

Commodities Derivatives Market in India: The Road Traveled and Challenges Ahead

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ABSTRACT

Derivatives as a risk management tool have existed in India for more than a century. But the testing times have come now when the global economies are removing trade barriers gradually to facilitate trade so that massive increase in demand can be handled and the uncertainties in supply is managed in an organized manner. This paper traces the origin and growth of commodity derivatives market. Price discovery which is one of the functions of futures market has been researched from a narrow perspective of quantitative analysis. India, now enjoys world ranking with respect to trading volume in certain commodities like Silver, Gold, Copper, Guar Seed etc.

Nevertheless, the functioning has been distorted due to lack of understanding of the dynamic nature of the markets. With this enhanced role there is a need to deliberate on the issues of further research in the area so as to promote the growth and development of the market

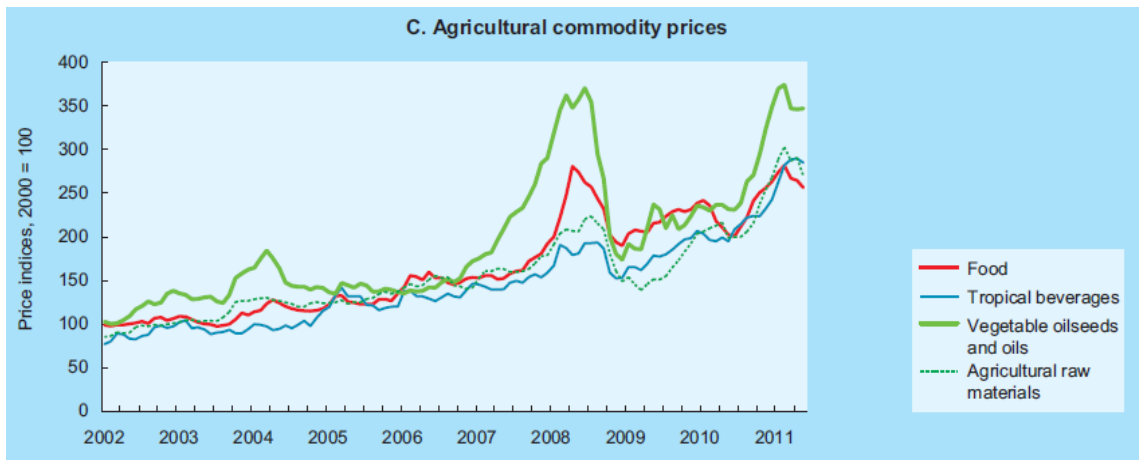
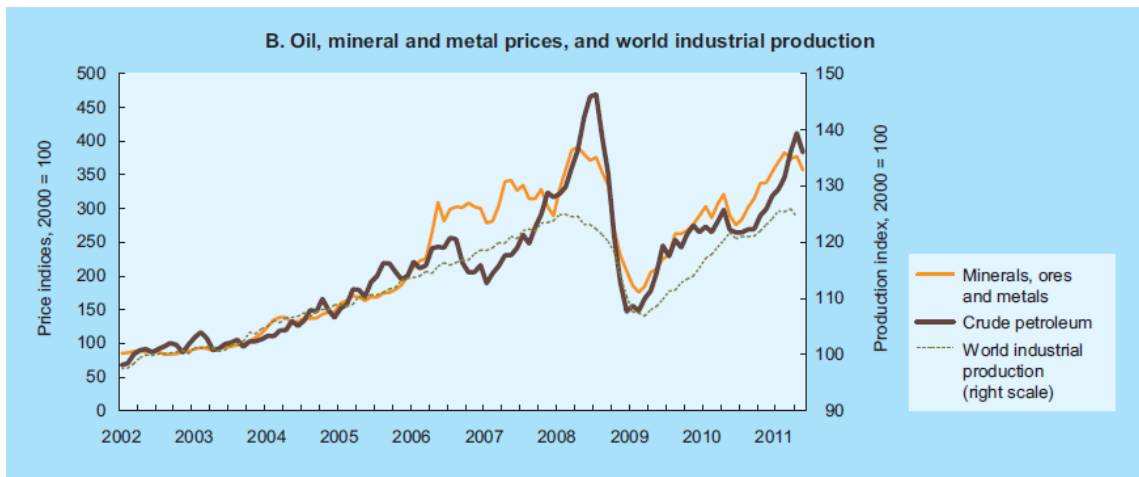
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INTRODUCTION

In the wake of globalization and surge in global uncertainties, the prices in commodity markets have shown wide fluctuations. Commodity price volatility is the most critical issue being faced by the producers of primary commodities. The instability in prices is largely originated by demand and supply discrepancies that stem from business cycles (as in case of metals, energy products and agricultural commodities) or political upheavals and unforeseen weather conditions. Since the year 2002, commodity prices have witnessed exceptional developments. The price rise has been drastic and unabated until the eruption of global financial crisis in the mid 2008 and has left many calculated hedges in a quandary. After a short respite the uptrend resumed in mid 2009. While the impact on metals, energy and non-agricultural commodities was more pronounced but the spike in case of food commodities has caused greater concern due to its social implications. Oil price rise in 2011 together with that of agricultural commodities has been especially disastrous for the poor in developing countries who spend 60 to 80 percent of their income on food (FAO, 2008). The high

prices for basic commodities limit the income of farmers/ small producers whereas high volatility of prices makes it very difficult for them to optimize the use of their income (Morgan 2000) Therefore, there are grave humanitarian concerns, social & economic repercussions of this vicious problem.

EVOLUTION OF COMMODITY PRICES (January 2002- May 2011)



Source: UNCTAD secretariat calculations, based on UNCTAD, *Commodity Price Statistics Online*; World Bank, *Commodity Prices (Pink Sheet)* database; *UNCTADstat*; and CPB Netherlands Bureau of Economic Policy Analysis, *World Trade* database.

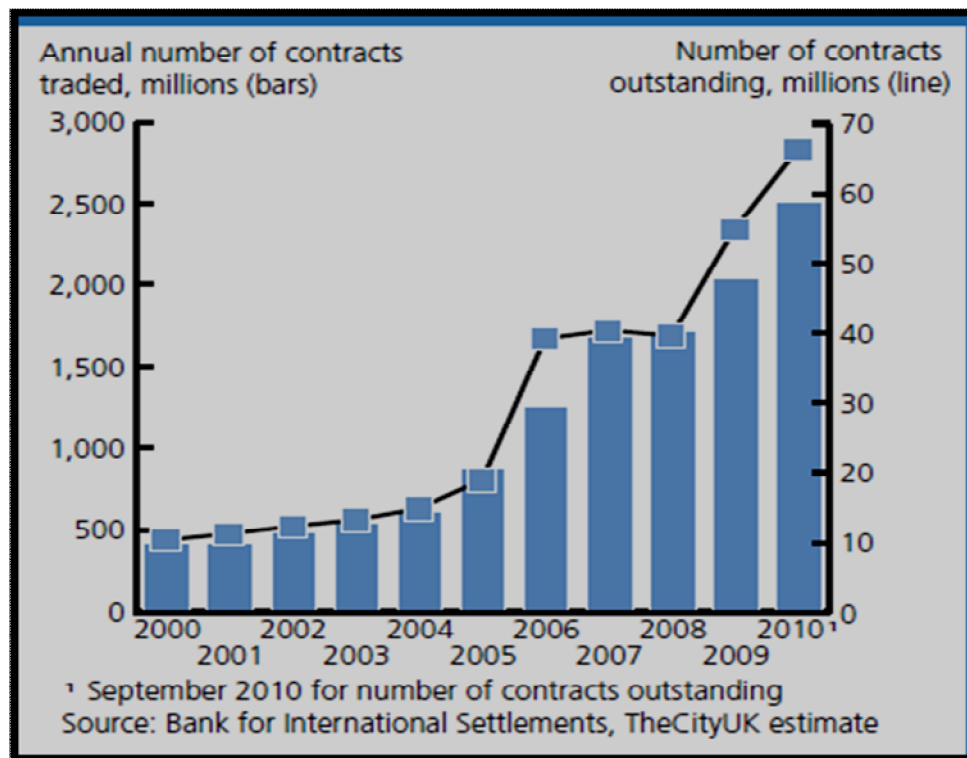
Worldwide the national governments have designed various policies to control these instabilities in prices, but by and large these policies have been based on intervention by the state to artificially stabilize prices. These measures put a strain on the national resources, promote inefficiencies and are counterproductive. Financial organizations around the world are forced to devise ways to tackle the price risk that comes along with these uncertainties. In the recent past countries have begun to liberalize commodity markets and in particular commodity futures markets are being developed. The World Bank initiated the use of market based instruments for dealing with commodity price risks and this has given fresh impetus for research in the area of commodity futures market. The World Bank (1999) notes: “market based management instruments, despite several limitations, offer a promising alternative to traditional stabilization schemes...”The argument is that the use of price risk management instruments allows governments to disengage from costly, distortionary and counterproductive policies.

EVOLUTION OF COMMODITY FUTURES

Commodity markets have existed for centuries around the world. Cash transactions were most common but sometimes forward agreements were also made, for example forward agreements related to rice markets in seventeenth century in Japan; however most scholars agree that forward agreements date back much further in time. Forward agreements gradually gave way to futures contracts when the first organized grain futures trading in U.S. began in places such as New York city and Buffalo city. Development of modern futures began in Chicago in 1840s. The city was a natural hub for trade, but the trading that took place was inefficient and unorganized until a group of Chicago based businessmen formed the Board of Trade in the city of Chicago in 1848. As trading of forward contracts increased, the Board decided that standardizing these contracts would streamline the trading and delivery processes. These standardized forward contracts are essentially the first modern futures contracts. The usefulness of futures trading began apparent and a number of futures exchanges came up in the country, the first one being Chicago Mercantile Exchange (CME) in 1919. Led by the innovative thinking of CME, the futures industry has expanded phenomenally to meet the risk management needs of our complex society.¹

The City UK (independent membership body, established in June 2010, promoting the UK financial and related professional services industry) estimates that commodities trading on exchanges increased by around a fifth in 2010 to over 2,500 million contracts. This follows a 19% increase in the previous year. Most of the growth in trading in these two years was in non-precious metals and agriculture contracts.²

COMMODITY TRADING ON EXCHANGES



Worldwide, there are around 50 major commodity exchanges that trade in more than 90 commodities. China and India have gained in importance in recent years with their emergence as significant commodities consumers and producers, though the market capitalization of Indian Exchanges has fallen considerably in 2011 due to foreign exchange variation

LARGEST COMMODITY DERIVATIVES EXCHANGES

| Name of Exchange | Country | Trades | No. of future contracts traded (million) 2009 |
|-----------------------------------|---------|----------------------|---|
| Dalian Commodity Exchange | China | Agriculture | 834 |
| Shanghai Futures Exchange | China | Non-prec. Metals | 435 |
| CME Group | US | Energy, metals, agr. | 431 |
| Zhengzhou Commodity Exchange | China | Agriculture | 227 |
| ICE futures Europe | UK | Energy | 165 |
| Multi Comm. Exchange of India | India | Agricul. Met. Energy | 161 |
| London Metal Exchange | UK | Non-prec. Metals | 106 |
| ICE Futures US | US | Energy | 39 |
| Mercado a Termino de Buenos Aires | Argen. | Agriculture | 14 |
| NYSE Liffe | UK | Agriculture | 11 |

Source: World Federation of Exchanges

Developments are taking place both at the national and international front for improvements of commodity futures market. At the International front *The Task Force on Commodity Futures Markets (Task Force)* was formed in September 2008 by the Technical Committee of IOSCO(International Organization of Securities Commissions) responding to calls for an examination of the functioning of certain commodity futures markets from the G8 Finance Ministers in 2008. It was decided that the scope of the Task Force should go beyond oil to include other commodity derivatives such as agricultural-based contracts. Task Force recommended that work on commodities markets be placed on a permanent basis within IOSCO. This will include making new recommendations for further work which is likely to lead to proposals to improve market transparency, anti-market abuse treatment for other commodities markets, where necessary. The Task Force noted that there had been a range of further studies in the intervening period and that many of these supported the view of the academic literature reviewed in the March 2009 which

assessed contemporary research into the causes of observed price volatility, and did not find any conclusive evidence of systematic influence from speculative activity. However, the Task Force acknowledged that commodity futures markets can experience periods of significant volatility and that improvements should be made to the functioning of these markets.³

At national level the Government of India's *Working Group on Agricultural Marketing Infrastructure and Policy Required for Internal & External Trade for Eleventh Five-Year Plan (2007-12)* saw an important role for commodity futures exchanges as delivering price discovery & risk mitigation for farmers, with emphasis on the development of electronic spot exchanges as a mechanism for further extending these benefits.

BENEFITS OF COMMODITY FUTURES MARKET

The primary benefit of commodity futures market is that they provide ***hedging against price risk***. Hedging is the practice of offsetting the price risk in a cash market position by taking an equal and opposite position in the futures market. By taking a position in the futures market that is opposite to that held in the spot market, the producer can offset the losses in the latter with the gains in the former. Hedgers use the futures market to mitigate their price risk while speculators seek to profit from the price movements in the market and in doing so they provide much needed liquidity to the market.

Another important function of futures market is ***price discovery***. Price signals are essential for the firms to take their production & marketing decisions. Price discovery is the process of buyers and sellers arriving at a transaction price for a given commodity. It also implies how information is produced and transmitted across markets and whether these transmitted prices can be used as a reference price for the trading needs. Proper price discovery can help farmers and traders in avoiding price slumps in the post harvest period and also help consumers in coping with price volatility. If new information is reflected first in futures prices, the futures markets are said to perform the price discovery function efficiently.

Futures markets also provide ***support for credit needs*** to small producers. The collateral value of inventory is enhanced if it is hedged, enabling firms to borrow on better terms.

According to Gorton and Rouwenhorst (2005) commodity futures have been seen to exhibit negative correlation with stock futures and bonds & positive correlation with inflation, so they serve as an *additional risk management tool*. They found that the average correlation between returns on equities and commodity futures was a statistically significant -0.42 if the investments were held for 5 years. Hence, they provide stability under volatile market conditions.

COMMODITY FUTURES IN INDIA

India was one of the first countries in the world to adopt commodity exchanges, with its earliest exchange dating back to the Bombay Cotton Trading association in 1880s. First organized futures market, for various types of cotton appeared in 1921 and subsequently proliferated. Regulated trading in commodities started after the enactment of Forward Contract (Regulation) Act 1952 which provided the legal framework for organized forward trading in the country and for recognition of commodity exchanges. Under this Act commodities are notified for regulation and prohibition of forward contract. Due to concerns regarding its effect on prices and supply of essential commodities and speculation in times of scarcity the markets for several commodities like cotton, oilseeds, bullion and jute were suspended during the 1960s and 1970s. Later the Khusro Committee (June 1980) recommended reintroduction of futures trading for cotton, kapas, raw jute and in the latter half of 1980 futures trading in potatoes was resumed in Punjab & Uttar Pradesh.

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. Also, Government of India set up Kabra Committee in 1993 to review the futures trading for other commodities which were hitherto prohibited. As a result, futures trading was revived, after a lapse of nearly three and a half decades, towards the close of the 20th century.

The year 2003 was a watershed year in the history of commodities with the establishment & recognition of three national exchanges with online trading & professional management. At present, there is a three tier regulatory system for commodities futures market viz. the Central Government, Forward Market Commission & recognized exchanges. Futures trading in India is currently permitted in 5 national level multi-commodity exchanges and 21 regional level commodity specific exchanges. Trading volumes in India's commodity exchanges in April 2011 to

March 2012 has risen 53.89% to Rs 173,69,550.60 crore as against Rs 112, 86,676.02 crore, according to market regulator Forward Markets Commission.

Commodity derivatives have witnessed remarkable growth since 2003; nevertheless fingers were still being pointed accusing futures trading for rising inflation in agricultural commodities. Four essential commodities- wheat, urad, tur and rice faced futures trading ban toward the end of 2006-07. An Expert Committee was set up under the Chairmanship of Prof. Abhijit Sen to examine the extent to which futures trading had contributed to price rise in agricultural commodities. The Committee was unable to find any causal relationship between price rise and futures trading in view of the short time period during which the futures market have functioned & the complexities that arise because of a large number of variables that impact spot prices.⁴

On one hand are the benefits of commodity futures trading for price risk management and portfolio diversification and on the other hand are the doubts regarding issues of excessive speculation resulting from derivatives trading. Amidst this backdrop, it is important to lay out a comprehensive agenda for research in the area of commodity derivatives in India which is relatively new as compared to other countries.

LITERATURE REVIEW

The performance of commodities futures market can be evaluated using certain broad parameters which include basis risk, price discovery, and impact of futures trading on spot price volatility. Review of existing literature, which has been done with respect to these parameters, is an attempt to identify the issues that can form the basis of this study.

Basis in context of futures market is the difference between future and spot price and it assumes importance because it is fundamental to the understanding of the most important functions of futures market viz. hedging. The risk that futures and spot prices may not change by the same amount is called **basis risk** and is measured as variance of basis. Therefore, an understanding of basis is very useful for the hedging activity to be successful. A few studies have been examined to understand the risk arising due to basis variation.

Theoretical considerations indicate that risk in basis behavior may vary over the contract life as new information becomes available and as it impacts on futures and general level of cash prices. Change in local demand and supply conditions results in different levels of basis risk in various

markets. On these lines Garcia, Leuthold and Sarhan (1984) have attempted to measure and analyze within contract basis for selected livestock commodities (cattle & hogs) and ascertain the variations in basis across different markets and as contract approaches maturity. Using Variate Difference approach and regression analysis they found that not much difference was observed in basis risk at different market locations. However, as contract approached maturity evidence was found of lower levels of risk in basis behavior indicating increased market information and activity near maturity influences both futures & cash position in a similar manner. Therefore, producers & market participants who hedge are advised to ascertain the level & long term pattern of prices. This will help in identifying period of high basis risk & lead to better production and marketing strategies.

Informational content of the basis using barley, oats and canola futures was studied by Khoury and Yourougou (1991) by measuring the relative responsiveness of the basis and of the futures prices to new information. If the ratio of the variance of the basis to cash price changes is much larger than that of futures to cash price changes, one might expect the basis to have a greater forecasting power than the futures. Results suggest that the futures market for the commodities under study is used as the primary point of price discovery and in this sense they are consistent with the informational content hypothesis of the basis. They also demonstrate that the basis provides statistically reliable information about cash prices several weeks before maturity. Therefore prices are discovered in futures markets, and then transmitted to cash markets.

Decision to hedge depends on the hedgers forecast of closing basis & whether it represents an attractive opportunity as compared to opening basis. Castelino (1992) has used Wheat and corn futures along with financial futures of T-Bill and Eurodollar for a period from Jan 1983 to Dec 1985 and calculated minimum variance hedge ratios using simple regression analysis. It was observed that a substantial risk reduction is possible through minimum variance hedging for T – bills and Eurodollar contracts whereas it is very less in case of commodities. Minimum variance hedge ratios possess a time dimension. They are low for hedges lifted far from contract expiration and increase as the hedge lifting date approaches the contract expiration. Existence of minimum variance hedge ratio does not imply that hedge should be used at all times. The major factor in hedging decisions is anticipation of favorable change in basis.

Netz (1996) has measured the impact of basis risk (unexpected changes in basis over time) on cash market position with corn as the underlying. Basis risk needs importance because very few contracts in the futures market are settled through physical delivery. Stockists' profits are a function

of variance of basis. Basis risk will negatively impact his cash position. Results indicated that basis risk reduces the level of storage. Faced with greater basis risk the agents reduce their exposure by reducing the level of inventory. Basis risk reduces the effectiveness of futures as a risk management tool or managing price risk. A one standard deviation increase in basis risk is associated with a decline in storage by between 1% and 14% of a standard deviation, depending on the location.

Garcia and Sanders (1996) studied basis risk in live hogs futures market to test whether basis volatility has increased over the last decade at selected terminal and direct markets. They used RMSE(root mean square error) as a measure of basis risk and tested it by using procedures set forth by Ashley, Granger and Schmalensee. Henrikson Merton Timing Test was used to check whether basis had a positive or negative sign. Results indicated that in the two markets live hog prices behaved similarly and that there was no meaningful difference in basis. Monthly basis variance was rather stable in the period 1975-94. Therefore the usefulness of live hog contracts had not declined due to unfavorable nature of basis behavior. The demand for use of futures contract as hedging instruments may have decreased due to other factors such as change in structure of hog industry with movements towards alternative and less costly means of managing price risk.

In the study on castor seed futures market in India from 1985 to 1999 Karande (2006) found that Basis risk as indicated by RMSE is lower for June contract as all information regarding supply of castor seed is available much before trading begins. It is opposite for December contract. Lower RMSE for Ahmadabad market is due to higher futures trading volume.

Price discovery is another important function of futures market and it hinges on whether new information in the market is reflected first in the changes in futures prices or changes in spot prices (Hoffman 1932). Through price discovery futures market establish a competitive reference (future) price from which spot price can be derived. Futures prices serve as the market expectations of subsequent spot prices and can be used by exporters, producers including farmers for optimal decision making and resource allocation. Price discovery function of futures market has been studied extensively using various underlying and at different time periods.

Garbade and Silber (1983) examined the characteristics of price movements in spot market and futures market for storable commodities and found that in general futures contract do not provide a perfect risk transfer facilities in the short time horizon. With respect to price discovery role of futures market evidence was found of information flow from futures to spot market. However,

reverse information flow from cash market to futures market was also observed. They also found that market size and liquidity played a positive role in the price discovery function.

Oellermann and Farris (1985) investigated lead lag relation between change in futures and spot price for live beef cattle between 1966 and 1982. The futures price led spot price during nearly every sub period analyzed. Based on Granger causality test for various sub samples of their data, they conclude that change in live cattle futures price led change in live cattle spot price. They also found that the spot market responded to change in futures price within one trading day. The authors conclude that futures market was the centre of price discovery for live cattle. They suggest that a likely explanation for the results is that the futures market serves as a focal point for information assimilation. They conclude that the cattle futures market contributes towards a more efficient price discovery process in the underlying spot market for live beef cattle.

Indian futures market has gone through a tumultuous period and researchers have tried to examine the various aspects related to future market efficiency. Karande (2006) in his doctoral thesis has examined the efficiency of castor seed futures market and the results of co integration analysis revealed that both Mumbai and Ahmedabad exchanges performed the function of price discovery. Also the introduction of castor seed futures market at Mumbai and Ahmedabad has had a beneficial effect on the castor seed spot price volatility. Thus, there is a strong case for promoting derivative markets in India.

Raizada and Sahi (2006) studied the efficiency of wheat futures contract at NCDEX with horizon varying from 1 week to three months. Results of Johanson's co integration tests revealed that wheat futures market is even in weak form inefficient and fails to perform the price discovery function. Future price one month before maturity is cointegrated with spot price, but future price two and three months before maturity are not cointegrated with spot price that is to say that future prices have relationship with spot prices only when closer to maturity. Spot market plays the leading role and captures the market information faster. They have also suggested that trading volume in commodity futures market along with other factors, have a significant impact on country's inflationary pressure.

Ahuja (2006) indicated that futures market especially for agricultural commodities are still in developing state and therefore there is an immediate need to address certain unresolved issues related to derivatives market such as introduction of more market based instruments like

commodity options, sophistication & privatization of Warehouses and standardization of products, role of regulator convergence of securities and commodities derivatives markets & removal of tax and legal bottlenecks.

Lokare (2007) has tried to test the efficacy and performance of commodity derivatives in steering the price risk management for agricultural commodities as well as metals. Almost all the commodities show evidence of co-integration in both spot and future prices, indicating their march towards improved operational efficiency, *albeit*, at a slower pace. In the case of some commodities, however, the volatility in the future price was substantially lower than the spot price indicating an inefficient utilization of information. Basis risk measured as the ratio of standard deviation of basis to the spot price in the maturity was high in respect of gur, mustard, wheat, etc. indicating that hedging in their case was less effective.

Instead of analyzing individual commodities Bose (2008) used notional price indices of commodity markets covering metals, energy and agricultural products. Results of JJ cointegration indicated that future indices of metals & energy provided more or less accurate information of future spot prices at least a month ahead.. However, for agricultural commodities group, the futures price index seems to indicate the future spot price best when looked at about a week to a fortnight prior to the date for which the spot price is of interest. Thus they do provide valuable information for the future spot prices. Energy and metal indices exhibit informational efficiency of commodity futures market with stabilizing effect on volatility of underlying market. However, agricultural indices fail to exhibit the feature of market efficiency and price discovery. There remains a possibility of improving these markets (and the socio-economic conditions of the small producers) by developing trading interests in futures (as a financial instrument).

Ghosh (2010) has tested the efficiency of wheat futures market by determining whether future price of wheat can be used as reference and the impact of volatility of future prices on physical markets. Narela Mandi at Delhi which has highest trading volume in Delhi & its prices are considered as indicative prices in India was studied for spot market prices and Vector Autoregression and Granger causality tests were conducted. Results gave little evidence to suggest that futures price serves as reference price for transacting contracts in the physical market, and therefore futures market volatility cannot lead to volatility in the physical market. The level of liquidity was low in the futures markets, as the markets were not only bereft of speculative volumes, it did not even seem to have served the purpose of hedgers. Hence it is not possible for a thin market, bereft of

adequate participation and liquidity, to provide a forum for discovering the reference price for the physical market, and thus it cannot destabilize the latter. Price volatility in the physical market or the volume of arrivals in that market do not play any role in determining volume of trading in the futures markets and that the two markets are independent.

Another debatable issue is the impact of future trading on the prices in underlying spot market. Critics of futures market claim that it destabilizes the spot market by increasing Spot price volatility as it attracts new speculators who do provide liquidity but can also create noise in the underlying spot market if they are less informed than the traders existing in the market. The other view is that spot market volatility decreases due to the liquidity provided by speculators. This additional liquidity allows spot traders to hedge their positions and curb volatility. Informational efficiency of futures market stabilizes the spot market. Early research on the effect of futures trading in commodities has generally concluded that the existence of a futures market tends to stabilize price in the spot market. Two papers on the onion market by Gray (1963) and Working (1960) found that futures trading reduced the range between high and low spot price over a crop year. A study of live cattle futures by Taylor (1974) compared the variance of price between a period with and without futures trading and found that the spot price was more stable when futures market was in existence.

Antoniou and Foster (1992) empirically investigated the effects of the introduction of a futures contract for Brent Crude Oil in 1988 on spot price volatility of Brent Crude in UK. The results of GARCH models indicated that introduction of futures market improved the quality of information flowing to the spot market & accordingly spot prices reflect more promptly changes that occur in demand & supply information. Similar results were indicated by GARCH M model & hence no volatility spillover was found from futures to spot market in case of Brent Crude Oil. Results of regression analysis revealed no apparent change in volatility after introduction of futures contract

Karande (2006) in Indian context also found a beneficial impact of futures trading on spot market volatility of castorseed futures market. However, in India futures trading for some food grain commodities has faced ban from time to time because of increased speculative activity leading to soaring prices. Studying the impact of futures trading on spot prices of wheat, urad and gram Nath and Ligareddy (2008) found that futures trading had a destabilizing effect on spot market. Results of regression, correlation and Granger Causality indicated that introduction of futures trading led to increase in price of urad significantly. Spot prices of these commodities declined after the ban on futures trading was introduced. Price volatility was also increased during the period, when trading

in futures was allowed. Wheat price increased in post futures period but the same was also coincided by steep fall in supply. Therefore, they believed that the suspicion of futures trading contributing for a rise in inflation appears to have no merit in the present context.

Abhijit Sen(2008) reported that though agricultural price inflation accelerated during the post futures period, it does not necessarily mean that this was caused by futures trading. One reason for the acceleration of price increase in the post futures period was that the immediate pre-futures period had been one of relatively low agricultural prices, reflecting an international downturn in commodity prices. A part of the acceleration in the post futures period may be due to rebound/recovery of the past trend. The period during which futures-trading has been in operation is too short to discriminate adequately between the effect of opening up of futures markets and what might simply be the normal cyclical adjustment. Indian data analysed did not show any clear evidence of either reduced or increased volatility of spot prices due to futures trading.

In relation to futures market another interesting issue that emerges is the existence of arbitrage opportunities. Arbitrage is a fascinating process and is like money lying on the road waiting to be picked. If the actual futures price differs from its theoretical price (fair price), such mispricing provides riskless arbitraging opportunities. In an efficient market such opportunities cannot sustain for long. The trick of the trade is in being able to spot the opportunity quickly. Empirical examination of arbitrage opportunity in commodities is desirable in an attempt to test the futures market efficiency.

In futures market, mispricings are generally a short term phenomenon and have important implications for hedgers and arbitrageurs. Vipul (2005) studied the time pattern of mispricing in NIFTY & 6 selected stocks using non-parametric tests including the Kruskal-Wallis test and the Mann-Whitney test. There are many sizeable arbitrage opportunities available to the traders who are willing to take a counterparty position opposite to the market demand. Such opportunities and their magnitude keep changing over time. An arbitrage opportunity is likely to go down in the last week before expiry because squaring up of short positions by hedgers creates sufficient demand of long position in futures market. One cannot expect more such opportunities on a particular day of the week.

Manir, Bhatt and Maniyar (2007) estimated lead-lag relationships between the cash NSE index, options and futures and found that futures returns lead both options and cash index returns by

approximately 10 minutes. Relationship between the likelihood of arbitrage opportunity and the size of bid-ask spreads in the futures and options markets suggest that the reason for the appearance of some arbitrage opportunities is that arbitrageurs would not step into the market when the spread is large. Therefore those seeming arbitrage opportunities might in fact be not profitable.

Study conducted by Gupta and Singh (2009) using high frequency data from April 2003 to March 2007 observed at five minutes interval finds strong and stable long-run co movement between futures and spot markets of Nifty and 50 individual stocks. On maturity date price convergence does take place. However, during short-run, significant violations of equilibrium relationship have been observed, which implies that significant volatility spillover from one market to other takes place. Granger Causality results further suggest that Indian equity futures market dominates the information assimilation process in the Indian capital market. Though price discovery takes place in both markets but Indian equity futures market has been found to be strongly causing the Indian cash market. In addition, it has been found that both markets observe significant lead-lag relationship whose duration varies in the range of five to fifty five minutes. Mispricing is negatively associated with days to expiry, which supports the argument that traders instead of unwinding their positions on the maturity date, either exercise early liquidation option or rollover their position to the next contract cycle. Friday offers maximum number of arbitrage opportunities.

Gurbandini (2010) also confirmed the existence of arbitrage opportunities in pepper and guar contracts which were not found to be fairly priced. However, the exploitability of arbitrage opportunities depends on their magnitude and timing.

Efficiency of metals futures market has been tested by researchers worldwide, but even there results have not been conclusive and especially in India there is still a lot of scope for further effort to explore this aspect so that we may have a developed and dynamic futures market which can keep pace with the growing needs of industrialization of Indian economy.

Empirically testing both the long run and short run efficiency of Copper Futures market from London Futures Exchange, Kenourgios and Samitas (2004) found that copper futures market on the London Metal Exchange was inefficient and the three and fifteen months of futures prices did not provide unbiased estimates of the future spot prices in both the long-run and short-run. Markets offered opportunities for making consistent speculative profits. However, Leming and Oun (2010) have found evidence of price discovery in case of steel rebar futures and steel wire rod futures at

SHFE (Shanghai Futures Exchange). The Steel Rebar futures play major role in price discovery and can be used for hedging risk when the trading volume is high. With a low trading volume, the steel wire rod futures have less effect than spots in price discovery.

In Indian context, Srinivasan and Deo (2009) investigated the temporal lead lag and causality between gold spot and futures market using Cointegration and Vector Error Correction Model (VECM). The findings suggested unidirectional causality running from spot to futures market in long-run dynamics and spot market serves as a primary market for price discovery. Results indicate that the price innovations are first aggregate in spot market and then transmitted to futures market, because the investors are still not familiar with futures commodity market, it is due to the infancy of commodity products. Hence, the spot market was found to be leading the futures market. Using the same VECM Chaihetphon, Pavabutr examined price discovery of standard and mini gold futures on MCX from 2003 to 2007. Their findings revealed that futures price leads spot price, indicating that price discovery occurs in the futures market. Mini contracts help contribute to price discovery despite their relatively smaller trading quantity. This is expected to be a consequence of efficient transmission of information among traders in small contracts as they tend to trade more frequently. Standard gold futures contracts on the MCX remain the key source of price discovery and liquidity. Mini contracts aid price discovery and serve smaller participants. Iyer and Pillai (2010) found evidence of price discovery in case of copper, gold and silver futures market. Two-regime TVAR framework developed by Garbade et al. is used to quantify the price discovery process. The results indicate that the rate of convergence is instantaneous for above commodities during the expiration week affirming the utility of futures contract as an effective hedging tool. In the non expiration week the rate of convergence of information is slow. Also, in case of chickpeas, nickel and rubber the convergence worsens during the expiration week indicating non usability of futures contract for hedging.

Much of the research on commodity futures markets in India has relied on econometric framework for analysing the relationship between the movements in futures and spot prices. This has given a very limited perspective to the dynamic nature of such markets. By and large the research has been done on similar lines as the stock markets which are assumed to follow EMH (efficient market hypothesis) i.e. there is free flow of information from one market to another. However, how much of this is applicable in Indian context is still beset with doubts. Also, it should be distinctly remembered that commodity exchanges are very different from stock exchanges. Stock prices are determined in the centralized locations of stock exchanges, whereas in case of commodities, there

are fragmented local markets where prices are determined according to the quality, output, seasonal forecasts etc. Essence of commodity futures markets is hedging whereas it is not so for stock markets. Hence it is imperative to undertake research in commodity derivatives market in such a way that there is a rational blend of sophisticated econometric techniques together with the study of market microstructure and value chain of individual commodities. An attempt in this direction will set the pace for promoting derivatives in commodities market further.

COMMODITY FUTURES MARKETS IN INDIA - CHALLENGES AHEAD

- **Strong support of Information & Communication Technology:** According to Jignesh Shah, former Managing Director & CEO, MCX "To emerge as a globally competitive exchange, it is essential to have cutting edge technology infrastructure that delivers highest levels of transaction processing capabilities." GOI has taken progressive steps towards the introduction of technology through the establishment of online trading exchanges which have helped in integrating the participants of commodity trading with the markets. Our national exchanges are well equipped with state of art online digital technology for commodity trading. Computer networking of the traders and the exchange is done through satellite based network (VSAT) or dedicated leased line from the service provider. This ensures processing of a large number of transactions in a short span of time. However, if the prospective expansion of derivatives market happens through the introduction of commodity index futures & options trading and entry of banks, mutual funds and FIIs, existing infrastructure will have to be upgraded to take the massive load. It is important that ICT is able to connect those potential stakeholders who are directly involved in commodity trading but are left out due to limited reach of technology in remote areas of Indian markets.
- **Integrating Commodity Derivatives market with the underlying Physical Market:** The major hurdle for the development of derivatives market is that the physical markets are fragmented, located in far flung rural areas not having access to the modern derivatives market. This is one of the causes for lack of liquidity in the futures market. The awareness drive initiated by FMC (Forward Market Commission) needs to be strengthened by conducting trainings, awareness programmes etc. The physical markets need to be modernized by amending the APMC Act.

- **Warehousing Reforms:** The present warehousing capacity in India is not sufficient to meet the increasing storage demand. CWC (Central Warehousing System), one of the biggest public sector warehouse operator in India has a storage capacity of 9.93 MT with 464 warehouses and 18 regional offices. This is far short of the demand of rapidly expanding country. Therefore, warehousing is one area which needs attention on a war footing together with reforms in the warehouse receipt system to facilitate the trading participants in their financial needs.
- **Introduction of Options in Commodity Derivatives Trading:** With proper surveillance and monitoring mechanism and exhaustive reporting system a thought can be given to the introduction of options in commodity trading so that the participants can reap full benefits of hedging through derivatives. In futures trading they are able to hedge the risk arising due to unfavorable price movements but they cannot take position to gain from the favorable price movements. Options will give them this choice .
- **Regulators Powers:** Presently FMC-the regulator of commodity derivatives, functions under the Ministry of Consumer Affairs, Food & Public Distribution. In view of the colossal task of handling derivatives trading in commodities whose volume has surpassed that of Equities, the powers of FMC should be increased. It should be allowed to function as an autonomous body like SEBI and take decisions that in the best interest of stakeholders of commodity markets.
- In addition to the above mentioned focus areas there are a host of reforms required including introduction and promotion of far month contracts to hedge the risk in commodities that are seasonal in nature, removal of tax and legal bottlenecks, strengthening the regional exchanges and efficient clearing & settlement system.

CONCLUSION

Commodity prices are very critical for the existence & growth of any industry and for the economy as a whole. Our government has brought about sweeping reforms in the commodities markets so that industry can efficiently manage the price risk they are faced with. This was the rationale behind promoting and encouraging futures markets for commodities. However, Indian markets are still nascent compared to their counterparts in US and China. Many apprehensions prevent average traders from using them for mitigating the uncertainties under which they do business. With

increasing demand the strain on commodities is going to increase in the times to come. Commodity prices will continue to behave unpredictably. Risk management through commodity derivatives will give stability to the economic activities of the country. Therefore, extensive research is required in this area to continuously bring out issues that need to be attended for the growth and development of commodities market.

Notes

¹ <http://www.oxfordfutures.com/history.htm> assessed on 2.05.11

² <http://www.thecityuk.com/media/216938/commodities%20trading%202011.pdf> accessed on 2.05.11

³ Task Force on Commodity Futures Markets, Report to the Financial Stability Board, Technical committee of the International Organization of Securities Commissions, OR01/11, April 2011.

⁴ The report of “*The Expert Committee to study the Impact of Futures Trading on Agricultural Prices*” 2008.

⁵ <http://www.ibef.org/economy/agriculture.aspx> accessed on 2.05.11

⁶ Government of India (September 2003) Draft report of the inter-ministerial task force on convergence of securities and commodity derivative markets, *Ministry of Consumer Affairs, Food and Public Distribution*, New Delhi.

⁷ Annual Report of FMC 2009-10

REFERENCES

Abhijit Sen(2008), ‘Report of the Expert Committee To Study the Impact of Futures Trading on Agriculture Commodity Prices’, submitted to Ministry of Consumer Affairs, Food & Public Distribution Government of India.

Ahuja, N. L. (2006); Commodity Derivatives Market in India: Development, Regulation and Future Prospects; International Research Journal of Finance and Economics; Issue 2

Aggarwal Rai, Sundararaghavan P.S.(1987),Efficiency of Silver Futures Market-An empirical study using daily data, Journal of Banking & Finance,11(1).

Antoniou A, J. F. Andrew(1992), The Effect Of Futures Trading On Spot Price Volatility : Evidence For Brent Crude Oil Using Garch; Journal of Bunness Finance & Accounting, 19(4)

Bose, S (2008); Commodity Futures Market in India - A Study of Trends in the Notional Multi-Commodity Indices; ICRA Bulletin of Money and Finance

Charles M. Oellermann and Paul L. Farris (1985) Futures or cash: which market leads live beef cattle, prices? The Journal of Futures Markets 5(4)

Dhuyvetter K.C., Swanser K., Kastens T., Mintert J., Crosby B.(2008), Improving Feeder Cattle Basis Forecasts, Selected paper for 2008 Western Agricultural Economics Association Meeting, Big Sky, MT.

Garbade, K. D. and Silber, William L. (1983) Price movements and price discovery in futures and cash markets, The Review of Economics and Statistics 65(2)

Ghosh Nilanjan (2008); Price Discovery in Commodity Markets: Floated Myths, Flouted Realities Commodity Vision, Volume 1, Issue 3.

Ghosh Nilanjan (2009); Issues and Concerns of Commodities Derivatives Markets in India: An agenda for further research; Working paper No.5

Ghosh, Nilanjan (2010); Role of thin commodity futures market in physical markets price making: An analysis of wheat futures in India in post ban era; Working Paper No.6.

Gupta.K., Singh Balwinder (2009); Price Discovery and Arbitrage Efficiency of Indian Equity Futures and Cash Markets; Working Paper.

Gurbandini Kaur, Rao D.N(2010) .; Do the spot prices influence the pricing of future contracts? An empirical study of price volatility of future contracts of select agricultural commodities traded on NCDEX; Journal of Management Research, Vol. 10, No. 2, pp. 116-132

G. S. Taylor and Raymond M. Leuthold (1974) The influence of futures trading on cash cattle price variations, Food Research Institute Studies 13 29–35

Holbrook Working (1960) Price effects of futures trading, Food Research Institute Studies 1 3–31

Iyer V., Pillai.A.(2010), Price Discovery and Convergence in Indian Commodities Market, Indian Growth and Development Review, Vol.3 No.1, 53-61

Janet S. Netz (1996); An empirical test of the effect of basis risk on cash market positions, The Journal of Futures Markets 16(3) 289–311

Kenourgios F.Dimitris, Samitas G. Aristeidis (2004), Testing Efficiency of the Copper Futures Market: New Evidence from London Metal Exchange, Global Business and Economics Review, Anthology.

Khalifa Ahmed A.A, Miao Hong, Ramchander S. (2011), Return Distribution and Volatility Forecasting in Metal Futures Market: Evidence from Gold, Silver and Copper, Journal of Futures Market, Vol. 31, No. 1, 55–80.

Khoury N.T., and Yourougou P.(1991), The Informational Content of the Basis: Evidence from Canadian Barley, Oats, and Canola Futures Markets, *The Journal of Futures Markets*, 11(1), 69-80.

Kiran Karande (2006), A Study of Castorseed Futures Market in India, Doctoral, Indira Gandhi Institute of Development Research Mumbai, India

Lokare, S. M. (2007); *Commodity Derivatives and Price Risk Management: An Empirical Anecdote*; Reserve Bank of India Occasional Papers, Vol. 28, No. 2

Maniar.H.M.,Maniyar D.M.,Bhatt Rajesh (2007), Arbitrage Opputunities in Intraday Trading between Futures, Options and Cash Markets-A case study on NSE India, 10th Indian Institute of Capital Markets Conference Paper.

Mark G. Castelino (1992) Hedge effectiveness: basis risk and minimum variance hedging, *The Journal of Futures Markets* 12(2) 187–201

Mukherjee,KN(2010); Impact of Trading on Indian Agricultural Commodity Market, Research Project at National Institute of Bank Management, <http://ssrn.com/abstract=1763910>

Nabil T. Khoury and Pierre Yourougou (1991) The informational content of the basis: evidence from Canadian barley oats and canola futures markets, *The Journal of Futures Markets* 11(1) 69–80

Nath, G. C. and Lingareddy, T. (2008), Commodity derivative market and its Impact on Spot Market, Working Paper Series.

Philip Garcia, Raymond M. Leuthold and Mohamed E. Sarhan (1984) Basis risk: measurement and analysis of basis fluctuations for selected livestock markets, *American Journal of Agricultural Economics* 66(4), 499–504

Philip Garcia and Dwight R. Sanders (1996) Ex ante basis risk in the live hog futures contract: has hedgers' risk increased?, *The Journal of Futures Markets* 16(4), 421–40

Raizada, G. and Sahi, G.S. (2006); *Commodity Futures Market Efficiency in India and Effect on Inflation*; Working Paper, Indian Institute of Management (Lucknow), India.

Roger Gray (1963) Onions revisited, *Journal of Farm Economics* 45 273–76.

Srinivasan, Deo(2009), The Temporal Lead Lag and Causality between Spot and Futures Markets: Evidence from Multi Commodity Exchange of India, *International Review of Applied Financial Issues and Economics*, Vol. 1, No. 1, 2009

S. Jackline, Malabika Deo (2011), Lead Lag Relationship between Futures and Spot Prices, *Journal of Economics and International Finance*, Vol. 3(7), 424-427

UNCTAD Trade & Development Report (2011), By the secretariat of the United Nations Conference on Trade and Development, New York and Geneva.

Vipul (2005), Temporal variations in futures mispricing, *Vikalpa*, 30(4)

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Volume 2, No.2.1 Quarter I 2012

ISSN: 2231-3699

Vipul (2008), Mispricing, Volume, Volatility and Open Interest : Evidence from Indian Futures Market, *Journal of Emerging Market Finance*, 7 : 3,263–92

Tang Lemin, Zhang Oun (2010), Study on the Price Discovery Function of China Steel Futures, *Management and Service Science(MASS)*, 2010 International Conference, Wuhan

Paschke. R and Marcel.P (2009), Investing in Commodity Futures Markets: Can Pricing Models Help? Conference of the Swiss Society for Financial Market Research 2009, Geneva, <http://ssrn.com/abstract=1348470>