

Role of Commodity Futures Trading in Triggering Commodity Spot Prices in India - A Study with the Crop Potato

Dr. Bidisha (Sarkar) Datta

Faculty
Department of Commerce
Sivanath Sastri College
Kolkata, West Bengal

Abstract

Commodity derivatives markets in India have been growing at stupendous rates since its full fledged allowance in 2003. However it has always remained under the scanner for its alleged role in triggering prices in the corresponding spot markets. This has also led to off and on bans on trading of accused commodities. This paper aims to investigate into the role of derivatives trading in triggering the spot prices. The methodology adopted looks into whether the spot returns in the selected commodity potato has changed after introduction of futures trading in comparison to the periods when trading was absent. The findings suggest that there has been no statistically significant change in returns or variances in periods where futures was allowed and when it was not being done. The article concludes that potato futures trading has not impacted the potato spot prices in India.

Keywords: Commodity Derivatives, Spot Price, ANOVA, Kruskal Wallis Test

Introduction

Commodity Futures trading has found its wings post liberalization, specifically post 2003 and have traversed great heights in growth of volumes and turn over. However the futures markets are simultaneously thwart with allegations as to their role in hiking the prices in the spot markets thus adding to the woes of ordinary people who are no way related to futures trading. The coexistence of two contrasting facts and opinions where one states factually the growth potential of the commodity derivatives markets and another strongly opines of its adverse impact on the spot prices calls for a closer look into the matter. Hence the topic has been chosen for this paper.

What are commodity futures?

'Futures' are standardised financial contracts traded on a futures exchange. A futures contract is an agreement to buy or sell a certain quantity of an underlying asset at a certain time in the future at a predetermined price. They carry with them legally binding obligations. These contracts are standardised in terms of quality, quantity and settlement dates.

At the time of trading of the futures contract actual delivery of goods does not take place. The trader, whether he is a hedger, speculator or arbitrageur, only anticipates the future direction of the price of the underlying asset, which may be a commodity, foreign exchange,

bonds, money market instruments, equity or any other item. The terms "buy" and "sell" only indicate the direction the trader expects future prices to take, i.e. he would buy it if he expects the price of the underlying asset to rise in the future and sell if he expects it to fall. The price at which the contract is traded in the futures market is called the futures price.

Commodity futures have commodity as their underlying asset and hence derive values from the prices of commodities. Commodity derivatives exchanges provide a platform where traders and investors from various parts of the country (/world) can participate in the hedging and price discovery of any listed commodity. Futures contract is marked to market, which means that there is a settlement and corresponding transfer of funds at the end of each trading day. Buyers and sellers have the obligation to take or make delivery of the underlying commodity at a specified price on the settlement date in the future.

Brief look into the evolution of commodity futures

Although the growth of commodity derivatives trading is witnessed in the recent times, and even more recently in India, its global origin can be traced back to ancient Greece in 6th century b.c. Aristotle had made a mention of a story as to how the Greek philosopher Thalys made handsome profits on using an 'instrument' which is similar to our modern 'options contract'. Historians cite the evidence of future delivery types of contracts existing in Babylonia several centuries b.c. Some texts show the presence and usage of derivative contracts in the Mahabharata era too. There is some evidence of rice futures being traded in China about 6000 years ago. Evidence has been found regarding prevalence of forwards contracts between traders in the medieval European trade fairs too. In the 12th century, a period of flourishing trade, merchants created a forward contract called 'lettre de faire' (letter of the fair). The merchant traded on the basis of samples using the letter as the negotiating instrument. This relived them of the risk of carrying their merchandise across long distances without the guarantee of it being bought. The letter served as the evidence that the full consignment of the traded commodity is held at a ware house for future delivery. Later, these letters which acted as contracts itself were traded amongst the traders. Although the medieval era had shown great efficiency in establishing standards and devising grading and inspection process, the concept of centralized exchanges were not prevalent then. The first recorded futures trading occurred in rice in 17th century in Japan. This was during the Edo period when the feudal Japanese landlords used to ship rice to storage warehouses to Osaka, thereafter they used to issue tickets termed rice tickets in order to raise cash. The tickets indicated a promise of delivery of rice at a future date. The buyer of the rice tickets had the right to take delivery of the specified quantity of rice on a specified date at a predecided price. Moving forward to

the 19th century Chicago thrived as the buzzing commodity forwards market. Subsequently in 1848, Chicago board of trade (CBOT) appeared as the debutant in the category of organised futures exchange. CBOT marked the era of modern day commodity futures exchanges. In the Indian context Bombay Cotton Trade association established in 1875 was the first futures exchange in India. It was set up soon after the establishment of cotton trade in the UK since Bombay was the hub of cotton trade in the British Empire. In 1893 Bombay Cotton Exchange Limited was established following great discontent amongst the owners and merchants over the functioning of the Bombay Cotton Trade association. Thereafter in 1900 futures trading in oilseeds started through the Gujarati Vyapari Mandali. Futures trading in groundnut castor seed, cotton picked up pace from this exchange. Several places and Punjab and up were already using wheat future trading. In 1913 futures exchange for wheat was established at chamber of commerce, Hapur. Trading in bullion futures marked its entry in 1920 in Bombay. In 1919, Calcutta hessian exchange was established for future trading in raw jute and jute goods, however organized futures trading in raw jute started only in 1927 post the establishment of East Indian jute association ltd. In 1945 these two associations amalgamated and generated East India Jute and Hessian Ltd. The turbulent history of Indian commodity markets jolted when in 1939, Government of Bombay curbed option trading in cotton to curb wide scale speculation. In 1947, in order to closely monitor the crisis situation Bombay forward contracts control act was enacted. Further on adoption of the Constitution of the Republic, the subject, "Stock Exchanges and Futures Markets" was included in the Union List. From 1940 to 1960 the prevailing scarcity situation in the country posed as serious hurdles to development of futures and forwards trading. Price controls implemented by government made forwards trading difficult. Forwards contract (regulation) act was enacted in 1952, and the regulatory body for forward markets 'forward markets commission' was set up in 1953 under the ministry of consumer affairs, food and public distribution. Forward Contracts (Regulation) Rules were notified by the Central Government in July, 1954

After liberalization of the Indian economy in 1991, steps were taken to liberalize commodity futures markets too. Various groups and committees had reform measures suggested for the development of the futures market. But by that time it was difficult to bring back the trade from the illegal black markets, as they had zero tax liability and no reporting requirements to the legal authorities. This was beneficial as the legal markets necessitated payments of taxes and reporting of information. Responding to the need of the commodity markets, Kabra committee was set up in 1993, much of whose recommendations have been implemented.

This was the first report post liberalization and it recommended opening of futures trading in 17 commodities although not too unanimous in the decision. However it had absolute unanimity in not recommending wheat, pulses, non-basmati rice, tea, coffee, dry chilli, maize, vanaspati and sugar for futures trading. In 1996 UNCTAD and World Bank joint Mission Report "India: Managing Price Risk in India's Liberalized Agriculture: Can Futures Market Help?" emphasised on the role of futures market in price risk management. They also highlighted on the necessity of strengthening the capacity of the regulator and exchanges for efficient market performance. The national agricultural policy of 2000 and The Expert Committee on Strengthening and Developing Agricultural Marketing (Guru Committee) in 2001 aimed for price risk management as well as marketing of agricultural produce. Thereafter, the budget speech of the hon'ble finance minister in 2002-2003 were indicative of the government's intention to put in place a mechanism of the futures trading /market . The last group of 54 trading commodities was opened up for trading. Three national level multi commodity exchanges were established and recognised and large numbers of regional exchanges too were given clearances for trading in commodities which were previously debarred from trading.

Objective of the paper

As mentioned earlier in the introduction part, this paper intends to closely look whether commodity futures that have been so prominent through ages have actually triggered the spot prices in the recent days. If yes, the issue need to be addressed, if no, then it should be allowed to flourish and not strangled by off and on bans as is the case in the present.

Sample selection and data collection

The paper has done the analysis with the crop potato. Potato has been chosen since this crop is widely used across all states in India thus vouching for its importance. Potato is a very popular starchy, edible tuber that is cultivated throughout the world and is consumed as a major staple food. This food crop occurs underground, in the stem of the plant on which it is grown. Potato plant comes from the family of Solanaceae and is long lasting in nature. After wheat, rice and maize, potato is the most important food crop in the world. Although potato is primarily used as a food item and is cooked as vegetable or made as potato chips, roast, fried etc, it has many other uses too. It is used in making potato vodka and wine too. Also ice creams are made these days. It is used in a number of beauty and medicine products too. Off late it is making its presence felt in soap production too.

Potatoes are grown in about 150 countries throughout the world and more than a billion people worldwide eat potato. The top ten potato producers in the world are China, Russia, USA, Ukraine, Poland, Germany, Belarus, Netherlands and France. Because of its importance it is always under the

scanner and it had been banned, after its introduction and thereafter futures has resumed in the crop again. This gives us different phases to investigate. The major potato exporting countries according to volumes exported are Netherlands ,Germany ,Egypt ,USA ,Turkey ,Poland ,Indonesia ,Argentina ,Morocco ,Russia ,Syrian Arab Republic ,Colombia ,China ,Iran ,India . Netherlands is also the leading potato importing country in the world. The other major importing countries of potatoes are Netherlands ,Germany ,USA ,Algeria ,Brazil ,Russia ,Egypt ,Iraq ,Morocco ,Cuba ,Mexico ,Poland ,Turkey . The international potato trade has now become more competitive with the entry of many developing countries. To survive this severe competition, these countries have to adopt new and improved technologies to raise their yield levels. Some organizations like Centro Internacional De La Papa (CIP) are working on providing new technology tools and machines that are used in potato cultivation to the farmers who cannot afford them. In the Indian subcontinent, potato is grown largely as rabi crop. The following three crops are raised per year in the country pertaining to different weather conditions in different areas

Summer crop –Planting is done in the months of March and April and harvesting is done in the months of August and September.

Autumn crop – Planting is done in the months of August and September and harvesting in December and January.

Spring crop – Planting is done in the months of January and February and harvesting in May and June.

India ranks 4th in area and it is the 3rd largest country in world in production of potato after China and Russian Federation. Major potato producing states in India are Uttar Pradesh ,Punjab ,Haryana ,West Bengal ,Madhya Pradesh ,Bihar ,Andhra Pradesh ,Tamil Nadu ,Gujarat ,Assam ,Karnataka ,Uttaranchal . Potatoes were not produced in India till in the 17th century. The Portuguese introduced this crop and cultivated it in Surat for the first time. Then on it spread over all of India quite rapidly. The countries to which India export potatoes are Sri Lanka ,Nepal ,Mauritius ,Singapore ,United Arab Emirates ,Japan . The imports of this crop in the country are negligible since its own production is fairly huge.

Market Influencing Factors

- Fluctuations in production levels in the country
- Fluctuations in weather conditions
- Prices of competitive vegetables
- Demand level from the various areas of the country
- Development stages of the crop
- Transportation charges
- Hoarding and Black-marketing

Government intervention

The central government doesn't fix up MSP on potato, however the state government depending on the situation often allow MSP on the crop, since it is a prime commodity consumed by large number of people, and very crucial for consumption by the poor.

Potato futures trading

Potato futures were allowed for uninterrupted trading since 1985. However following high food price inflation potato futures were banned from may 2008 to December 2008. But noticeable fact was that the potato prices were declining at the time of the ban. Farmers, traders' community including the FMC chairman stated the ban to be unreasonable. In fact it was apprehended by many sections that the ban would lead to poorer price discovery. MCX launched potato futures in March 2006 and NCDEX in July 2006. Amongst regional exchanges, the chamber of commerce, Hapur, trade in potato futures.

Objectives of the study

The objective of taking up the work is to understand whether the spot market prices of commodities have actually risen or triggered post introduction of futures in the commodity sector.

Review of literature

A number of works have been conducted to verify whether a commodity derivative trading stabilizes or destabilizes the spot markets. Hart (1977) showed that a sophisticated speculator could destabilize the futures prices by exploiting the naïve forecasting technique of less sophisticated speculator. Studies by Figlewski, 1981; Clifton; 1985; Grammatikos and Saunders, 1986 have criticized the futures market for destabilising the spot markets. On the other hand according to Turnovsky and Campbell (1985), since forward markets reduce the price risk of holding inventories, larger inventories are held and prices tend to stabilize as consequence. Gilbert (1989) and Netz (1995) have all found that the variance of cash prices decreased substantially after futures market began. Hence literatures cite works on both stabilizing and destabilizing nature of derivatives markets. The present work adds to the literature by investigating the issue by a different and very simple method. Hence the newness of the work lies in its method.

Methodology

The methodology includes studying the mean gross spot returns as well as the inflation adjusted spot returns in periods when futures were present and when it was not present.

Gross spot returns have been calculated by the following formula

Gross spot returns=Lognormal (spot pricet /spot pricet-

1)*100

Inflation adjusted spot returns have been calculated using the following formula

Inflation adjusted spot returns = (((1+ (gross returnst/100))/ (1+WPI inflationt/100)))-

1)*100....eq 3.2

Lognormal of returns were taken since returns are calculated as continuously compounded.

Hypothesis framed are as follows:

Hypothesis 1

Null hypothesis H01= Mean gross spot returns on potato prices in the pre futures period =Mean gross spot returns on potato prices in the post futures period.

Alternative hypothesis H11= mean gross spot returns are not equal in the pre and post futures periods.

Hypothesis 2

Null hypothesis H02= Mean inflation adjusted spot returns on potato prices in the pre futures period = Mean inflation adjusted spot returns on potato prices in post futures period.

Alternative hypothesis H12= mean inflation adjusted spot returns are not equal in the pre and post futures phases.

Hypothesis 3

Null hypothesis H03= Mean variance in gross spot returns on potato prices are equal in the pre and post futures phases.

Alternative hypothesis H13= mean variance in gross spot returns are not equal in the pre and post futures phases.

Hypothesis 4

Null hypothesis H04= Mean variance in inflation adjusted spot returns are equal in pre and post futures phases.

Alternative hypothesis H14= mean variance in inflation adjusted spot returns are not equal in the phases.

The data had been collated in MS Excel and thereafter the required tests were conducted in SPSS.

Period of data considered

Since MCX was the first electronic exchange to have launched potato futures, the date of launch i.e. March 2006 has been considered to be the cut off period used to define pre and post futures period. However potato futures were banned from may 2008 to December 2008. Therefore for turmeric the pre futures period has been taken to be from April 1994 to February 2006 thereafter the futures trading period is from march 2006 to April 2008 then the ban period is from May 2008 to December 2008. And futures resumption is from January 2009 to March 2010. In the analysis, the pre futures period has been referred to as period

1 and the futures trading period has been referred to as period 2. The period of ban is referred as period 3 and the futures resumption period is period 4

Data source

Since spot price data for the mentioned period could not be found from some authentic source, hence it has been substituted with the WPI indexed price series of turmeric, with the base year 1993-1994. The same base year has been considered for the entire period, hence no error will arise owing to base effect. WPI price of potato and the WPI of all

commodities have been taken from the website of the office of economic advisor.

Results and discussions

Analysis and Findings for Hypothesis 1

Normality tests conducted on the four returns series, i.e. the pre futures gross spot returns (Period 1) and the post futures gross spot returns (period 2), ban period spot returns (period 3) and futures resumption (period 4) revealed that 3 series are non normal.

Table 1a

Tests of Normality							
period for potato		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
gross returns inclusive of inflation for potato	1	.105	142	.001	.949	142	.000
	2	.160	26	.085	.882	26	.006
	3	.368	8	.002	.763	8	.011
	4	.158	15	.200*	.926	15	.241
*. This is a lower bound of the true significance.							
a. Lilliefors Significance Correction							

The significance values (as per table 1c) for the first three periods are less than alpha(5% and 1%), thus suggesting that the null hypothesis of normality cannot be accepted .Since

the series were found to be non normal Kruskal Wallis test was conducted to check the equality of means in the pre and post futures periods.

Table 1b

Ranks			
period for potato	N	Mean Rank	
gross returns inclusive of inflation for potato	1	142	96.56
	2	26	96.38
	3	8	81.38
	4	15	97.80
	Total	191	

Table 1c

Test Statistics ^{a,b}	
	gross returns inclusive of inflation for potato
Chi-Square	.592
df	3
Asymp. Sig.	.898
a. Kruskal Wallis Test	
b. Grouping Variable: period for potato	

The p value of .898(in Table 1c) suggest acceptance of the null hypothesis 1 and hence we conclude there has been no

significant change in the mean gross spot returns in periods when futures was present and when it was not present.

Table 2a

Tests of Normality							
period for potato		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
inflation adjusted return for potato	1	.106	142	.001	.949	142	.000
	2	.147	26	.157	.887	26	.008
	3	.245	8	.171	.800	8	.029
	4	.175	15	.200*	.921	15	.198
*. This is a lower bound of the true significance.							
a. Lilliefors Significance Correction							

Since some of the series were found to be normal and some non normal, hence both ANOVA as well as Kruskal Wallis test was conducted to check the equality of means in the pre and post futures periods.

Table 2 b

ANOVA					
gross returns inclusive of inflation for potato					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	37.059	3	12.353	.041	.989
Within Groups	56894.455	187	304.248		
Total	56931.513	190			

The ANOVA test results for checking equality of means in the four periods suggest a p value greater than alpha, thus accepting the null hypothesis at both 1% and 5% levels suggesting that there is no significant difference in mean returns in the various phases where futures trading was present and was not present.

There after multiple comparisons were checked through Post-Hoc Tukey tests and the results as shown in Table 2c and Table 2d depict no significant difference in mean on individual comparison of mean returns of different periods too.

Table 2 c

Multiple Comparisons						
Dependent Variable: gross returns inclusive of inflation for potato						
Tukey HSD						
(I) period for potato		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-.0679315749800	3.7208140052214	1.000	-9.713330145969	9.577466996009
	3	1.8071881333662	6.3382684656463	.992	14.623390099058	18.237766365790
	4	.9931857404329	4.7355910489312	.997	11.282800931314	13.269172412180
2	1	.0679315749800	3.7208140052214	1.000	-9.577466996009	9.713330145969
	3	1.8751197083462	7.0521567605601	.993	16.406058185857	20.156297602549
	4	1.0611173154128	5.6555362624268	.998	13.599626625896	15.721861256722
3	1	-1.8071881333662	6.3382684656463	.992	18.237766365790	14.623390099058
	2	-1.8751197083462	7.0521567605601	.993	20.156297602549	16.406058185857
	4	-.8140023929333	7.6363787685511	1.000	20.609648388232	18.981643602365
4	1	-.9931857404329	4.7355910489312	.997	13.269172412180	11.282800931314
	2	-1.0611173154128	5.6555362624268	.998	15.721861256722	13.599626625896
	3	.8140023929333	7.6363787685511	1.000	18.981643602365	20.609648388232

Table 2d

gross returns inclusive of inflation for potato		
Tukey HSD		
period for potato	N	Subset for alpha = 0.05
		1
3	8	-1.163488419000
4	15	-.349486026067
1	142	.643699714366
2	26	.711631289346
Sig.		.989
Means for groups in homogeneous subsets are displayed.		
a. Uses Harmonic Mean Sample Size = 16.866.		
b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.		

Since a few series were found to be non normal Kruskal Wallis tests were also run on the same data.

Table 2e

Ranks			
period for potato		N	Mean Rank
inflation adjusted return for potato	1	142	96.61
	2	26	95.73
	3	8	83.50
	4	15	97.40
	Total	191	

Table 2f

Test Statistics ^{a,b}	
	inflation adjusted return for potato
Chi-Square	.436
df	3
Asymp. Sig.	.933
a. Kruskal Wallis Test	
b. Grouping Variable: period for potato	

The p value of .933 (as per table 2e and 2 f) suggest acceptance of the null hypothesis and hence we conclude there has been no significant change in the mean gross spot returns in periods when futures was present and when it was not present.

Findings for Hypothesis 3

Levene's test for homogeneity of variance was conducted on the four series of gross returns on potato prices

Table 3a

Test of Homogeneity of Variances			
gross returns inclusive of inflation for potato			
Levene Statistic	df1	df2	Sig.
2.072	3	187	.105

The significance value of .105 indicates that the null hypothesis has been accepted and there is no significant difference in variance amongst the four return series

Findings for Hypothesis 4

Levene's test for homogeneity of variance was conducted on the four series of inflation adjusted returns on potato prices

Table 4 a

Test of Homogeneity of Variances			
inflation adjusted return for potato			
Levene Statistic	df1	df2	Sig.
2.010	3	187	.114

The significance value of .114 indicates that the null hypothesis has been accepted and there is no significant difference in variance amongst the four inflation adjusted return series

Conclusion

After summarizing all of the above findings it can well be concluded that introduction of futures trading had caused no statistically significant change in the gross returns and inflation adjusted returns on spot prices. Also the price fluctuations have remained the same whether futures trading was allowed or disallowed. This implies that the event of futures trading has not resulted in extra gains for the spot traders by giving them higher return. Neither has the price fluctuations turned high. Overall conclusion thus suggests that introduction of potato futures trading has not impacted the potato spot prices adversely.

Limitations of the study

The study is restricted by analysis in context of the crop Potato only. A more holistic picture is obtainable when it is simultaneously carried out for a number of other crops too.

References:

Books

Chevallier, J.,Lelpo,F.(June 2013). The Economics of Commodity Markets. John Wiley & Sons

Kevin, S.(January 2014). Commodity and financial derivatives.PHI Learning Pvt. Ltd.

Journals:

Barber, B.M., T. Odeon & N. Zhu(2009) “Do Retail Trades Move Markets?” Review of Financial Studies 22,151-186.

Board, J., Sandmann, G., and Sutcliffe, C. (2001). “The effect of futures market volume on spot market volatility”, Journal of Business finance and accounting, 28, 799 819.

Cox, C. C. (1976). “Futures trading and market information”, Journal of Political Economy, 84, 1215–1237.

Weblinks:

www.fmc.gov.in/faq.

www.mcxindia.com

www.eaindustry.nic.in/