"A STUDY OF PROSPECTS OF AGRICULTURAL COMMODITY FUTURES IN INDIA – A CASE OF TURMERIC"

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Abstract

A commodity exchange is defined as a market where buyers and sellers trade commodity linked contracts on the basis of terms and conditions laid down by Commodity Exchange (UNCTAD, 2007). At present, there are 23 exchanges operating in India and carrying out futures trading activities in as many as 146 commodity items. As per the recommendation of the Forward Market Commission (FMC), the Government of India recognized the National Multi-Commodity Exchange (NMCE), Ahmedabad, Multi-Commodity Exchange (MCX) and National Commodity and Derivative Exchange (NCDEX), Mumbai, as nation-wide multi-commodity exchanges. NMCE commenced in November 2002 and MCX in November 2003 and NCDEX in December 2003. In an emerging market context like India, the growth of capital and commodity future market would depend on effectiveness of derivatives in managing risk. There have been extensive research and commodity future markets in several countries across the world. However, reviews of literature on commodity future markets indicate that while there has been research on technical questions, the research has had inefficient economic content. Thus our paper focuses the studying correlation between spot and future price for commodity market, turmeric in particular.

Keywords: *national Multi-Commodity Exchange, Multi-Commodity Exchange, National Commodity and Derivative Exchange, Spot Price, Future Price, Arbitrage,*

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1. INTRODUCTION

A commodity exchange is defined as a market where buyers and sellers trade commodity linked contracts on the basis of terms and conditions laid down by Commodity Exchange (UNCTAD, 2007).

The history of organized commodity derivatives in India goes back to the nineteenth century when the Cotton Trade Association started futures trading in 1875, barely about a decade after the commodity derivatives started in Chicago. Over time the derivatives market developed in several other commodities in India. Following cotton, derivatives trading started in oilseeds in Bombay (1900), raw jute and jute goods in Calcutta (1912), wheat in Hapur (1913) and in Bullion in Bombay (1920). However, banning of option in cotton in 1939 to curb widespread speculation, stringent price control by government in mid 1940s, suspension of forward trading in several commodities like jute, edible oil, cotton etc. in 1960 due to fear of increase in commodity price, reflected the turbulence in the commodity market over the years.

Due to the importance of commodity production and consumption in India, it was necessary to develop the commodity market with proper regulatory mechanism for efficiency and optimal resource allocation. Thus, after independence, the parliament passed Forward Contracts (Regulation) Act, 1952, on the basis of the recommendations of the Shroff Committee providing legal framework for organized forward trading. The Act applies to goods, which are defined as any movable property other than security, currency and actionable claims. The Act prohibited options trading in goods along with cash settlements of forward trades, rendering a crushing blow to the commodity derivatives market. Under the Act, only those associations/exchanges, which are granted recognition by the government, are allowed to organize forward trading in regulated commodities.

The Act envisages three-tier regulation: (i) The Exchange which organizes forward trading in commodities can regulate trading on a day-to-day basis; (ii) the Forward Markets Commission provides regulatory oversight under the powers delegated to it by the central Government, and (iii) the Central Government – Department of Consumer Affairs, Ministry of consumer Affairs, Food and Public Distribution – is the ultimate regulatory authority. The first organized future trading was by India Pepper and Spices Trade Association (IPSTA) in Cochin in 1957. However, futures trade was prohibited in most of the commodities thereafter. Since then both the Dantawala Committee (1966) and the Khusro Committee (1980) have recommended the revival of futures trading in agricultural commodities.

After the 1991 reforms, the government set up a Committee in 1993 headed by Dr.K N Kabra to examine the role of futures. The committee recommended that futures trading in 17 commodities be permitted. Further, National Agricultural Policy (2000) and the expert committee on strengthening and developing Agricultural Marketing (2001, Guru Committee) supported commodity futures trading. In February 2003, the government revoked the ban and accepted most of these recommendations allowing futures trading in 54 commodities in bullion and agricultural sectors. Responding positively to the favourable policy changes, several Nationwide Multi-Commodity Exchanges (MNCE) were up since 2002, using modern practices such as electronic trading and clearing. The Forward Markets Commission (FMC) regulates these exchanges.

At present, there are 23 exchanges operating in India and carrying out futures trading activities in as many as 146 commodity items. As per the recommendation of the FMC, the Government of India recognized the National Multi-Commodity Exchange (NMCE), Ahmedabad, Multi-Commodity Exchange (MCX) and National Commodity and Derivative Exchange (NCDEX), Mumbai, as nation-wide multi-commodity exchanges. NMCE commenced in November 2002 and MCX in November 2003 and NCDEX in December 2003.Unlike the stock markets, the commodity markets in India have a single product (only futures) and a single user (only traders including corporates). In this short span since commodity future commodity “futures” trading was permitted in

2003, the commodity derivative market in India has witnessed phenomenal growth. During this period, volumes traded at various commodity exchanges in India have grown since 2004-05 to reach Rs 40.65 lakh crore in 2007-08.

Existence of vibrant, active and liquid commodity market is considered as healthy sign for development of economy. In an emerging market context like India, the growth of capital and commodity future market would depend on effectiveness of derivatives in managing risk. Like any other derivative, future contracts can be used as an insurance against unfavorable price fluctuation.

However the linkage needed for long term robust growth of the markets, including wide participation and awareness of the markets and its functioning among policy makers and the opinion makers on the one hand and at the grass root level on the other are inadequate. Other constraining factors include the lack of well spread spot markets, availability of easily accessible research material and intelligence on market trends in respect of various commodities. Also, as in any other emerging markets, there is little research in commodity derivative sector resulting in poor understanding of dynamics of the commodity markets.

Thus our research focuses on studying the correlation between spot and future prices for commodity market. In our paper focus would be only on turmeric as a commodity. India being the largest producer, consumer and exporter of turmeric, has 185.32 lakh hectres under turmeric cultivation with a total production of 701.66 lakh tones. The total turnover for commodity turmeric traded on in NCDEX platform as on August 19, 2009 is Rs 30,336/- (Rs in lakhs).

This study would also through light on the scope of arbitrage possibility for turmeric commodities. Scope of our paper would include all contracts of turmeric traded from Jan.2005 to June 2009.

2. REVIEW OF LITERATURE

Beginning with Massell (1970), most empirical studies attempted to measure unanticipated price movements employing various de-trending schemes which sometimes led to contradictory results [Glezakos (1973), Knudsen and Parnes (1975) Lam (1980) or Cuddy & Della Valle (1978) and Mac Bean and Nguyen (1980)]. The study finds that in India future trading in the selected commodities had apparently led to increase in prices of commodity [Golaka C.Nath, Tulsi Lingarrddy, (2008)].

During the last 4-5 years the Indian stocks as well as commodity markets have grown considerably. The studies have explored the advantages of adding commodities to a portfolio of equities in Indian context [Alok Kumar Mishra, (2008)]. Bose (2007) found than Indian stock markets are more volatile as compared to developed markets. Indian commodity future markets are going through many ups and downs and allegations of speculative activity have been made.

Also, Yabuki & Akiyama (1996) examined export revenue of 12 major primary commodities in developing countries and found that 8 out of 12 commodities show significantly higher price effect than quantity effects.

There are few studies on the performance and efficiency of Indian commodity derivatives market. Despite a considerable amount of empirical literature, there is no general consensus on whether or not the markets are efficient. The study done in Washington suggest that for certain commodities expected excess returns to future speculation are non zero, though researchers also argue that these results do not necessarily imply that markets are inefficient [Graciela Kaminsky, (1989)]. The efficiency test of agricultural commodity future market was also done in China by Hong Wang (2005) and Bingfanke (2005). The results suggest a long term equilibrium relationship between the future price and cash price for Soya beans and weak short term efficiency in Soya bean future market.

The result also showed future market for wheat as inefficient, which may be caused by over speculation and government intervention. A study by Lokare (2007) finds that although Indian commodity market is yet to achieve minimum critical liquidity in some commodities (sugar, pepper, gur and groundnut), almost all the commodities show an evidence of co-integration between spot and future prices revealing the right direction of achieving the improved operational efficiency, though at a slower rate. Further hedging proves to be effective in respect of some commodities. However, in a few commodities, the volatility in future price has been substantially lower than the spot price indicating an inefficient utilization of information. Thomas (2003) reports that major stumbling blocks in the development of derivatives market are the fragmented spot markets. Because of fragmentation, prices of major commodities vary widely across Mandis. These differences arise because of poor grading, differential rates of taxes and levies and inadequacy of storage facilities (Bhattacharya, 2007). Experts have not only studied the commodity future market efficiency in India but also analyze its effects on social welfare and inflation in the economy. The result showed that commodity future market in not efficient in the short run. Also the growth in commodity futures markets leads to social loss and significantly impacts inflation in the economy (Gurpreet S Sahi, Gaurav Kaizada, 2006). In addition, Gary B. Gorton (2005) and K.Geert Rouwenhorst (2005) stated that commodity futures are positively correlated with inflation, unexpected inflation and change in expected inflation.

Many researchers have defined hedging effectiveness as the extent of reduction in variances as a risk minimization problem (Jhonson, 1960, Ederington, 1979). However, Rolfo (1980) and Anderson and Danthine (1981) calculated optimal hedge ratio by maximizing traders' expected utility, which is determined by both expected return and variance of portfolio. Hedging effectiveness of future markets is one of the important determinants of success of future contracts (Silber,1985, Pennings & Meulenberg, (1997). Role of hedging for minimizing the risk of market fluctuations have been extensively researched. Several distinct approaches have been developed to estimate the optimal hedge ratio. Techniques like OLS, VAR, and VECM estimate constant hedge ratio and bivariate GARCH models estimates dynamic hedge ratios which factor in conditional

distribution of spot and future returns. However, there has been extensive debate on which model generates the best hedging performance (Baillie & Myers, 1991; Ghosh, 1993; Park & Switzer, 1995; Kavussanos & Nomikos, 2000; Lien et al., 2002; Floros & Vougas, 2006). Superior performance of bivariate GARCH models was supported by Baillie and Myers (1991), Park and Switzer, (1995), Kavussanos and Nomikos, (2000), Floros and Vougas (2006) etc. Ghosh (1993), however, found better performance of VECM among constant hedge models and Lien et al. (2002) found that the basic OLS approach clearly dominates other alternatives.

In 1950 Prebisch (1950) and Singer (1950) independently offered the hypothesis that, because of differing elasticity's of income and demand, prices for primary commodity export would fall relative to manufactured imports.

As the poor performance of stabilization schemes became more evident, writers began to emphasize the distinction between policies that attempted to change the distribution of prices internationally or domestically with policies of managing uncertainty using markets for price risk. McKinnon explored the use of futures markets as an alternative to buffer stocks in 1967. Later Gilbert (1985) demonstrated that hedging on forward markets could substitute for some of the welfare gains normally associated with buffer stocks. Gemmill (1985) argued that futures markets for cocoa, coffee, and sugar would provide an attractive mechanism for hedging export earnings risks and that forward contracts could be substantially cheaper than buffer stock operations. O'Hara (1984) looked at the use of commodity bonds to stabilize consumption. Rolfo (1980) investigated the use of futures for cocoa producing prices and calculates the optimal hedge ratio in the presence of both production (output) and price volatility. Overdahl (1986) demonstrated the benefits of oil futures markets for oil producing states. Kletzer, Newbery and Wright (1990) proposed financial instruments to smooth commodity export revenue and Claessens (1991) has pointed out that commodity bonds can be used to hedge debt management problems associated with volatile export earnings.

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 context of Indian commodity futures. 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. Floros and Vougas (2006) studied the hedging effectiveness in Greek Stock index futures market for the period of 1991-2001 and found that time varying hedge ratio estimated by GARCH model provides highest variance reduction as compared to the other methods. 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. 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%).

The literature review reflects that there has been some work regarding fluctuation and volatility in commodity market and also many experts have discussed hedging as risk minimization tool. There has been extensive research on the commodity future markets in several countries across the world. These research findings will be the starting point of research in India. Reviews of the literature on commodity futures markets indicate that while there has been widespread research on technical questions, the research has had inefficient economic content. There is a need to contribute to the academic literature with special attention on working of future markets in the Indian context. The relation and extent between spot price and future price needs to be studied. Also some light on arbitrage possibility can be thrown by studying the pattern of future prices both open and close.

3. OBJECTIVES

Based on the research gap presented above, the following objectives have been set in the context of Turmeric for National Commodity & Derivatives Exchange Ltd. (NCDEX):

1. To study of relationship between the spot and future price for turmeric
2. To study the scope of arbitrage in the agricultural market in India.

4. HYPOTHESES

Hypothesis 1 :

H_0 : There is no significant relationship between spot and future price for turmeric.
H_1 : There is significant relationship between spot and future price for turmeric.

Hypothesis 2 :

H_0 : The difference between spot open, close price and future open , close price is not significant. for turmeric.
H_1 : The difference between spot open, close price and future open , close price is significant. for turmeric.

5. METHOD

Considering the nature of research problem and the objectives, exploratory research method is adapted as the proposed research relies much on secondary research such as reviewing available literature and/or data. The data collected has been analyzed and tabulated in suitable form, keeping in view of the objectives of the study.

5.1 Sample of the study

NCDEX which is considered as prime national level commodity exchange is selected for the study. The research would concentrate on all the contracts during the timeframe from January 2005 to June 2009 for turmeric. The date for spot and future prices for turmeric are recorded on daily trade basis.

5.2 Tools for Data Analysis

1. Correlation technique would be used to find -
   (i) Relation between spot close and future open price of turmeric.
   (ii) Relation between difference in open and close price of future contracts and in difference open and close price of spot contracts.
2. Regression would be used to find the extent of relation between the above two, if any.
3. Standard deviation would be used to study the scope of arbitrage for turmeric.

6 RESULTS AND ANALYSIS

6.1 Correlation Analysis

The future open, close, and spot open, close prices were recorded from Jan.2005 to June 2009 for all the trading days. Correlation between future open and spot close was applied and the following result were obtained.

Table-1: Correlation between F(O) & S (C)

	S(C)
F(O) Pearson Correlation	.987
Sig. (2-tailed)	.000
N	966

From Table 1 we see that the correlation between future (O) and Spot (C) is .987 and p-value of two tailed test of significance is less than .0005 (value less than .0005 are shown as 0.000 is SPSS). From this figure we conclude that there is a strong positive correlation between Future (O), Spot (C) and this correlation is significant at significance level of 0.01 and hence we accept H_1 of hypothesis-1.

Table-2: Correlation between ΔF (O, C) & ΔS (O,C)

	ΔS(O,C)
ΔF(O,C) Pearson Correlation	.321
Sig. (2-tailed)	.000
N	966

Table 2 shows that the correlation coefficient between the difference in opening and closing price of future contract and the difference in opening and closing price of spot contract is less (.321) and is significant at one percent level implying that difference in opening and closing price of spot on day N – 1 does not influence the difference in opening and closing price of future contract on day N. Hence we accept H_0 of hypothesis-2.

To study the extent of relation or dependence of future open price on spot close price, regression was carried between them.

6.2 Regression analysis

Regression Technique as a tool is used to find the extent of relation between variables and also to make predictions for future. The theoretical equation we derive from regression model is as follows.

Regression between F(O) & S (C)

Variable	Coefficient	Std. Error	t- Statistic	Sig
Constant	47.064	15.392	3.058	.002
S(C)	.989	.005	191.564	.000

R squared .974
Adjusted R Squared .974

Y = 47.06 + .989 X

The above equation is of form Y = a+bX, Where Y is dependent variable (future open price), 47.06 is the intercept, .989 is the slope of the line and X is the independent variable (spot close price). The regression coefficient here gives us an idea of spot close price.

The slope of line b tells us how much change we can expect in the criterion variable /independent, given a unit change in the predictor variable/independent variable.

Therefore, our slope reflects 98.9% change in future open price is due to spot close price.

The regression equation is also useful for predicting the dependent variable/criterion. The most popular summary measure of this is R^2 (also known as coefficient of

determination). If R^2 = 0 then there is no relationship between predictor and criterion variables. In this case R^2 = .974, explains 97.4% of total variation observed in the dependent variable. Thus only 2.6% of total variation in the dependent variable (future open) remains unexplained by the regression equation.

Standard Deviation F (O) , F (C)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
F(O)	966	1736	5538	2845.54	941.34
F(C)	966	1673	5520	2846.66	944.38
Valid N (listwise)	966				

To study the scope of arbitrage standard deviation between future open and close price was calculated. The results indicate that there is not much difference between the mean and standard deviation in the opening and closing price of future contracts therefore, not much arbitrage opportunity exists. The low arbitrage opportunity is nullified by the transaction cost.

7. Conclusion:

The result and conclusion is the most important part of any research work. After analyzing the data we come to the conclusion that there is strong correlation between spot close price and future open price for turmeric commodity. Thus spot closing price on the previous day (N-1) influences the opening price of future contract on the next day (day N). Though some relation is not found between difference in opening and closing price of future contract and the difference in opening and closing price of spot contract.

Furthermore, the research showed not much arbitrage opportunity to exist in the turmeric product due to very minute difference between standard deviation in the opening and closing price of future contract.

The above conclusion shows that trader can make use of knowledge about spot close price to estimate the future price in commodity market.

8. Limitation of the study:

1 .This paper is limited to Turmeric commodity. Research can be conducted for other commodities and results can be generalized for commodity market.

2. Though the arbitrage possibility is not found in case of Turmeric, however it cannot be generalized for other commodities.

9. Scope for Future Research:

1. Further research on major agricultural commodities can be done

2. Other issues like if commodity future market is fairly priced or not can be studied.

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