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Price Discovery in Commodity Future Market: A Case Study of Rubber

COMMERCE

KEYWORDS : Price discovery, Spot market, Futures market

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ABSTRACT

Rubber is an elastic hydrocarbon polymer that is derived from latex of some plants. The collection of the latex is called tapping. Rubber tree or Para tree is Hevea brasiliensis which is from family Euphorbiaceae and is the most important source of Natural Rubber. It originates from Amazon forests, though it derives its name from Para, one of the states of Brazil. In a competitive environment, where supplies are uncertain and prices frequently move up and down, there is a need for protection from losses. There are various ways to cope with this problem. Apart from increasing the stability of the market, various participants in the farm sector can better manage their activities in an environment of stable prices through derivative markets. Futures trade assumes significance in a volatile ready market and price risk management because of the price discovery. The study was undertaken with the objectives of analysing the price behaviour in Spot and Future market for Rubber, to examine the efficiency of price discovery in Indian Rubber market and to compare the price discovery during pre recession and post recession. For this purpose daily price data of rubber futures and spot markets were collected during the year 2004-2014 and analysed, using descriptive mean, variance and Vector Auto Regression model.

INTRODUCTION

Natural Rubber (NR) is produced from latex or field coagulum obtained from rubber trees planted in plantations. The most important forms in which Natural Rubber is processed and marketed are the following: Sheets, Crepes, Block rubber and Preserved Latex Concentrates. Thailand, Indonesia, Malaysia, India, Vietnam are the major producers of rubber in the World.

Commodity futures have been trading in India since 1800 (Thomas and Varma, 2010), which points to an economic need for these contracts that has been present for a long time. Futures trade assumes significance in a volatile ready market and price risk management because of the price discovery. The price discovery is the process of determining the price of a commodity, based on supply and demand factors. The expectations theory hypothesises that the current futures price is a consensus forecast of the value of the ready (spot) price in the future. The performance of price discovery function can be measured from the temporal relation between futures and spot prices. The causal relation investigates whether the spot market leads the futures market or the futures market leads the spot market or whether there exists bidirectional relation between the two markets. If information is first reflected in futures price and later in spot price, futures price should lead spot price indicating that the futures market performs the price discovery function. An important component in understanding and managing market price risk for different commodities is identifying and comparing the relationship between futures market and spot market. Since Rubber has been one of the prominent trading commodities in Indian commodity market, a study focusing the nexus between spot and future markets for Rubber indeed a significantly in judging the price discovery functions of Indian commodity market.

Objective of the study

1. To analyse the price behaviour in Spot and Future market for Rubber
2. To examine the efficiency of price discovery in Indian Rubber market.
3. To compare the Price discovery in Commodity Future market during Pre recession and Post recession Period.

Research Methodology

Time series data of daily futures and spot prices of Rubber for a period of ten years (2004-2014) have been used for the study. The study is purely based on secondary data. The secondary data collected from the official website of National Multi Commodity Exchanges (NMCE). Descriptive statistics have computed for both spot and future prices. Vector autoregressive (VAR) method is used for assessing the short run causality between spot and future prices of Rubber.

DATA ANALYSIS AND INTERPRETATION

The data analysis which made in this chapter is divided into two parts. First part deals with descriptive properties of data. Second part verifies the short run causality between spot and future market.

The average daily price change in spot and future market during the period 2004-2009 reveals the Indian Rubber received maximum price on daily basis during the year 2009. Both spot and future markets have produced almost similar results during that year. In the years 2007 and 2013 both markets registered least price changes. The prices of Rubber terrifically crashed in 2014. The trend in price movement was almost similar in both markets during the period of observation.

The rubber futures showed highest price volatility in 2008. The spot market also showed same rate of fluctuation in the same year. In the year 2013, both the spot and futures market were more stable. During the pre-recession period (2004-2008) rubber futures was highly volatile compared to the post recession period (2008-2014).

On analysing the monthly price movements of Indian Rubber market, it was observed that the Indian Rubber got consecutive price appreciation until 2009 in both market segments. The years 2008 and 2009 were really beneficial for Rubber producers of India. But during the post recession period the Rubber prices on monthly basis was in downturn. The condition was most vulnerable during the 2014.

The Indian Rubber market was relatively more volatile during the pre recession period of 2004-2008. The price volatility was extremely high in 2006 and trend has continued two to three years also. But during the second phase of study (2009-2014) the volatility was at lower scale, even though the prices of Rubber were at its bottom.

It was seen in the daily price movement in Indian Rubber market, the maximum change in annual price of Indian Rubber was happened in the year 2009 (i.e. 8.97 in the future to 9.49 in the spot). In 2010 also the prices of Indian Rubber appreciated significantly. But from the year 2011 onwards the price trend was totally negative causing distress to thousands of Indian Rubber farmers. One important point to be noted here is that during most of the years Indian Rubber price change was in negative terrain.

Price discovery in Rubber Futures market: short run causality analysis using Vector Auto Regression (VAR) results.

This part exclusively deals with the analysis of short run causality between spot market and future markets for Indian Rubber. The analysis has been made by splitting and post recession phase (2009-2014).

Table 1 Causality from spot market to future market: Pre-recession phase

	Coefficient	Std. Error	t-ratio	p-value	
Const	-0.057716	0.0429659	-1.3433	0.17945	
future_pre_re_1	0.0212018	0.0319502	0.6636	0.50709	
future_pre_re_2	-0.0226276	0.0365778	-0.6186	0.53629	
future_pre_re_3	-0.0116886	0.0369522	-0.3163	0.75182	
future_pre_re_4	0.049491	0.0359696	1.3759	0.16912	
spot_pre_retu_1	-0.042103	0.0435987	-0.9657	0.33440	
spot_pre_retu_2	0.0073208	0.0438015	0.1671	0.86729	
spot_pre_retu_3	0.0510978	0.0425964	1.1996	0.23055	
spot_pre_retu_4	0.0399624	0.0377468	1.0587	0.28996	

Source: Compiled from Secondary data

The table 1 shows using the lag period 4, the study has analysed the causal relations running from spot market to future markets for Rubber. The analysis could not find causal relations between two markets at any of the selected lags. The spot market price movement of Rubber could not impact of future market prices during the pre recession period.

Table 2 Causality from future market to spot markets: Pre recession phase

	Coefficient	Std. Error	t-ratio	p-value	
Const	0.0871497	0.0314382	2.7721	0.00566	***
future_pre_re_1	0.414565	0.023378	17.7331	<0.00001	***
future_pre_re_2	0.184178	0.026764	6.8816	<0.00001	***
future_pre_re_3	0.101926	0.0270379	3.7697	0.00017	***
future_pre_re_4	0.0429606	0.026319	1.6323	0.10289	
spot_pre_retu_1	-0.183477	0.0319012	-5.7514	<0.00001	***
spot_pre_retu_2	-0.0208581	0.0320496	-0.6508	0.51530	
spot_pre_retu_3	0.0215169	0.0311678	0.6904	0.49011	
spot_pre_retu_4	0.0501505	0.0276194	1.8158	0.06967	*

Source: Compiled from Secondary data

The table 2 gives the result of VAR analysis investigating the causal relation directed from future markets to spot markets during pre recession. During this period the price movements in future market also could not discover the prices in spot market.

Table 3 Causality from Spot markets to future markets: Post recession phase

	Coefficient	Std. Error	t-ratio	p-value	
Const	-0.0458294	0.0320431	-1.4302	0.15285	
future_post_r_1	0.0237018	0.0276429	0.8574	0.39134	
future_post_r_2	0.0762851	0.0329232	2.3171	0.02063	**
future_post_r_3	-0.0188971	0.0333898	-0.5660	0.57151	
future_post_r_4	0.0262114	0.0333912	0.7850	0.43258	
spot_post_ret_1	-0.0668821	0.044737	-1.4950	0.13511	
spot_post_ret_2	0.0244662	0.0447374	0.5469	0.58454	
spot_post_ret_3	0.0448962	0.0445692	1.0073	0.31393	
spot_post_ret_4	-0.0058589	0.04411	-0.1328	0.89435	

Source: Compiled from Secondary data

The Table 3 we have selected lag 4 using lag selection criterions. No empirical evidence with regard to the causal nexus from spot markets to future markets could be produced by the analysis. Rather price movements in Rubber market is affected by its 2 days lag price in the market.

Table 4 Causality from future markets to spot market: Post recession phase

	Coefficient	Std. Error	t-ratio	p-value	
Const	0.0402642	0.0198132	2.0322	0.04230	**
future_post_r_1	0.405596	0.0170925	23.7295	<0.00001	***
future_post_r_2	0.140765	0.0203574	6.9147	<0.00001	***
future_post_r_3	0.0359485	0.0206459	1.7412	0.08185	*
future_post_r_4	0.0162896	0.0206467	0.7890	0.43025	
spot_post_ret_1	-0.0508649	0.0276622	-1.8388	0.06614	*
spot_post_ret_2	-0.0400827	0.0276625	-1.4490	0.14754	
spot_post_ret_3	0.0452219	0.0275585	1.6409	0.10101	
spot_post_ret_4	0.0176986	0.0272745	0.6489	0.51649	
spot_post_ret_5	-0.016929	0.022426	-0.7549	0.45043	

Source: Compiled from Secondary

The Table 4 show produces substantive evidence for the Price discovery function of Indian Rubber market. The spot price of Rubber is affected by the future prices at all lag observed.

Table 5 Causality from Spot market to future market: overall period of analysis.

	Coefficient	Std. Error	t-ratio	p-value	
Const	-0.0642337	0.0313785	-2.0471	0.04075	**
future_all_re_1	0.0513848	0.0244179	2.1044	0.03544	**
future_all_re_2	0.00765339	0.0269647	0.2838	0.77656	
future_all_re_3	-0.0571013	0.0271613	-2.1023	0.03562	**
future_all_re_4	0.028562	0.0271305	1.0528	0.29254	
spot_all_retu_1	-0.0442837	0.0306244	-1.4460	0.14829	

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spot_all_retu_2	0.043936	0.0310216	1.4163	0.15680	
spot_all_retu_3	0.031217	0.0309651	1.0081	0.31348	
spot_all_retu_4	-0.0491698	0.0306242	-1.6056	0.10848	

Source: Compiled from Secondary data

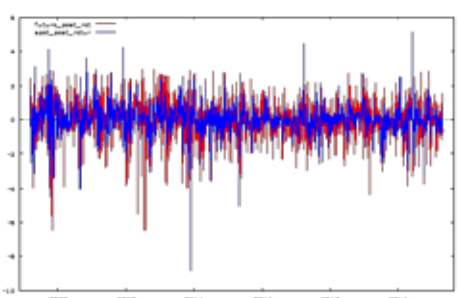
Table 6 Causality from future market to spot market: overall period of analysis

	Coefficient	Std. Error	t-ratio	p-value	
Const	0.0536708	0.0250331	2.1440	0.03212	**
future_all_re_1	0.399372	0.0194801	20.5016	<0.00001	***
future_all_re_2	0.146454	0.0215119	6.8081	<0.00001	***
future_all_re_3	0.057836	0.0216687	2.6691	0.00765	***
future_all_re_4	0.028751	0.0216441	1.3284	0.18417	
spot_all_retu_1	-0.187292	0.0244315	-7.6660	<0.00001	***
spot_all_retu_2	-0.0744818	0.0247484	-3.0096	0.00264	***
spot_all_retu_3	-0.0014133	0.0247033	-0.0572	0.95438	
spot_all_retu_4	-0.0130195	0.0244313	-0.5329	0.59414	

Source: Compiled from Secondary data

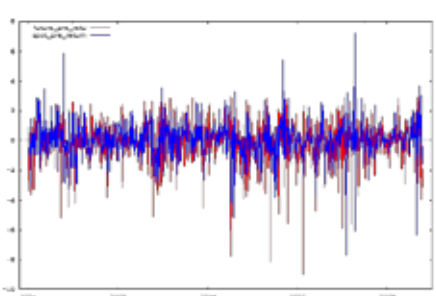
On observing the results in Table 5 and Table 6, we can confirm that the future market for Rubber is much efficient in impacting the price movement in its spot market. It shows the discovering the prices of Rubber spot market. So the analysis of the current price movements in future markets for Rubber can definitely helpful for the farmers and traders of Indian Rubber to design their trading strategies thereby can estimate the potential gains or losses from the market.

Figure 1 Price movements in Spot and Future markets for Indian Rubber: Post recession periods



Source: Compiled from Secondary data

Figure 2 Price movements in Spot and Future markets for Indian Rubber:



Pre recession periods

Source: Compiled from Secondary data

RESULTS OF THE STUDY

The major findings of the study are summarized in to two heads;

- Price behaviour in Spot and Future market for Rubber and
- Price discovery in Rubber Futures market

Price behaviour in Spot and Future market for Rubber

1. The Indian Rubber received maximum price on daily basis during the year 2009. Both spot and future markets have produced almost similar results during that year.
2. In the years 2007 and 2013 spot and future markets registered least price changes
3. Daily price volatility during the period 2004-2014, rubber futures showed highest price volatility in 2008.
4. In the year 2013, both the spot and futures market are more stable.
5. During the pre-recession period (2004-2008) rubber futures was highly volatile compared to the post recession period (2008-2014).
6. On observing monthly price movements of Indian Rubber market, the Indian Rubber got consecutive price appreciation until 2009 in both market segments.
7. During the post recession period the Rubber prices on monthly basis was in downturn. The condition was most vulnerable during the 2014.
8. On considering the monthly price movements of Indian Rubber market was relatively more volatile during the pre recession period of 2004-2008.
9. The price volatility was extremely high in 2006.
10. But during the second phase of study (2009-2014) the volatility was at lower scale, even though the prices of Rubber were at its bottom.
11. In Indian Rubber market, the maximum change in annual price of Indian Rubber was happened in the year 2009.
12. From the year 2011 onwards the price trend was totally negative causing distress to thousands of Indian Rubber farmers
13. During most of the years Indian Rubber price change was in negative terrain.
14. Price discovery in Rubber Futures market
15. The spot market price movement of Rubber could not impact of future market prices during the pre recession period.
16. During pre recession period the price movements in future market also could not discover the prices in spot market.
17. No empirical evidence with regard to the causal nexus from spot markets to future markets during post recession period.
18. Rather price movements in future market is affected by its 2 days lag price in the market during post recession period.
19. Substantive evidence for the Price discovery functions of Indian Rubber market. The spot price of Rubber is affected by the future prices at all lag observed during post recession period. It shows the discovering the prices of Rubber spot market.
20. Analysis of the current price movements in future markets for Rubber can definitely helpful for the farmers and traders of Indian Rubber to design their trading strategies thereby can estimate the potential gains or losses from the market.

CONCLUSION

The significance of price discovery depends upon a close relationship between futures and spot price. The performance of price discovery function can be measured from the temporal relation between futures and spot prices. The causal relation investigates whether the spot market leads the futures market or

the futures market leads the spot market or whether there exists bidirectional relation between the two markets. If information is first reflected in futures price and later in spot price, futures price should lead spot price indicating that the futures market performs the price discovery function. It is useful to the producer because he can get an idea of the price likely to prevail at a future point of time and therefore, can decide between various competing commodities and choose the best that suits him. It enables the consumer to get an idea of the price at which the commodity would be available at a future point of time. The futures trading is also much useful to the exporters as it provides an advance indication of the price likely to prevail and thereby helps the exporter in quoting a realistic price and secure export contract in a competitive market. Here the study reveals that during the post recession period the Rubber futures play its inherent function of price discovery. So the participants in the market can trust futures market prices to predict the spot price movements. That helps them to reduce the risk of their portfolio.

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