain hardly 5% variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a value of -1.79 which is negative and insignificant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Natural Gas is towards the SENSEX market. In this case  $\beta$  value is -0.46 which suggests that if SENSEX increase by 10% Natural Gas's price will decline by 2.2%.

**Regression Line of Natural Gas on NIFTY:** Here Natural Gas is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Natural Gas & SENSEX. It may be concluded that Natural Gas & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) and Beta ( $\beta$ ) values are also insignificant and in addition  $R^2$  value is also insignificant.

**Graph 28: Variation of the market between SENSEX, Nifty & Natural Gas**



## **29.Silver**

Silver (Ag) - is a metallic chemical element and a soft, white, lustrous transition metal. It has the highest electrical conductivity of any element and the highest thermal conductivity of any metal. Silver is very ductile and malleable with a brilliant white metallic luster. It has its sensitivity to high reflectance of light and the ability to endure extreme temperature ranges. Due to these unique properties, it can be classified as both a precious metal and an industrial metal.

Silver is found in native form, as an alloy with gold, and in ores. The principal sources of silver are the ores of copper, copper-nickel, lead, and lead-zinc obtained from Peru, Mexico, China, Australia, Chile, Poland and Serbia. Peru and Mexico have been mining silver since 1546 and are still major world producers. Top silver-producing mines are Proao / Fresnillo (Mexico), Cannington (Queensland, Australia), Dukat (Russia), Uchucchacua (Peru) and Greens Creek mine (Alaska).

The metal is primarily produced through electrolytic copper refining, gold, nickel and zinc refining, and by application of the Parkes process on lead metal obtained from lead ores that contain small amounts of silver. Commercial-grade fine silver is at least 99.9% pure, and purities greater than 99.999% are available. In 2008, Peru was the world's top producer of silver, closely followed by Mexico.

## **Scenario**

### **Domestic Market:**

Indian Silver market is majorly Silver import market. Annual demand for silver in India is close to 2500MT - 3200MT comprising 50% demand from Industry, 39% from Jewelry & Silverware, 9% from Coins & 1% each from photography & Net implied investment. 77.1% of the total demand is met through imports, 18.8% from secondary silver & 2.5% from Hindustan Zinc which is the largest producer of silver in India. Most of the imports close to 50% is from China.

### **International Market:**

Silver mine production rose by 4% to 709.6 Moz in 2009. Rise was mainly from primary silver mines and as a by-product of gold mining. Peru was the worlds largest silver producing country in 2009, followed by Mexico, China, Australia and Bolivia. All of these countries saw increases last year except for Australia, where output from the lead/zinc sector declined markedly. With respect to scrap supply, 2009 saw a 6 percent decrease over 2008s figure to a 13-year low of 165.7 Moz. This represented the third consecutive year of losses in the scrap category. Global primary silver supply recorded a 7 percent increase to account for 30 percent of total mine production in 2009. Total fabrication demand was lower by 11.9% in 2009 primarily due to global financial crises

### **Future prospects**

India is world's largest importer of Silver. Total world fabrication demand forecast to be around 10% higher y-o-y in 2010. World Industrial off take is expected to recover by 18% in 2010. Jewellery & Silverware demand combined expected to decline marginally due to continuing high prices. Whereas, with investors continue to demand silvers coins, Investment demand expected to grow.

### **Factor influencing prices**

#### **Rising Demand:**

- Rise in Investor demand
- Robust Jewelry off take
- Geo-political concerns
- US dollar movement against other currencies

- Indian rupee movement against the US dollar
- Central Banks diversifying into bullion

**Fall in Supply:**

- Central Bank Sales Slowing and Massive De-Hedging
- Low supply from Scrap sector

**Silver future**

Silver Futures contract started trading on NCDEX platform from 2004 onwards has witnessed considerable volatility. Using futures platform importers & domestic buyers can minimize their price risk. Wide range of Market participants ensure good price discovery. With ever increasing import demand, importers can insure themselves against price risk. Disparity between import prices provide good arbitrage opportunities to the various market participants.

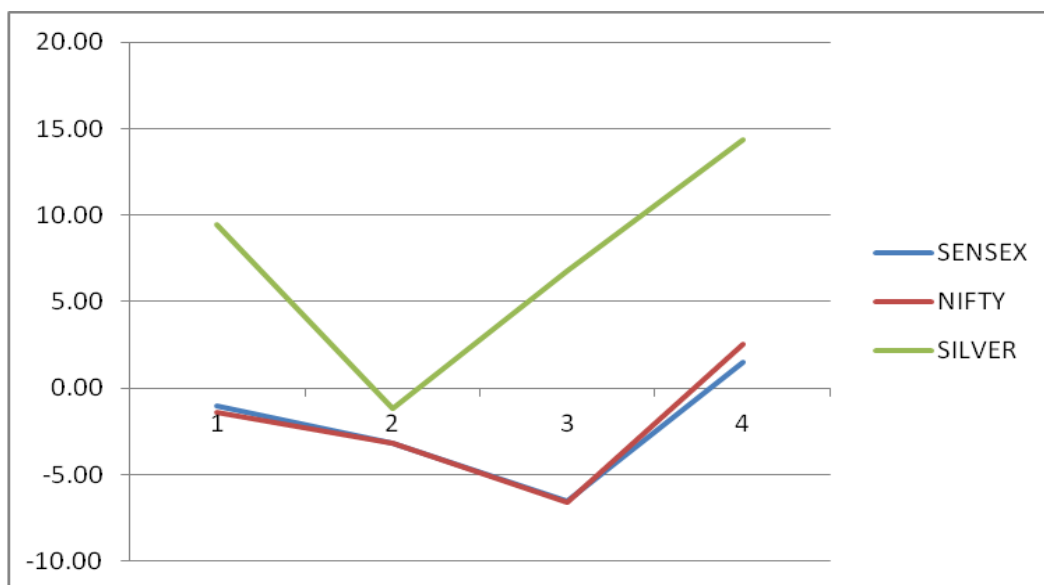
**Table 29: Result of Regression Line comparing Silver & SENSEX and Silver & Nifty**

SENSEX				Nifty			
R <sup>2</sup>	α	β	r	R <sup>2</sup>	α	β	r
0.36	10.00	1.14	0.60	0.38	9.64	1.05	0.62

**Regression Line of Silver on SENSEX:** Here Silver is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Silver & SENSEX is just 0.60 which can be considered as significant. The value of R<sup>2</sup>, the coefficient of Determination has a value of 0.36 which is able to explain hardly 36% variations in the SENSEX, in other words, it is having insignificant impact. Alpha (α), vertical intercept of the Regression line, has a value of 10.00 which is positive and significant. Beta (β), slope of the Regression line tells us how sensitive Silver is towards the SENSEX market. In this case β value is 1.14 which suggests that if SENSEX increase by 10% Silver’s price will increase by 11.4%.

**Regression Line of Silver on NIFTY:** Here Silver is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Silver & SENSEX. It may be concluded that Silver & Nifty are significantly correlated. The Alpha ( $\alpha$ ) and Beta ( $\beta$ ) values are also significant and in addition  $R^2$  value is insignificant.

**Graph 29: Variation of the market between SENSEX, Nifty & Silver**



### **31. Silver 5kg**

Silver (Ag) - is a metallic chemical element and a soft, white, lustrous transition metal. It has the highest electrical conductivity of any element and the highest thermal conductivity of any metal. Silver is very ductile and malleable with a brilliant white metallic luster. It has its sensitivity to high reflectance of light and the ability to endure extreme temperature ranges. Due to these unique properties, it can be classified as both a precious metal and an industrial metal. Silver is found in native form, as an alloy with gold, and in ores. The principal sources of silver are the ores of copper, copper-nickel, lead, and lead-zinc obtained from Peru, Mexico, China, Australia, Chile, Poland and Serbia. Peru and Mexico have been mining silver since 1546 and

are still major world producers. Top silver-producing mines are Proao / Fresnillo (Mexico), Cannington (Queensland, Australia), Dukat (Russia), Uchucchacua (Peru) and Greens Creek mine (Alaska). The metal is primarily produced through electrolytic copper refining, gold, nickel and zinc refining, and by application of the Parkes process on lead metal obtained from lead ores that contain small amounts of silver. Commercial-grade fine silver is at least 99.9% pure, and purities greater than 99.999% are available. In 2008, Peru was the world's top producer of silver, closely followed by Mexico.

## **Scenario**

### **Domestic Market**

Indian Silver market is majorly Silver import market. Annual demand for silver in India is close to 2500MT - 3200MT comprising 50% demand from Industry, 39% from Jewelry & Silverware, 9% from Coins & 1% each from photography & Net implied investment. 77.1% of the total demand is met through imports, 18.8% from secondary silver & 2.5% from Hindustan Zinc which is the largest producer of silver in India. Most of the imports close to 50% is from China

### **International Market**

Silver mine production rose by 4% to 709.6 Moz in 2009. Rise was mainly from primary silver mines and as a by-product of gold mining. Peru was the worlds largest silver producing country in 2009, followed by Mexico, China, Australia and Bolivia. All of these countries saw increases last year except for Australia, where output from the lead/zinc sector declined markedly. With respect to scrap supply, 2009 saw a 6 percent decrease over 2008s figure to a 13-year low of 165.7 Moz. This represented the third consecutive year of losses in the scrap category. Global primary silver supply recorded a 7 percent increase to account for 30 percent of total mine production in 2009. Total fabrication demand was lower by 11.9% in 2009 primarily due to global financial crises

## Future prospects

India is worlds largest importer of Silver. Total world fabrication demand forecast to be around 10% higher y-o-y in 2010. World Industrial offtake is expected to recover by 18% in 2010. Jewelry & Silverware demand combined expected to decline marginally due to continuing high prices. Whereas, with investors continue to demand silvers coins, Investment demand expected to grow.

## Factor influencing

### \* Rising Demand

- \* Rise in Investor demand
- \* Robust Jewelry off take.
- \* Geo-political concerns
- \* US dollar movement against other currencies
- \* Indian rupee movement against the US dollar
- \* Central Banks diversifying into bullion

### \* Fall in Supply

- \* Central Bank Sales Slowing and Massive De-Hedging
- \* Low supply from Scrap sector

**Table 30: Result of Regression Line comparing Silver 5kg & SENSEX and Silver 5kg & Nifty**

SENSEX				Nifty			
$R^2$	$\alpha$	$\beta$	r	$R^2$	$\alpha$	$\beta$	r
0.13	3.43	0.49	0.35	0.11	3.40	0.46	0.34

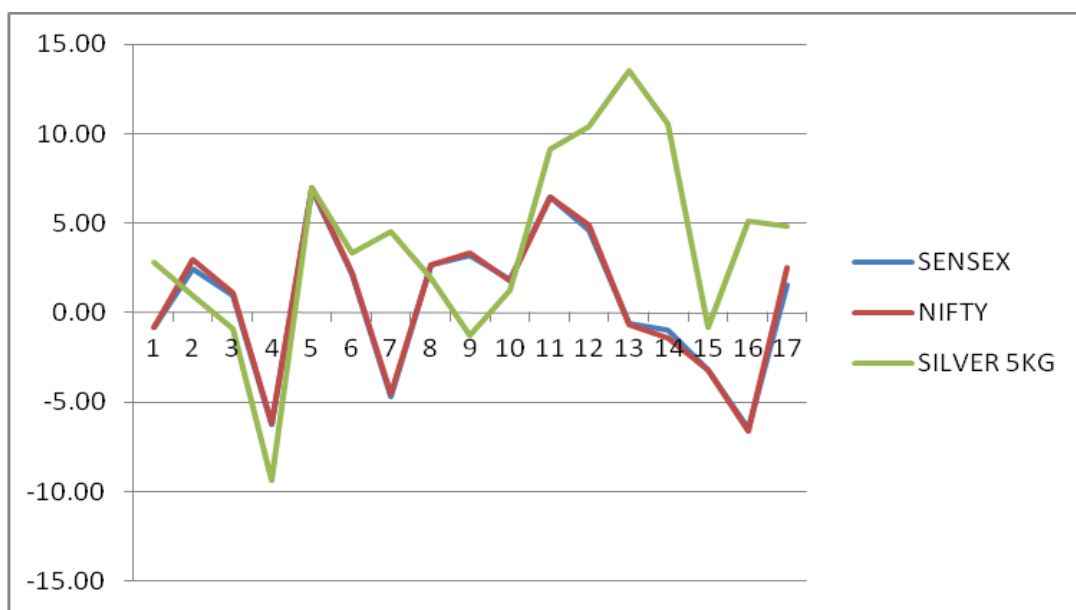
**Regression Line of Silver 5kg on SENSEX:** Here Silver is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Silver & SENSEX is just 0.35 which is insignificant. The value of  $R^2$ , the coefficient of Determination has a value of 0.13 which is able to explain hardly 13% variations in the SENSEX, in other words, it is having insignificant impact. Alpha ( $\alpha$ ), vertical intercept of the Regression line, has a



value of 3.43 which is positive and significant. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive Silver is towards the SENSEX market. In this case  $\beta$  value is 0.49 which suggests that if SENSEX increase by 10% Silver's price will increase by 4.9%.

**Regression Line of Silver 5kg on NIFTY:** Here Silver is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Silver & SENSEX. It may be concluded that Silver & Nifty are insignificantly correlated. The Alpha ( $\alpha$ ) value is significant where Beta ( $\beta$ ) value is insignificant and in addition  $R^2$  value is insignificant.

**Graph 30: Variation of the market between SENSEX, Nifty & Silver 5kg**



### **32. Steel**

Steel, an alloy, mixture of two or more components, mainly Iron & Carbon, followed with manganese, zinc, lead, nickel, silicon etc. Across the chain, Steel is available in more than 2700 grades & forms, shapes, sizes etc. Across the value chain Steel is classified broadly into two categories Steel Long & Steel Flat.

In 2010, World Steel production was 1.4 billion tons, which was higher by 15% as compared to 2009. China is the world's biggest consumer & producer of Steel across the variants. India is the fifth largest producer of Steel, produces close to 60MMT annually. Down the line 2020, with existing & proposed new Steel plants, production capacity of India is expected to reach 120 MMT.

Steel is available in the form of ingots, blooms, billets, slabs, plates, CR coils, HR coils, stainless steel, tin free steel etc. Out of given forms of Steel, lion share of Steel is consumed in construction sector, followed by engineering use, automobile, consumer durables etc.

### **Scenario**

In India around 60% of the Steel production is for Long Products used mainly for the Construction activities with different form such as TMT, Bars, Wire Rod, Channels etc. Balance 40% of the Steel produced is for flat products, used for the electrical, automobile & engineering purpose .

Indian Steel industry is broadly classified in two forms, Primary & Secondary producers, Primary producers are manufacturers who have backward integration i.e. have their own captive mines, they are the major producers for Flat products in India. Secondary producers seek Sponge Iron, Scrap etc as their raw material for making steel, these manufacturers are active in Long products & nearly 75% of the long steel production is made through them.

For Long products Mandi Gobindgarh, Gaziabad, Raipur, Mumbai, Bhavnagar are the major trading & production centres including semis(Ingot/Billet) & finish(TMT/Channels etc). Lot of sponge Iron producers are located in the eastern part of the country, which facilitates sponge availability across the India. Whereas port cities are used for scrap importing, this circulates it to the production centres. Scrap & Sponge are both used for Steel making & cost of economies are worked out on the current prices for Ingots/Billets.

## **Future prospects**

Persistent Increase in the raw material prices i.e. higher Iron ore, Coke & Coking coal prices. Many raw material production areas were hit by natural disasters or a regime change in setting Iron ore prices from annual contract to quarterly pricing mechanism.

With increase in the proposed Steel plants, production is expected to rise two folds in coming 10 years, making India amongst the top 3 producers. Increased economic activity & rising GDP is prompting for increase in per capita consumption of Steel, which is far more for India as compared to other developing countries.

## **Factor influencing prices**

- Raw material prices viz., iron ore, scrap
- Demand across the various finished steel products
- Mandi Gobindgarh market is considered to be the price benchmark and price trend driver
- Government policies
- International markets price dynamics

## **Steel future**

Steel future started in March 2005, thereon many changes have been made based on the feedback from the industry, NCDEX being the pioneer in running a successful steel contract across the world, shares the position of only exchange having an adequate liquid contract for Steel in India.

With its wider acceptance across the industry, due to widely accepted quality parameters it has become the major tool for Risk management amongst the Steel participant. Good quantity of Steel Ingots/ Billets are being traded & deposited at the exchange accredited warehouses benefiting the physical & financial participants.

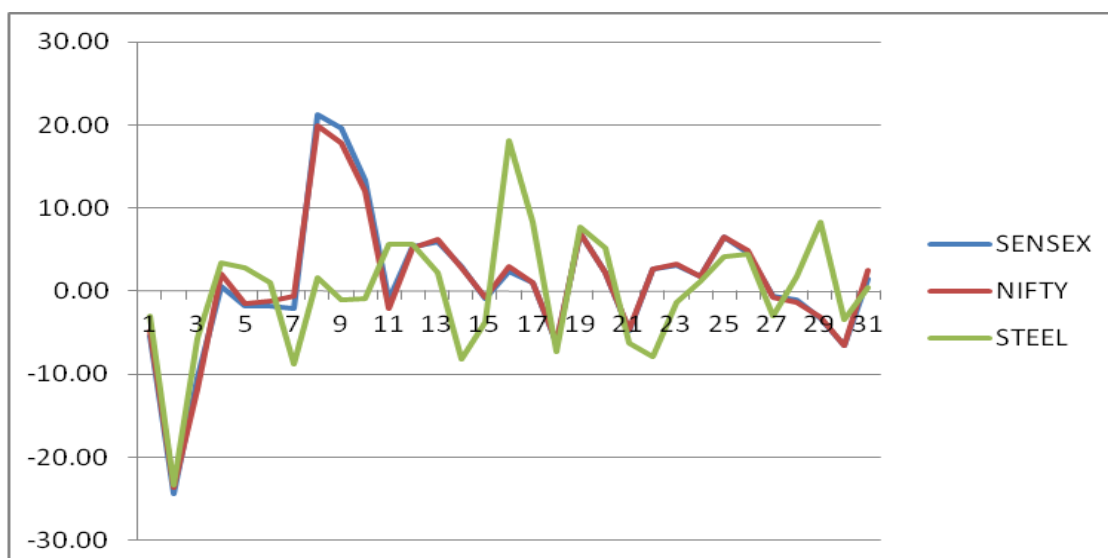
**Table 31: Result of Regression Line comparing Steel & SENSEX and Steel & Nifty**

SENSEX				Nifty			
R <sup>2</sup>	α	β	r	R <sup>2</sup>	α	β	r
0.24	-0.51	0.44	0.49	0.26	-0.54	0.46	0.51

**Regression Line of Steel on SENSEX:** Here Steel is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Steel & SENSEX is just 0.49 which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of 0.24 which is able to explain hardly 24% variations in the SENSEX, in other words, it is having insignificant impact. Alpha (α), vertical intercept of the Regression line, has a value of -0.51 which is negative and insignificant. Beta (β), slope of the Regression line tells us how sensitive Steel is towards the SENSEX market. In this case β value is 0.44 which suggests that if SENSEX increase by 10% Steel's price will hardly improve by 4.4%.

**Regression Line of Steel on NIFTY:** Here Steel is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Steel & SENSEX. It may be concluded that Steel & Nifty are insignificantly correlated. The Alpha (α) and Beta (β) values are also insignificant and in addition R<sup>2</sup> value is also insignificant.

**Graph 31: Variation of the market between SENSEX, Nifty & Steel**



### **33. Zinc**

Zinc is a metallic chemical element. Zinc is the 24th most abundant element in the Earth's crust and has five stable isotopes. The most common zinc ore is sphalerite (zinc blende), a zinc sulfide mineral. The largest mineable amounts are found in Australia, Asia, and the United States.

Brass, which is an alloy of copper and zinc, has been used since at least the 10th century BC. Corrosion-resistant zinc plating of steel (hot-dip galvanizing) is the major application for zinc. Other applications are in batteries and alloys.

#### **Scenario**

Zinc is the fourth most common metal in use, trailing only iron, aluminium, and copper with an annual production of about 12 million tonnes. About 70% of the world's zinc originates from mining, while the remaining 30% comes from recycling secondary zinc. Commercially pure zinc is known as Special High Grade, often abbreviated SHG, and is 99.995% pure.

Worldwide, 95% of the zinc is mined from sulfidic ore deposits, in which sphalerite ZnS is nearly always mixed with the sulfides of copper, lead and iron. There are zinc mines throughout the world, with the main mining areas being China, Australia and Peru. China produced 29% of the global zinc output in 2010.

#### **Factor affecting prices**

- Increase or decrease in production of zinc from mines also affects zinc prices.
- Increased consumption of galvanized steel would lead to increased demand of zinc
- Increased demand from China and other developing countries like India.

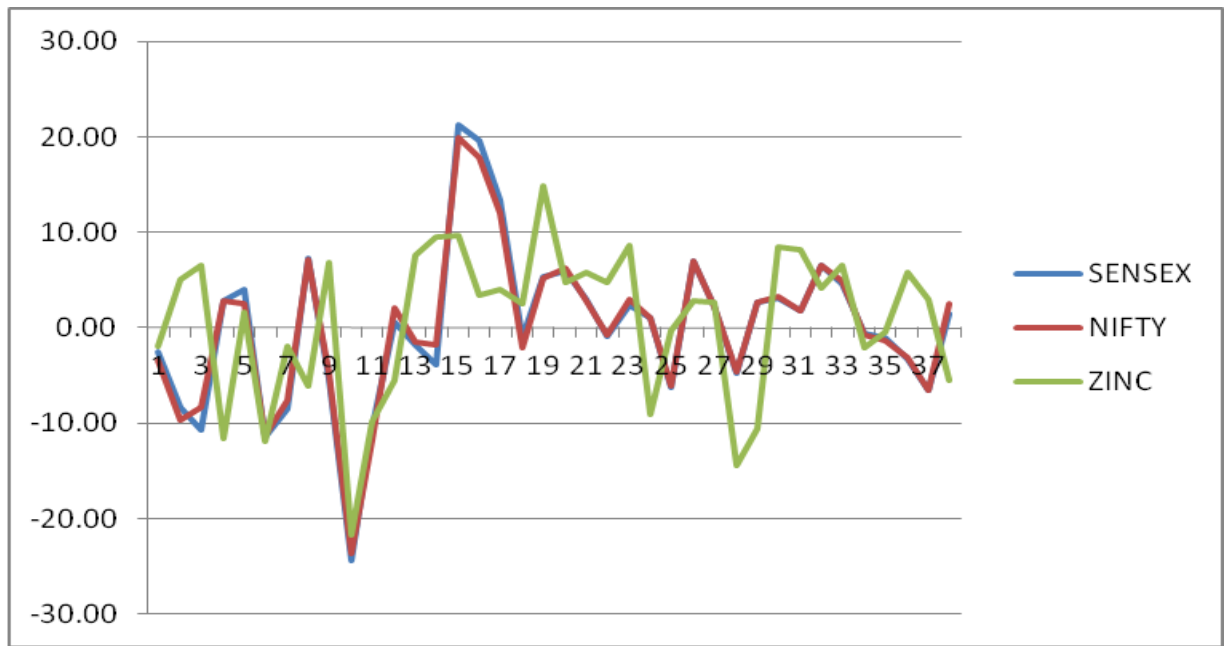
**Table 32: Result of Regression Line comparing Zinc & SENSEX and Zinc & Nifty**

SENSEX				Nifty			
R <sup>2</sup>	α	β	r	R <sup>2</sup>	α	β	r
0.20	0.58	0.42	0.44	0.21	0.58	0.46	0.46

**Regression Line of Zinc on SENSEX:** Here Zinc is the dependent variable and SENSEX is the independent variable. The value of r, i.e. correlation between Zinc & SENSEX is just 0.44 which is insignificant. The value of R<sup>2</sup>, the coefficient of Determination has a value of 0.20 which is able to explain hardly 20% variations in the SENSEX, in other words, it is having insignificant impact. Alpha (α), vertical intercept of the Regression line, has a value of 0.58 which is positive but insignificant. Beta (β), slope of the Regression line tells us how sensitive Zinc is towards the SENSEX market. In this case β value is 0.42 which suggests that if SENSEX increase by 10% Zinc's price will hardly improve by 4.2%.

**Regression Line of Zinc on NIFTY:** Here Zinc is the dependent variable and Nifty is the independent variable. The results are quite similar with the results between Zinc & SENSEX. It may be concluded that Zinc & Nifty are insignificantly correlated. The Alpha (α) and Beta (β) values are also insignificant and in addition R<sup>2</sup> value is also insignificant.

**Graph 32: Variation of the market between SENSEX, Nifty & Zinc**



The above discussions on Non-Agricultural Products concludes that there is insignificant correlation between each of the non-agricultural commodities and stock indices namely SENSEX and Nifty. In addition all 10 commodities individually not able to explain the variations in SENSEX and Nifty. Thus, second hypothesis of the study is accepted.

### Conclusions and Suggestions

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#### Conclusion:

1. Impact of most of the commodities on SENSEX and Nifty are insignificant. None of the commodity during the study is found significantly correlated with SENSEX and Nifty. Highest correlation is found between Silver and SENSEX i.e. 0.60 and Silver with Nifty i.e. 0.62.
2. Beta ( $\beta$ ), slope of the Regression line tells us how sensitive or volatile each commodity is towards the SENSEX market. In the study, commodity having the highest beta value with SENSEX is Silver i.e. 1.14 which explains that Silver is the most sensitive with SENSEX.
3. In regard to the above mentioned beta ( $\beta$ ) in the study, commodity having the highest beta value with Nifty is again Silver i.e. 1.05 which explains us that Silver is the most sensitive with Nifty.
4. Alpha ( $\alpha$ ) is vertical intercept of the Regression line also shows the significance level of each commodity. In the study, commodity having the highest alpha value with SENSEX is Silver i.e. 10.00 which explains us that Silver is having the highest significance level with SENSEX.
5. In regard to the above mentioned alpha ( $\alpha$ ) in the study, commodity having the highest alpha value with Nifty is Silver i.e. 9.64 which explains us that Silver is having the highest significance level with Nifty.
6.  $R^2$  is the coefficient of Determination which explains the variations each commodity is having with the market. In the study the commodity having the  $R^2$  with SENSEX is Silver i.e. 0.36 which explains that Silver is insignificantly related with SENSEX.



7. In regard to the above mentioned  $R^2$  in the study, commodity having the  $R^2$  with Nifty is Mustard Seed RMSeed i.e. 0.45 which explains that Mustard Seed RMSeed is insignificantly related with Nifty.

### **Suggestions:**

The basic idea behind establishment of commodities exchange is to ensure a ready and profitable market for farmers but the benefits are being taken away by the intermediaries or the brokers. The real stakeholders, farmers are largely unaware about the existence and functioning of commodity exchanges in India. Thus, they are deprived of any benefits of the same. Thus, there is an urgent need of awareness programs for the farmers.

### **Suggestions for further studies:**

1. The analysis could have been done further using modelling- Multivariate model by taking all the three indices together as independent variable predicting each commodity

$$Y = a + b_1x + b_2x + b_3x + e$$

Where  $b_1$  may be Dhaanya

$b_2$  may be SENSEX

$b_3$  may be Nifty

For a commodity return  $Y$

2. Another possibility is using as many significant indices such as consumer price index, interest rate index, etc.
3. Removal of skewness and outliers by using ARCH model or GARCH model.
4. By using the above model and incorporating the indices that are significant for economy, one could find the best predictor of  $Y$ .

5. Investment in commodity derivatives in India must be made by taking into consideration the components of regression, i.e.  $\alpha$  ,  $\beta$ ,  $R^2$  so as to maintain consistent returns.
6. Irrespective of the models mentioned above, the stock market moves randomly. In practice, the theoretical model often fails to hold true. The reason being the history of commodity returns on the basis of the time horizon of the returns used to compute to a vast extent affects the result of the models.

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