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Demystifying Financial Speculation in Commodity Future Markets in Emerging Markets

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Abstract
Present study focuses on comparing financial speculation on commodity future markets of China and India. Two agricultural products and two metal products were chosen from both countries for the present study. Utilizing a comprehensive dataset spanning over twenty years, we employ quantitative methods to measure the hedging and speculative ratios within Chinese and Indian commodity future markets. Relevant results and visual representations were extracted using EVIEWS. Outcome of the study demonstrated that Indian commodity future markets are more speculative than Chinese commodity future markets both in cases of agricultural and metal products. The results will provide valuable implications for policymakers and market participants aiming to compare financial speculation in commodity markets *vis-à-vis* emerging economies like China and India. Additionally, the outcomes of this study are particularly relevant for market players, and policymakers to comprehend the mind-set/behavioural pattern of investors trading in Chinese and Indian commodity future markets.
Keywords: Speculation Ratio, Hedging Ratio, Commodity Futures, China, India, Agriculture, Metal.

1. Introduction

Investor interest in emerging economies is growing, particularly in times of global economic expansion. The capacity of emerging markets to yield higher returns than the developed ones explains this tendency. In addition, the kinds of investments, their goals, and their lengths of time vary according to the specific investor or fund. In this particular setting, a significant portion of capital inflows and outflows from the capital markets are attributed to speculative investments. This is especially true for the commodity markets, where speculative trading plays a significant role in the use of various risk-hedging mechanisms like futures and options contracts. Concerns about the nature of speculative trading and its implications are raised by the size and scope of the biggest growing economies, including China and India.

The study will address the existing gap associated with the focus on the commodity futures markets in China and India. Previous studies provided research on these markets separately, it is possible to note a lack of evidence focusing on both markets simultaneously. Such an approach will allow for obtaining broader evidence regarding the financial speculation in commodity markets of emerging markets. Thus, it will be possible to draw conclusions that will offer value in terms of theory and practice.

2. Literature Review

A steady increase in capital inflows was observed when taking into account the characteristics of emerging economies and the corresponding expansion in the economy. Capital investments are mostly directed towards the commodity markets, even during periods of increased volatility (Fan & Zhang, 2018). Significant capital outflows are frequently the result of economic downturns, which has led to a drop in the pricing and liquidity of commodities in emerging economies' commodity markets. The financial component of the markets and the speculative nature of some activities could be linked to the characteristics of capital volatility. It was feasible to characterize the two major groups in this context based on how they felt about the speculative aspect of the commodities markets.

Due to the favorable impacts that financial speculation was supposed to have, the first group actively supported it. However, the study findings showed that there are direct harmful repercussions of financial speculating. Even though both sides provided proof to back up their claims, it was crucial to give each component equal weight. Determining the entire impact of financial speculating in the commodity markets would be possible with such an approach. A positive total effect would follow from the positive effects having a larger weight, and vice versa. Simultaneously, a neutral result could be anticipated if commodity markets show that financial speculation has no discernible impact. As a result, the three groups of study results that concentrated on financial speculating provided different perspectives. Early studies of financial speculation mostly focused on the workings of the commodities markets, the principles and theory of hedging, and the general knowledge of the latter. Johnson (1960) was one of the first scholars to present the theory of hedging commodities futures speculation in this respect. He found that the accuracy of the Theory of Speculation, which was in use at the time, lacked empirical backing. By adding the concepts of holding periods and relative prices, he modified the model. Based on the relative price changes, the model made it possible to project speculative activity in the markets. These results were essential for the later research. Carter (2002) focused his research on inverted markets and price volatility. The results showed how common the price of storage theories and normal backwardation were in the literature that was available. Simultaneously, he discovered that a wide spectrum of academics have seriously criticized the convenience yield linked to the cost of storage theory (Carter, 2002). The study highlighted the gap in the literature about the impact of financial speculation on commodity markets in this particular scenario. Therefore, it was imperative to broaden the investigation and include the examination of financial speculation.

Irwin et al. (2009) investigated the connection between financial speculation and price bubbles in commodity markets. The authors discovered that market bubbles were not being caused by long-only index funds or the speculative activity that went along with them. In fact, the evidence of an inverse link raises the possibility that the perceived price bubbles are the result of speculative behavior. It was also feasible to see how China and India contributed to the price fluctuations. More specifically, the price volatility described above was being exacerbated by the growing demand in these sectors.

The ability of financial speculators to affect market outcomes remains among the main areas of research. Kim (2015) used a sample of 21 commodity futures in the U.S. futures market to test the relationship between financial speculation and adverse market outcomes. The study covered the period between 1992 and 2012 with the use of cross-sectional analysis.

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The author found that changes in speculative positions have no effect on prices during volatility periods (Kim, 2015). He also observed an inverse relationship between prices and financial speculation. While it is possible to consider a broad range of activities in commodity markets as speculation, it is common to assume that index investments constitute financial speculation. Stoll and Whaley (2015) viewed financial speculation in commodity markets through the scope of unwarranted price increases that was impairing the effectiveness of the underlying contracts. In particular, the passive nature of index investments, along with their long-term nature was preventing the classification into the speculative category. Furthermore, the authors noted that index investment was an effective hedging tool used in commodity markets. Additionally, capital outflows and the prices of futures were unaffected by changes in the commodity index rolls. These results validated the previous conundrum surrounding the categorization of market activity as speculative. In a similar vein, it was feasible to observe that financial speculation and price bubbles in the commodity markets were unrelated. The significance of risk hedging mechanisms in commodities markets and the potential of financial speculation to bolster the quality of hedging instruments were recognized by the writers. From the perspective of increased liquidity in the commodity markets, financial speculating is valuable in this sense.

The wider scope of the research was made possible by the use of large samples in evaluating speculation and its consequences on commodity futures markets. Haase et; al (2016) synthesized data from one hundred empirical research to identify the key variables concerning probable speculative impacts on the commodity markets. Price, volatility, and spillover effects were the main variables that were found, which is in line with Carter (2002). According to Haase et al. (2016), the results showed that speculative behaviors were not having an imposing or weakening influence on focus factors. It would imply the third hypothesis' acceptance in the context of this study. Financial speculating was defined by Fan and Zhang (2018) from the perspective of long-only index investors. They based their study on a sample of thirty commodities from various industries and the idea that financial speculators could destabilize China's commodity market. DataStream International provided the authors with a sample that they gathered between 1992 and 2017. Regardless of the kind of speculator, the research indicated that defining their position in the commodities markets required taking into account the nature of their activity. The authors also observed an exponential increase of activity in China's commodity markets. As a result, Chinese investors have the ability to affect the global pricing dynamics of a number of important commodities, which would cause emerging nations to take regulatory action. Similar trends have also been seen in India's commodity markets due to its size and pricing inclinations. In this sense, it was feasible to witness notable speculative money inflows into both nations' commodity futures markets. These characteristics are consistent with those seen in industrialized economies like the US. Depending on how speculative activities are defined and the relevant entities are identified, different approaches to financial speculation are taken.

The models projecting behavior in commodity markets strengthened with the availability of bid data and new research findings over the past two decades. Boyd et al. (2018) reviewed a broad range of literature focusing on the impacts of speculation in the commodity markets. The authors focused specifically on the recent period of growth of the finance component in the commodity markets. The study also focused on the regulatory measures aimed at the prevention of financial speculation and its adverse effects. The data obtained from CFTC's Large Trader constituted a sample with the trader positions in regulated futures and options markets (Boyd, et al., 2018). The authors collected sufficient evidence supporting the hypothesis of minimal to non-existent adverse effects of financial speculation on commodity markets. These findings are consistent with the preceding studies entailing a sufficient strength of the existing regulatory frameworks to prevent damaging market tendencies. At the same time, Kang et al. (2020) described a dynamic interaction between the net positions of traders and risk premiums in commodity markets. The authors separated the short-term position changes and the long-term position changes based on the factors affecting them. In this regard, the study suggested that the short-term position changes were dependent on the demands of noncommercial traders, i.e. financial speculators. At the same time, the long-term variations were relying on the hedging demands of commercial traders (Kang, et al., 2020). In this regard, the authors relied on the theory of normal backwardation, suggesting that speculative traders were absorbing the risks of the commodity markets. Such an assumption was entailing the inherently positive role of financial speculation in the financial markets. The study underlined the inherent difficulty associated with the differentiation between speculative and hedging activities. For instance, the commercial market participants focusing primarily on the risk-hedging element could react differently to the market news, which would introduce the speculative element to their market positions. However, the types of speculative traders could vary. The examination of financial speculation in commodities markets was supported by the emphasis on commodity premiums. The investing potential of commodities risk premiums in China was evaluated by Bianchi et al. (2021). The main factors restricting the investment potential were determined by the authors to be carry and basis-momentum elements in addition to conventional momentum. These elements were restricting the possibility of financial speculating in China's commodity markets. Simultaneously, Manogna and Mishra (2021) discovered that during the low points of the commodity index value (COMDEX), speculative investors could be a factor in price hikes in India's commodity markets. According to Manogna and Mishra (2021) these findings include the support of the commodity markets' liquidity by capital inflows from the stock markets during periods of decline. In essence, financial speculating would serve as a buffer against downturns in the market. The reduced prices presented a chance for speculative investors, which increased capital inflows. Fan et al. (2022) discussed the issues of speculation in China's commodity markets. Their study evaluated the destabilising impacts of financial speculation in China's commodity markets using thirty commodities from various sectors. The assessment correlations between speculative trading and the previously described negative impacts were the main focus of the technique. The authors discovered that there were no significant negative consequences of financial speculating, such as increased volatility, stronger cross-market correlations, or worse economic results. Moreover, the data indicated that financial speculating contributes to price discovery and lowers price volatility. It is therefore possible to conclude that the theory regarding the advantages of financial speculating in commodity markets is supported by current research.

The commodity futures market has been a subject of significant interest in both China and India, as it plays a crucial role in price discovery, risk management, and investment opportunities. The futures market allows for the trading of these commodities at a predetermined price and delivery date, providing a platform for hedging against price fluctuations and speculative activities.(Rh & Ps, 2016). The agricultural production system in India has undergone profound changes, leading to the reintroduction of futures

trading in a large number of agricultural commodities in 2003.(Rh & Ps, 2016). Similarly, China has also witnessed the growth of its commodity futures market, with trading in a wide range of commodities, including agricultural products, metals, and energy.
The types of participants in the commodity futures markets of China and India also shape the nature of speculation. However, the role of speculation in these markets has been a subject of ongoing debate. Speculators, who aim to profit from price movements, can potentially contribute to price volatility and market instability. India's agri-commodities futures markets have been observed to enable price discovery and better price risk management, while also contributing to the diversified growth of Indian agriculture.(Kar, 2021). In China, the market is dominated by institutional investors and state-owned enterprises, which generally have better access to market information and capital, leading to a more controlled and less speculative environment (He, Wang, & Ke, 2015). On the other hand, India's market has a higher participation of retail investors and smaller traders who often engage in speculative trading to achieve short-term gains. This difference in participant composition contributes to higher volatility and speculation in India's futures markets (Kumar & Pandey, 2011). China's stricter regulatory measures have been effective in curbing excessive speculation but sometimes at the cost of market liquidity. India's regulatory framework has evolved to address speculation but started from a less stringent base, resulting in higher initial speculative activities (Chen, 2016; Basu & Dalal, 2020).
Acquiring a comprehensive comprehension of the consequences of financial speculating and the necessity of taking appropriate action is vital. Our goal in this research article is to compare the commodities futures markets in these two developing nations, emphasizing the significance that speculation plays. It is feasible to ask the following research question in this context:
Does financial speculation affect commodity futures markets in Emerging Markets (China and India)?

3. Methodology

3.1. Characteristics of Chinese and Indian commodity futures markets

In early 1990s Chinese future markets commenced their operations and in present times four futures exchanges are working - the Dalian Commodity Exchange (DCE), the Zhengzhou Commodity Exchange (ZCE), the Shanghai Futures Exchange (SHFE) and the China Financial Futures Exchange (CFFEX) of which DCE excelled and its volume hovers around 1.54 billion contracts according to the latest annual futures and options volume survey, published by the Futures Industry Association (FIA). According to Acworth, (2017) ZCE trading volume is around 901 million contract in 2016 and ranks the 11th largest exchange in the world.
Looking at Table 1 clearly indicates that in 2013 eleven out of the top twenty agricultural commodity contracts are Chinese. Chinese futures markets are still gaining ground and this call for more academic research on China's futures markets. Although Chinese commodity futures markets have developed rapidly, but there still is a lack of evidence on studying the behavior of speculators in these markets. It is envisaged in a report published by Citigroup that Chinese investors are comparatively more speculative in nature than other nationalities.
The Indian commodity futures market is characterized by its diversity, regulation, and integration with the global market. The market offers futures contracts for a wide array of commodities including agricultural products (like wheat, rice, and cotton), metals (such as gold, silver, and copper), and energy products (like crude oil and natural gas). The market is regulated by the Securities and Exchange Board of India (SEBI), which took over the regulation of commodity derivatives from the Forward Markets Commission (FMC) in 2015. This move has brought more stringent regulations and increased transparency in the market. Indian commodity exchanges, such as the Multi Commodity Exchange (MCX) and the National Commodity and Derivatives Exchange (NCDEX), provide a robust infrastructure for trading, clearing, and settlement of futures contracts. The market sees participation from a variety of entities including institutional investors, retail investors, hedgers, and speculators. This diverse participation ensures liquidity and helps in the discovery of fair market prices.

Table 1: Top 20 Agricultural Contracts (Acworth, 2017)

	Contract	Volume Jan–Dec 2016
1	**Soybean Meal Futures, DCE**	388,949,970
2	**Rapeseed Meal Futures, ZCE**	246,267,758
3	**Palm Oil Futures, DCE**	139,157,899
4	**Corn Futures, DCE**	122,362,964
5	**White Sugar Futures, ZCE**	117,293,884
6	**Rubber Futures, SHFE**	97,371,256
7	**Soybean Oil Futures, DCE**	94,761,814
8	Corn Futures, CBOT	85,625,219
9	**Cotton No. 1 Futures, ZCE**	80,530,129
10	**Corn Starch Futures, DCE**	67,445,264
11	Soybean Futures, CBOT	61,730,753
12	Sugar Futures, ICE Futures U.S.	33,115,334
13	**No. 1 Soybean Futures, DCE**	32,570,158
14	Chicago Soft Red Winter Wheat Futures, CBOT	31,059,726
15	Soybean Oil Futures, CBOT	29,429,298
16	**Rapeseed Oil Futures, ZCE**	27,312,246
17	Soybean Meal Futures, CBOT	25,953,938
18	Corn Options, CBOT	22,794,484
19	**Egg Futures, DCE**	22,474,739
20	Soybean Options, CBOT	20,109,648

Note: This table presents trading volume for top 20 global agricultural futures contracts in 2016. Data are obtained from FIA 2016 Annual Volume Survey

Speculators play a critical role in the commodity futures market by providing liquidity and aiding in price discovery. However, their activities can also have negative consequences, particularly when speculation becomes excessive or manipulative. Excessive speculation can lead to increased volatility in commodity prices. When speculators dominate trading activity, prices may become more sensitive to speculative trades rather than fundamental supply and demand factors. This can create an unstable market environment. A recent report by the Reserve Bank of India (RBI) (2023) highlights that excessive speculative activity has been

linked to sharp price fluctuations in agricultural commodities. Speculators, especially those with significant financial power, can sometimes manipulate prices, creating artificial inflation or deflation in commodity prices. This price distortion can mislead producers and consumers, causing them to make suboptimal production and consumption decisions. A study by the National Institute of Securities Markets (NISM) (2022) discusses how speculative activities can lead to price distortion, impacting the credibility of the futures market as a tool for price discovery. Excessive speculation can undermine the confidence of genuine investors and hedgers in the market, potentially leading to reduced participation and liquidity in the long term.

Against this backdrop, the aim of our paper is to analyse and compare the speculative activity in Chinese and Indian futures markets for four commodities.

For the present study two agricultural and two metal future markets will be considered/compared for China and India:

Products
Cotton
Soybean
Copper
Gold

3.2. Returns and Speculation Measures

To begin, we generate a *return* from the commodity futures series by using the natural log of future contract prices.

$$Returns = \ln\left(\frac{P_t}{P_{t-1}}\right) x100 \quad (1)$$

We have decided to go with the continuous futures contract day's closing price.

Diverse techniques are employed in the scholarly literature on futures markets to differentiate between hedging and speculation. Utilizing information from the Commitments of Traders (COT) reports that the U.S. Commodity Futures Trading Commission (CFTC) provides is a popular method of answering the question. There have been several challenges to the original COT report, which divides traders into two categories: non-commercial (speculators) and commercial (hedgers) (Ederington & Lee, 2002; Peck, 1982). Empirical investigations that look into how speculative activity affects return volatility should be grounded in data with a minimum daily frequency. Moreover, the CFTC only releases statistics for particular futures contracts that are traded on American marketplaces. Therefore, in order to examine the Chinese and Indian futures markets, several techniques to distinguish hedging from speculative activity must be employed.

In order to assess the nature of trading activity on a particular trading day, we calculate two ratios that each incorporate daily data of volume and open interest. The total number of trades made for a given contract within a given day is known as the daily trading volume. Any positions in that contract that are not equalized by a position in the opposite futures market, fulfilled by the actual delivery of the good, or settled with cash are referred to as open interest.

The first ratio is proposed by Garcia et al. (1986) and is defined as daily trading volume (*TVt*) divided by end-of-day open interest (*OIt*):

$$\text{Spec}^{\text{ratio}} = \frac{TV_t}{OI_t} \quad (2)$$

The speculation ratio calculates how much more speculative activity there is in the contract under analysis than hedging activity. In relation to hedging activity, a high (low) speculation ratio denotes high (low) speculative activity. As a result, an increase in the speculation ratio indicates that speculators are becoming more dominant in the market. The premise of the speculation ratio is based on the idea that whereas speculators primarily want to avoid holding their bets overnight, hedgers retain their positions for longer periods of time. The hedging ratio and the speculating ratio typically have a negative relationship.

A second ratio, which is proposed by Lucia and Pardo (2010), to provide supportive results for the first one. The second ratio is also based on the different trading behaviour of speculators and hedgers, but relates daily trading volumes to open interest in a different way. The ratio gauges the relative importance of hedging activity instead of speculative activity on a specific trading day and is defined as the daily change in open interest ($\Delta OI_t = OI_t - OI_{t-1}$) divided by daily trading volume:

$$\text{Hedge}^{\text{ratio}} = \frac{\Delta OIt}{TV_t} \quad (3)$$

The change in open interest during period *t* is a measure of net positions being opened or closed each day and held overnight and is used to capture hedging activity. Since the change of open interest during period *t* is in the range [-TVt, + TVt], the hedging ratio can only take on values in the range of [1, -1] (Lucia, Mansanet-Bataller, & Pardo, 2015). A positive value of the hedging ratio indicates that the number of opened positions has exceeded the number of closed positions, while a negative value implies the reverse. Therefore, a hedging ratio with a value close to either one or minus one indicates low speculative activity relative to hedging activity in the contract examined. A value close to zero indicates relatively high speculative activity (Palao & Pardo, 2012). The correlation between the two ratios used in this study should be negative. As the hedging ratio increases, indicating a higher degree of risk mitigation, the speculation ratio tends to decrease, reflecting fewer speculative positions relative to hedged positions. Conversely, a lower hedging ratio typically suggests a higher speculation ratio, indicating more speculative activity compared to hedged positions.

In a more recent study, Chan, Nguyen, and Chan (2015*)* investigate the role of speculators on oil futures markets by proxying speculative activity with the speculation ratio. They come to the conclusion that, during the post-financialization period, speculators without knowledge dominate the oil futures market.5. The study conducted by Lucia et al. (2015*)* examines the relative significance of speculative and hedging activity in the European carbon futures market, utilizing both the speculation and hedging ratios as shown

in equation (1) and (2). The authors calculate the various speculative behavior dynamics across the three EU Emission Trading Scheme phases.

4. Data and Preliminary Analysis

4.1. Chinese Descriptive

For the four Chinese commodities under investigation, Table 2 shows summary statistics for returns (r_t), open interest (OI_t), trading volume (TV_t), the speculative ratio ($Spec^{ratio}$), and the hedging ratio ($Hedge^{ratio}$). The following statistics were displayed for each time series: mean, skewness, kurtosis, maximum (Max), minimum (Min), standard deviation (Std. Dev.), and Jarque-Bera statistics. A cursory look at Table 2 reveals that mean returns for the majority of the time series under investigation are positive and almost zero. The values of Jarque-Bera statistics corroborate the skewness and kurtosis parameters' indication that none of the four return time series has a normal distribution. The null hypothesis of a normal distribution is rejected for every time series at the 1 percent level based on the findings of the Jarque-Bera tests.

The $Spec^{ratio}$ for cotton futures has the lowest mean, 0.27, as Table 2 illustrates. Keep in mind that a high $Spec^{ratio}$ indicates more speculative activity than hedging activity. Moreover, based on its high standard deviation, the $Spec^{ratio}$ of Soybean futures seems to be the most volatile. For every contract, the hedging ratios have mean values that are negative and very near to zero. The range of values for the hedging ratio suggested by Lucia, Mansanet-Bataller, & Pardo (2015) is limited to [1, -1]. According to Palao & Pardo (2012), there should be a negative connection between the two ratios employed in this study—speculation and hedging. High levels of speculation are indicated by a $Hedge^{ratio}$ that is near zero.

Table 2: Summary Statistics for two Agricultural & two Metal products (China)

	Mean	Max	Min	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
			Cotton				
			Sample (6/01/2004 to 1/06/2023), Daily Observations : 4539				
R	0.006272	0.083768	0	0.007573	3.095293	17.86858	43870.68***
OI	42674.57	636592	16	84635.41	3.104224	13.23504	24235.75***
TV	23836.88	856624	2	76345.77	5.063035	33.42626	173910.30***
$Spec^{ratio}$	0.27141	4.130591	0.001092	0.384727	3.298823	17.35839	42229.20***
$Hedge^{ratio}$	-0.21261	0.977143	-0.99083	0.355178	0.239812	3.317966	56.00***
			Soybean				
			Sample (3/15/2002 to 12/30/2022), Daily Observations : 5001				
R	0.006728	0.193475	0	0.008589	5.660524	79.77418	998219.50***
OI	41230.13	448770	2	57286.47	2.236138	10.00045	11437.99***
TV	23358.9	580672	1	50797.55	3.15487	15.85215	33977.19***
$Spec^{ratio}$	0.431778	31	0.00023	0.966057	15.89707	414.8767	28285781.00***
$Hedge^{ratio}$	-0.1516	0.990109	-0.99755	0.335611	0.242678	3.970384	195.12***
			Copper				
			Sample (12/13/1999 to 12/13/2022), Daily Observations : 5500				
R	0.008213	0.082612	0	0.0089	2.349669	10.46614	17215.99***
OI	32728.7	194782	355	32525.63	1.77232	5.890659	4627.76***
TV	16599.43	234458	10	24017.37	2.672745	13.10867	28925.08***
$Spec^{ratio}$	0.420816	6.551807	0.000756	0.396052	3.895146	39.34948	305704.00***
$Hedge^{ratio}$	-0.27808	0.984783	-0.98919	0.21621	0.244884	5.601755	1550.45***
			Gold				
			Sample (1/09/2008 to 1/06/2023), Daily Observations : 3552				
R	0.008332	0.079045	0	0.00946	2.563949	11.86393	8170.70***
OI	5902.078	88588	2	12892.89	2.906794	11.78806	8650.92***
TV	5952.472	186338	1	18032.22	4.778185	30.1751	64656.03***
$Spec^{ratio}$	0.796118	26	0.003676	1.388617	7.977716	110.3006	916922.10***
$Hedge^{ratio}$	-0.2272	0.969527	-0.97605	0.313739	0.090049	3.524412	23.95***

4.2. Indian Descriptive

Summaries of the returns (r_t), open interest (OI_t), trading volume (TV_t), speculative ratio ($Spec^{ratio}$), and hedging ratio ($Hedge^{ratio}$) for the four Indian commodities under investigation are shown in Table 3. Table 3 shows that mean returns for all time-series under investigation are positive and almost zero. The values of Jarque-Bera statistics support the skewness and kurtosis parameters' indication that none of the four return time series exhibits a normal distribution. The null hypothesis of a normal distribution is rejected for every time series at the 1 percent level based on the findings of the Jarque-Bera tests.

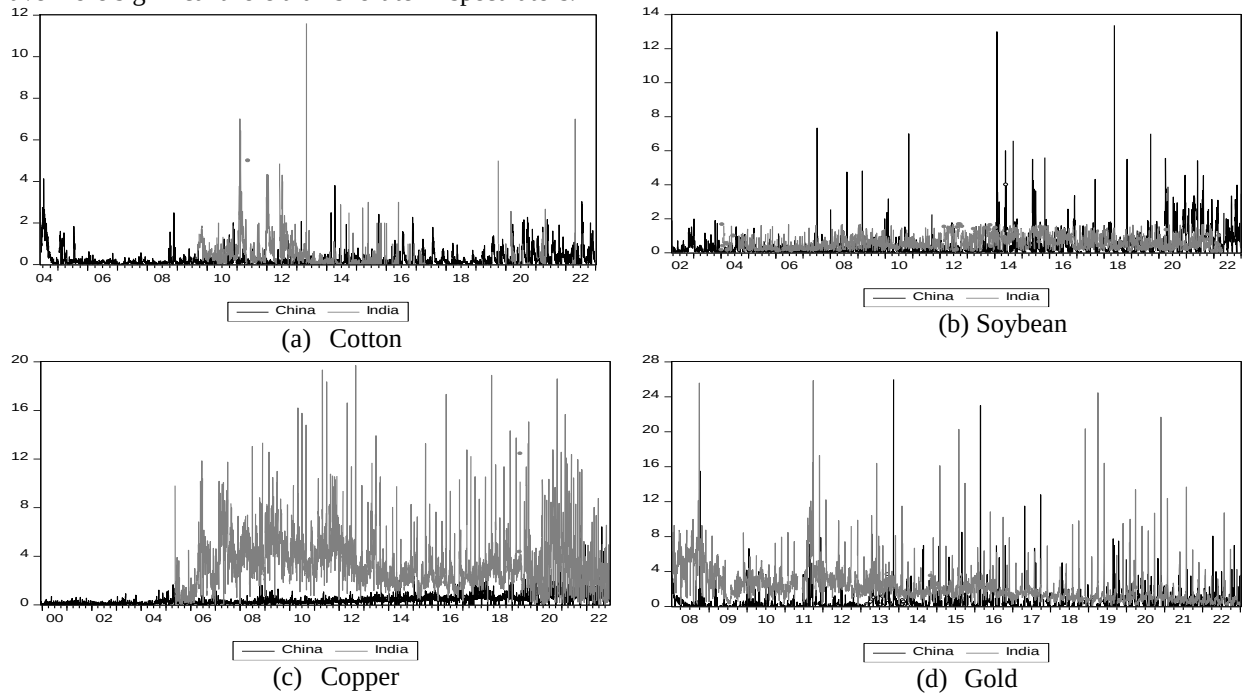
Table 3 further shows that the highest means for the speculation ratios for Indian agricultural commodities are for Cotton and Copper futures, at 0.119 and 0.106, respectively. The lowest mean, 2.29, is displayed by the $Spec^{ratio}$ for Gold futures. Keep in mind that a high $Spec^{ratio}$ indicates more speculative activity than hedging activity. Given its high standard deviation, the $Spec^{ratio}$ of Copper futures seems to be the most volatile. Cotton exhibits the highest level of speculation among agricultural commodities, as its means for the hedging ratio are the closest to zero. Conversely, copper exhibits the highest level of speculation among metal commodities, as its means for the hedging ratio are the closest to zero.

Table 3: Summary Statistics for two Agricultural & two Metal products (India)

	Mean	Max	Min	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
				Cotton			
				Sample (9/03/2009 to 12/30/2022), Daily Observations : 2620			
r	0.011916	0.212994	0	0.014094	5.835621	67.68775	202533.90***
OI	528.7067	2780	1	528.8508	1.420679	5.350353	637.38***
TV	350.0933	5871	1	518.9743	3.694202	26.39131	28206.65***
$Spec^{ratio}$	0.64936	7.005967	0.012658	0.751478	3.040554	16.25896	9974.06***
$Hedge^{ratio}$	0.000902	0.975191	-0.8	0.204294	0.216417	7.280705	867.74***
				Soybean			
				Sample (01/01/2004 to 7/20/2022), Daily Observations : 4600			
r	0.010508	0.35754	0	0.01412	8.049332	139.8491	3827433.00***
OI	53741.85	288850	0	46440.97	1.246854	4.926621	2002.64***
TV	30424.78	262140	0	33363.12	1.804049	7.284088	6142.33***
$Spec^{ratio}$	0.57	1.68	0.09	0.36	0.92	3.17	576.176***
$Hedge^{ratio}$	-0.2338	0.984954	-0.998663	0.304136	-0.37324	4.561491	493.63***
				Copper:			
				Sample (5/16/2005 to 12/30/2022), Daily Observations : 4400			
r	0.01062	0.106125	0	0.010784	2.294688	11.83576	18992.22***
OI	16557.73	9395000	0	138705.9	67.21888	4545.42	3960000000.00***
TV	50104.67	284351	0	43848.72	1.155599	3.896157	1139.59***
$Spec^{ratio}$	3.490116	39	0	2.392429	3.071717	26.87162	112658.50***
$Hedge^{ratio}$	-0.01226	0.987654	-0.9817	0.128852	-1.83046	23.07592	75532.69***
				Gold:			
				Sample (10/25/2004 to 12/30/2022), Daily Observations : 4443			
r	0.006733	0.094693	0	0.00747	3.055616	20.39489	67178.55***
OI	9217.464	26076	1	5030.755	0.011132	2.525565	44.60***
TV	20584.03	150019	0	19204.98	1.541937	6.251941	3804.51***
$Spec^{ratio}$	2.293355	25.85109	0	2.016013	3.323026	24.62128	96914.95***
$Hedge^{ratio}$	-0.03708	0.983912	-0.9817	0.159693	-1.5801	15.69363	31285.55***

5. Comparison of Speculation in Chinese and Indian Commodity Futures Markets

In emerging economies, trading on Indian future markets is believed to more speculative, particularly, when compared to Chinese future markets. To verify this claim speculation ratio for four identical Indian and Chinese future markets were exhibited on the same graphs in Figure 1. Figure 1 clearly indicates that Indian metal future markets are more speculative as compared to Chinese future markets. Thus we can say that in Indian markets traders enter and exit for a short term on the same trading day, which results in inflating trading volumes rather than increasing the open interest. However, in Chinese future markets the hedgers retain their investment for extended duration which results in inflating open interest rather than trading volume, in this way the Chinese hedgers have more significant role than short term speculators.



(a) Cotton (b) Soybean

(c) Copper (d) Gold

Figure 1: Speculation Graphs for Chinese Vs Indian products

Figure 2 further supplements our premise that there exists more speculation in the Indian markets as compare to Chinese Markets. Figure 2 exhibits the number of trading days per month with high speculative activity. It is quite evident that India has higher number of days per month with high speculative activity then China.

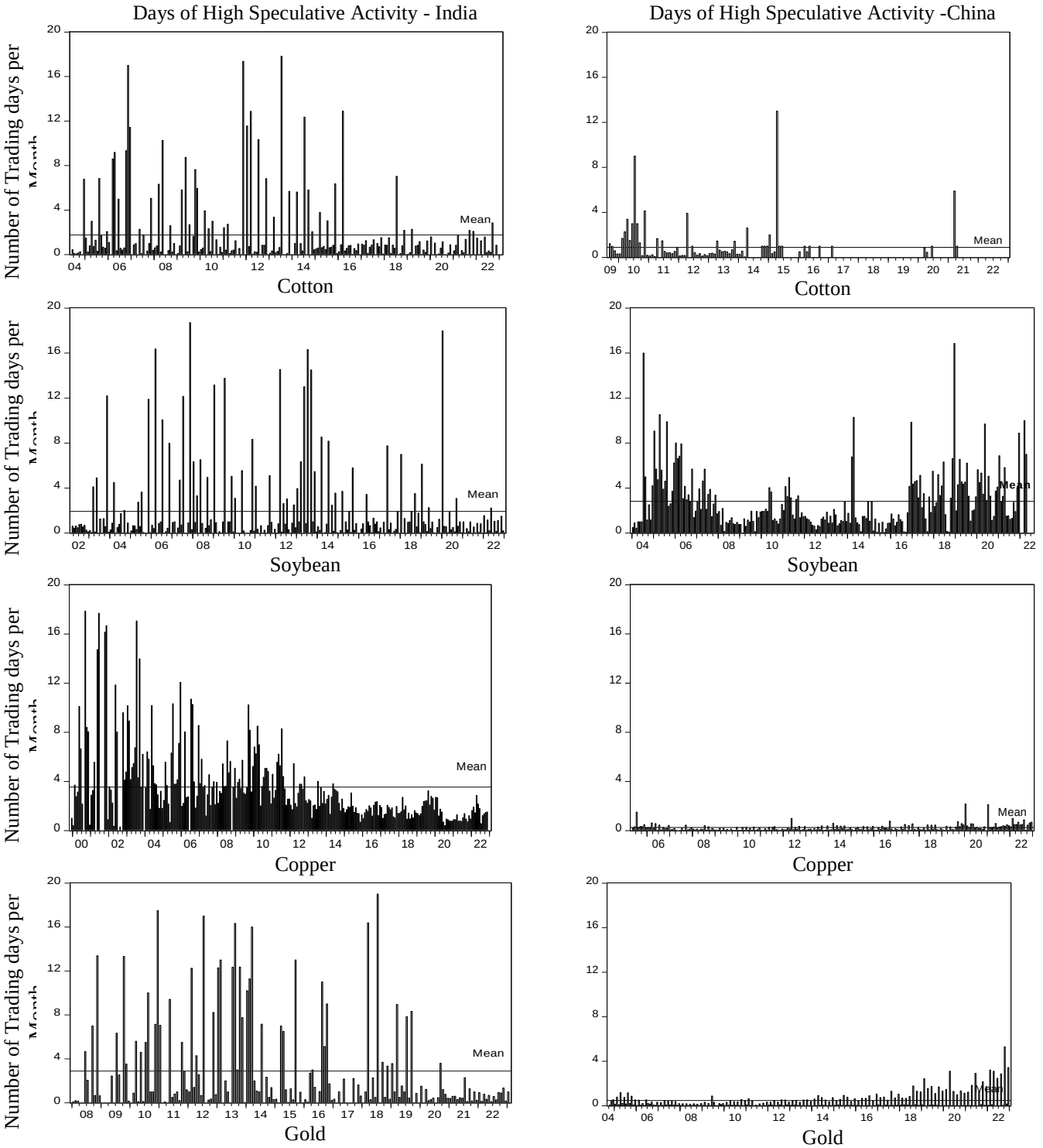


Figure 2: Comparison of High Speculative Trading Activity days per month (China vs. India)

Table 4 shows the consolidated empirical comparison for Chinese and Indian markets. On the average Indian market has greater returns then Chinese market across all the four commodities with an exception of mean return of Gold which is slightly higher in Chinese market. The comparison table shows that one of four commodities in the Chinese market is considered to be speculative whereas, in Indian market two out of four commodities are considered to be speculative. In Chinese market Gold seems to be more speculative but in Indian market both copper and gold are speculative. Though Gold is speculative in both the markets but is less speculative in Chinese market. Hence, it can be exhorted that Indian market is more speculative than Chinese market which results in higher mean returns.

Table 4: Comparison of China and India

Emergent market		China				India			
Commodity		Cotton	Soybean	Copper	Gold	Cotton	Soybean	Copper	Gold
r_t	Mean	0.0062	0.0067	0.0082	0.0083	0.0119	0.0105	0.0106	0.0067
	(SD)	(0.0075)	(0.0086)	(0.0089)	(0.0095)	(0.0141)	(0.0141)	(0.0108)	(0.0074)
TV	Mean	23836.88	23358.9	16599.43	5952.47	350.09	30424.78	50104.67	20584.03
OI	Mean	42674.57	41230.13	32728.7	5902.08	528.71	53741.85	16557.73	9217.464
Speculative?	If (TV-OI = positive)	(-)	(-)	(-)	(+)	(-)	(-)	(+)	(+)
$Spec^{ratio}$	Mean	0.2714	0.4318	0.4208	0.7691	0.6493	0.57	3.49	2.2933
$Hedge^{ratio}$	Mean	-0.2126	-0.1516	-0.2781	-0.2272	0.0009	-0.2338	-0.0123	-0.0371

6. Discussion and Conclusion

Present study revealed that Indian investors are more speculative than their counterparts in China and this is reflected more in the Copper and Gold future markets but not much speculative difference is witnessed in the agricultural commodity future markets. The commodity futures markets in China and India exhibit distinct characteristics shaped by their regulatory frameworks, market participants, and speculative activities. China's stringent regulations and institutional dominance result in a more controlled speculative environment, whereas India's market, influenced by retail participation and evolving regulations, experiences higher levels of speculation and volatility. Understanding these differences is crucial for policymakers and market participants to develop strategies that balance market efficiency with stability. Future studies may also look into the volatility of future markets both in China and India using GARCH or some of its variants like E-GARCH or M-GARCH with a bigger basket of commodities.

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