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**Agricultural Commodity Futures:
Searching for Potential Winners**

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Abbreviation

CBOT	Chicago Board of Trade
CFFE	China Financial Futures Exchange
CFTC	Commodity Futures Trading Commission
CME	Chicago Mercantile Exchange
COFCO	China National Cereals, Oils and Foodstuffs Corporation
CSRC	China Securities Regulatory Commission
CTT	Commodity Transaction Tax
CV	Coefficient of Variation
CZCE	China Zhengzhou Grain Commodity Exchange
DCE	Dalian Commodity Exchange
e-NAM	Electronic National Agriculture Market
FAO STAT	Food And Agricultural Organization Statistical Database
FCRA	Forward Contracts Regulation Act
FMC	Forward Market Commission
FRP	Fair & Remunerative Price
ICE	Intercontinental Exchange
IPSTA	Indian Pepper & Spice Trade Association
MCX	Multi Commodity Exchange
MGE	Minneapolis Grain Exchange
MSP	Minimum Support Price
NCDEX	National Commodity and Derivative Exchange
NMCE	National Multi Commodity Exchange
NSEL	National Spot Exchange Limited
PCA	Principal Component Analysis
SAP	State Advised Prices
SCE	Shanghai Commodity Exchange
SCRA	Securities Contracts Regulation Act
SEBI	Security and Exchange Board of India
STE	State Trading Enterprises
USDA	US Department of Agriculture
USDA-FAS	Department of Agriculture Foreign Agricultural Service
WDRA	Warehousing Development Regulatory Authority
WPI	Wholesale Price Index

Glossary

Derivative- A derivative is a contract that derives its value from the performance of an underlying asset. The most common underlying assets include stocks, bonds, commodities, currencies, interest rates and market indexes.

Futures- are contracts to buy or sell an asset on a future date at a price specified today. These contracts are standardized according to the quality, quantity and delivery time and location for each commodity.

Exchange- A board of trade designated by the regulatory body to trade futures or options contracts on a particular commodity

Long position- One who has bought futures contracts or owns a commodity

Short position- One who has sold futures contracts or plans to purchase a commodity

Speculator- A market participant who tries to profit from buying and selling futures and options contracts by anticipating future price movements.

Hedger- The participant who undergoes the process of hedging. Hedging is the practice of offsetting the price risk inherent in any cash market position by taking an equal but opposite position in the futures market.

Margins- An amount of money deposited by both buyers and sellers of futures contracts to ensure performance of the terms of the contract (the making or taking delivery of the commodity or the cancellation of the position by a subsequent offsetting trade). There are several types of margins

1. **Initial Margin-** The margins collected upfront for taking long/short position would be referred to as initial margins.
2. **Additional Margin-** Margins imposed on both long and short sides over and above the other margins, would be called additional margins. These are imposed in case prices deviate from predetermined price limits.
3. **Special Margin-** The margins which are imposed only on one side, i.e., either the long side or short side would be called as special margins. These are imposed in case prices deviate from predetermined price limits.

Open Interest- The total number of outstanding futures or options contracts of a given commodity that are held by market participants at the end of the day. It is also defined as the total number of contracts that have not been exercised (squared off), expired or fulfilled by delivery.

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Abstract

Agricultural futures markets can provide useful information to farmers for taking more informed planting decisions for their crops, which are forward looking, and thus reduce their market risk. But in India, agri-futures have gone through a roller-coaster ride since their mega opening in 2003, which does not bode well for farmers. As per our review and analysis, one of the principal reasons behind its lack-lustre performance has been unpredictable and perhaps excessive regulatory interventions in some commodities that appear to be sensitive in common man's consumption basket. These interventions often generate negative market sentiments and have detrimental impact on trade. We use Principal Component Analysis to identify criteria for assessing potential success of a commodity in agri-futures in India. We find that commodities that are relatively less sensitive from the perspective of food security of common man have higher prospect of success in agri-futures than say staple food commodities.

Thus, the lessons learnt are that futures market can be deepened in India by (1) focusing first on 'non-sensitive' commodities which are less susceptible to Government intervention. The portfolio can later be diversified, once agri-futures attain a sufficiently large scale. (2) Given the fluctuations in domestic production, consumption and global trade, these prospects need to be reviewed at regular intervals, (3) Developing delivery based contracts will increase the comfort of the regulator and policy maker, thus helping to deepen agri-futures in India, (4) Government of India can encourage its State Trading Enterprises to trade on agri-futures platform so that they have better information and comfort about the dynamics of these markets. (5) make it more attractive by allowing global players and Indian importers currently hedging in exchanges in foreign countries, especially for edible oils such as palm and soya oils and (6) developing agri-futures is as much the responsibility of the regulator as that of Commodity Exchanges, and both need to work in harmony for the benefit of various stakeholders.

Keywords: *Agriculture, Futures market, Potential, Criteria, Principal Component Analysis*
JEL classification: *G10, G13, Q02, Q18*

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Executive Summary

Almost every other year some segments of farmers in India have to face distress because of volatility of agricultural commodity prices. It points towards lack of efficient agricultural markets devoid of any good instruments for price discovery. Farmers take their planting decisions based on last year's prices rather than expected prices at the time of harvest, and thus remain embroiled in the cobweb of boom and bust of commodity prices. Futures market, despite being more than a century old, has not served the farmers in a significant way so far to break from this boom and bust cycle of commodity prices. Despite its potential benefits in the form of efficient price discovery and risk management, it is generally treated as a black box by policymakers, and quite often presumed to be the primary cause driving inflation. No wonder then it faces the flak from policymakers at almost every instance of food price rise.

Although Indian agri-futures markets are more than a century old, suspensions started since the Second World War and most commodities were suspended by mid-1960s. It was only in 2003 that a bold decision of restoring the futures markets was taken by the Atal Bihari Vajpayee government. Three national exchanges were established and all commodities were permitted to be traded in the market with a hope that futures markets will give right signals and will lead to more efficient decisions by farmers and other stakeholders. Since then, futures trade has gone through a roller coaster ride. During the initial years, 2003-2007, it showed a promising growth. Then it hit turbulence around 2007-08 in the wake of global food price crisis. But it picked up momentum again and reached a peak in 2012, but thereafter it has been almost on a secular decline. It is time to think afresh as to what has gone wrong with India's agri-futures markets, and based on an unbiased analysis, how best they can be resurrected.

Accordingly, the objective of this paper is to identify measures to revamp agri-futures market in India. Our review and analysis shows that interventions like abrupt hike in margins and suspensions have damaged its prospects. A pre-requisite for the development of agri-futures market is to have a stable policy environment. And it is a job of the regulator and the Government to provide a favourable environment for futures trade to flourish while commodity exchanges have to invest in designing appropriate contracts for business development. Abrupt interventions with higher margins or outright suspensions and bans, or frequent changes in stocking restrictions on private trade, have adversely impacted the growth of agri-futures in India. We also find that suspensions and their duration, as well as high margins, have been targeted more towards commodities that are perceived as sensitive in common man's food basket. For example, tur, urad, rice have been suspended for more than a decade now. High margins for sensitive commodities, e.g., 100 percent for potato (August, 2014), 95 percent for chana (June, 2016) and 70 percent for sugar (September 2016), all reflect government's intention of blocking their futures trade.

Therefore, mere introduction of the commodity in the market, as India did in 2003 is not going to help recover the market. One has to understand the dynamics of the market structure for various commodities. Given that suspensions and hikes in margins are often targeted towards commodities which are sensitive from the perspective of food security, it is very

clear that policymakers are wary of letting go off their control from these sensitive commodities. Therefore, the first step for development of agri-futures markets in India would be to identify the commodities that have higher prospect of success, meaning they are less likely to invite stringent government intervention. Once the markets are deep enough for these commodities, and the government has more comfort with agri-futures, the portfolio can be diversified towards other commodities that are even somewhat more sensitive from food security point of view. In this paper we propose a set of criteria for potential success in agri-futures trade and based on that criteria, we identify potential winners.

Our proposed criteria are based on characteristics of highly traded commodities across the globe. The largest number of agricultural contracts are traded in China (69 percent of global agricultural futures contracts), USA being the second largest player (18 percent of global agricultural futures contracts) in TE-2016. The high traded commodities in China (oilseed complexes, viz. soybean, rapeseed, palm oil and sugar) and USA (soybean complex, corn, wheat and sugar) show that all of them have some common characteristics – (1) not sensitive from the perspective of food security and Government intervention of those countries, (2) most of them are not basic staple food commodities (although wheat is a staple but US is such a large exporter of it that it is not counted as ‘sensitive’ for US consumers) , (3) these countries have large share in global trade of these commodities and (4) these countries are large producers and/or consumers of these commodities.

Based on the characteristics of high traded commodities across the globe, the parameters in our proposed strategy include commodity surplus, use of commodity, sensitivity of the commodity with respect to food security and Government intervention, trade related factors and price volatility. We give higher scores to a commodity if India has a large surplus and high share in global trade. Our assessment of the Indian futures market shows that margins have been particularly high for commodities which are sensitive from point of view of food security and Government intervention, (like, chana, sugar and potato). Therefore food commodities have to be treated differently from other non-sensitive commodities like oilseed complex¹. Higher score is given to a commodity if it is not used as a staple food commodity.

Sensitivity of a commodity is another vital characteristic which determines its prospects. Given the history of steep margins and suspensions on those commodities which are sensitive from the perspective of Government intervention and food security, we use two measures of sensitivity- (1) procurement at Minimum Support Prices (MSP) or other Government schemes and (2) average monthly positive price (WPI) deviation from the trend in the last five years. Higher score is given to the commodity if it is not procured through any Government scheme and had lower average positive price deviation in the last five years. However, the extent of permissible price deviation considered favourable is commodity specific. For example even a small deviation of price in rice might attract Government intervention while for soybean, the same level of deviation might not have any impact. We also use price volatility as a determinant in our study. We assume a non-linear relationship between the price volatility and prospect of a commodity. This is because high price volatility

¹ Oilseed complexes comprise of oilseed, oil and meal from the oil seed.

increases its prospects in futures market but after a certain cut-off, higher price volatility becomes a concern and attracts Government intervention. Commodities have been suspended when there was evidence of extreme price volatility (for example, rice, wheat, pulses, guar gum, among others). Once again, the extent of 'reasonable' volatility is commodity specific with higher cut-off for non-sensitive commodities.

We estimate Principal Component Analysis models to compute commodity specific scores for rice, wheat, maize, chana, soybean complex, rapeseed and mustard oil complex, palm oil, sugar, pepper and cotton for four years, 2010 to 2013. Our results show that commodities which are not basic staple food items, not procured by Government, with price volatility within a certain range and a high share in global trade with a large surplus could be potential winners in futures market. High potential commodities are maize, oilseed complex, fibre and spices whereas commodities like rice, wheat, chana and sugar have comparatively lower prospects for developing in the futures market on a sustainable basis. Further, we find that prospect of a commodity varies over time due to change in domestic and global factors like global trade, domestic production and consumption. Therefore, to deepen agricultural futures market in India the lessons are-

- First, stay away from sensitive commodities (e.g., common rice, wheat, most pulses, and even sugar), at least for some time. Better focus and develop less sensitive commodities like oilseed complex (oilseeds, meals, and oils), feed (maize), cotton, basmati rice, spices, etc. Once markets are developed and the regulator has higher degree of comfort, then India can diversify to other commodities in agri-futures portfolio. This points to the important role that regulator has to play, by giving a clear direction in terms of choice of commodities, and then stay the course by adopting a stable policy with minimal interventions.
- Second, given the fluctuations in domestic production, consumption and global trade, these prospects need to be reviewed at regular intervals.
- Third, for government to have high level of comfort that speculators are not rigging markets, it may be useful if the regulator allows only delivery based contracts, at least till markets deepen.
- Fourth, Government of India can encourage its State Trading Enterprises (STEs) to trade on agri-futures platform. This will boost Government's confidence in agri-futures as it will have ample information from its STEs.
- Fifth, another strategy would be to make futures market in India more attractive for global players and Indian importers currently hedging in exchanges in foreign countries. For example palm oil importers of India are hedging their risk in Malaysia Derivatives Exchange in Malaysia. Out of overall trade of 13 million futures contracts in Malaysia, 11 million contracts (85 percent) are in crude palm oil in TE-2016. Futures trade in Indian exchanges for importers of major commodities can be incentivized by the Government by

having a stable import export regime, appropriate duty structure and stability in Government policies related to futures trading.

- Lastly, it must be noted that markets will not deepen only by the initiatives of the exchanges. These initiatives have to be supported by stable Government policies related to trade, stocking, and movement of commodities. Such policies will ensure more stability in futures market which will further aid in price discovery and reduce uncertainty. It has to be recognized that developing agri-futures is as much the responsibility of the regulator as that of Commodity Exchanges, and both need to work in harmony for the benefit of various stakeholders, especially peasants who need useful information about future prices for their products while they are planting those crops.

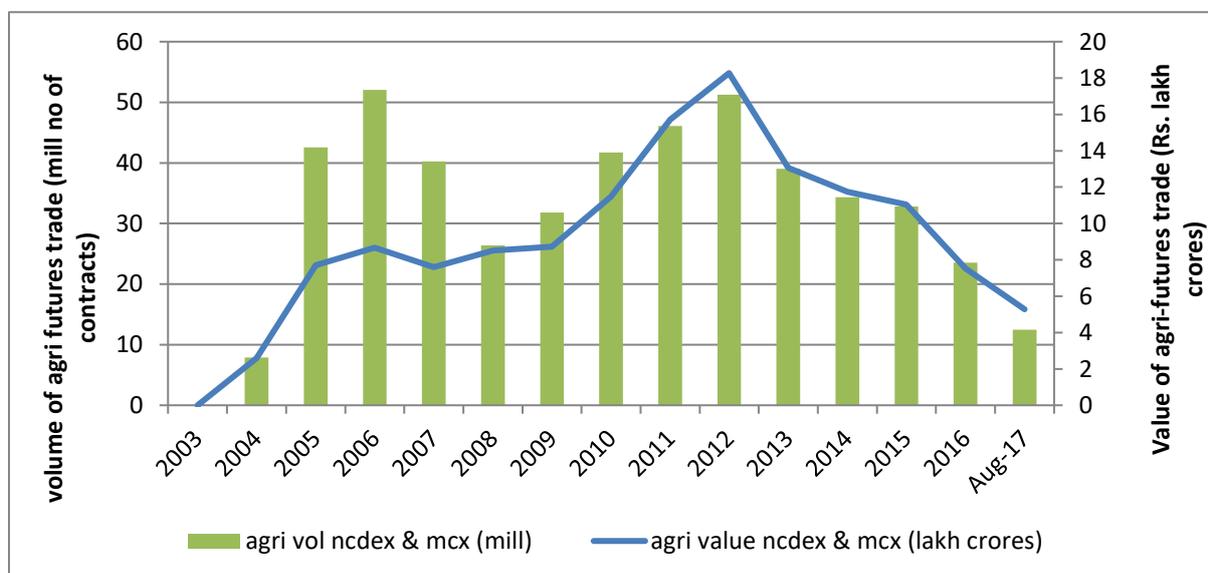
Agricultural Commodity Futures: Searching for Potential Winners

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1. Introduction

The purpose of futures trade is to reduce uncertainty in the market through the process of price discovery and risk management. Trading in derivative market ensures that both buyer and seller receive a certain predetermined price for a particular commodity at a specified time in future. An effective commodity derivative market therefore can minimize price risk for all stakeholders in an agricultural value chain. Although the very objective of derivative market is to bring certainty, its functioning itself has been very uncertain in India. The value and volume of agricultural futures market in India trade have gone through a roller coaster ride since its mega opening in 2003 (Figure 1).

Figure 1: Volume and value of agricultural futures trade in India



Source: NCDEX and MCX

Our review of Indian agricultural futures market (discussed later in Section 2) shows that there were several developments post 2012 which collectively or individually might have hampered market sentiments and made markets thin. Principal among them were frequent regulatory interventions like abrupt suspensions and steep special and additional margins. Such interventions make markets uncertain and discourage genuine players. Circulars retrieved from commodity exchanges like National Commodity and Derivative Exchange (NCDEX) and Multi Commodity Exchange (MCX) show that since 2003, 15 suspensions have been recorded in India. In 2016 alone, two high traded commodities, viz. chana and castor seed were suspended. Frequency of hike in margins was higher in the period post 2012 compared to earlier years. Also, the extent of increase in margins was comparatively higher

for sugar, chana and potato which are relatively more sensitive from the perspective of food security and Government intervention. For example, margins for sugar increased to 70 percent in September, 2016 while that of potato increased to 100 percent in July, 2014.

Another factor which might have played a role in hurting market sentiments and declining trade was National Spot Exchange Limited (NSEL) scam. It came into limelight in 2012 when Forward Market Commission (FMC) restricted NSEL from making fresh contracts. Although the case is still under investigation, allegations and arrests on account of alleged involvement of key stakeholders, like members of the exchanges and Government officials affected the trust factor in the market and discouraged genuine players from participating in the market. Also, transition of regulatory powers from FMC to Security and Exchange Board of India (SEBI) could have been responsible for the decline. Commodity Transaction Tax (CTT) introduced in 2013 could be cited as another factor that led to market uncertainty. Although agricultural commodities were exempted from CTT, change in number of exempted commodities increased (from 23 in June 2013 to 61 in February 2015) could have negatively affected volume of trade. We discuss these factors in detail in Section 2.

Against this background, the objective of this paper is to understand what went wrong in Indian agricultural futures market and suggest measures to restore the market. The need of the hour is to make market sentiments favorable so that genuine players find it attractive to trade in the market. The first step would be to identify commodities which have high potential in futures market and allow them to function with minimal interruption. In this paper, we propose a set of criteria for success in commodity futures trade and identify potential winners on the basis of the proposed criteria. Identification of such criteria will enable policy makers and exchanges to understand which commodity to introduce, when to introduce, which ones to scale up and sustain and which ones to withdraw and suspend, at least in the short term.

SEBI recognized the importance of identifying potential winners in reviving the futures market and introduced a list of criteria for commodities eligible for futures trading in January, 2017. It asked exchanges to come up with commodity specific scores and submit it to SEBI for approval. The commodities which it considers fit for trading would be allowed to trade in the exchanges. National Commodity Derivative Exchange (NCDEX) has assigned commodity specific scores for each parameter in the criteria circulated by SEBI. We find that the scores given by NCDEX, for chana or sugar, are very high. High scores indicate high prospects of a commodity in futures trade. But steep margins and suspension of trade in chana and steep margins for sugar in the past indicate that these commodities belong to 'sensitive category' and therefore attract Government intervention. It may be worth for NCDEX to rethink about the scores they have given to these commodities, lest market participants are taken by sudden surprise of suspension of these commodities from futures platform. Our review (discussed later in detail) also shows that SEBI may also like to revisit their own criteria as there are some vital gaps in the factors they have suggested.

We develop our criteria based on the characteristics of high traded commodities in the best performing countries across the globe (China and USA). We use Principal Component

Analysis (PCA) to generate commodity specific scores and identify high potential commodities based on those scores. Our results show that basic staple food items like cereals and pulses have lower potential while feed material like oilseed complexes have higher potential in futures market in India.

However, it must be noted that commodity markets cannot be deepened by the initiatives of the commodity exchanges alone. Such initiatives need to be backed by stable Government policies related to export, import, stocking, and movement and trading of agricultural commodities. In the long run, an efficient and stable futures market for agricultural commodities will help farmers by providing advance information about prices which in turn will help them to make decisions related to cropping pattern and resource allocation. The State Governments can also play a meaningful role by improving the functioning of mandis and implementing e-NAM in its true spirits. Government of India has provided funds to 455 mandis in 13 states for implementation of e-NAM including procurement of hardware and software, payment of salaries to staff and training of mandi officials and farmers. It is hoped that trading will be possible across geographic location through the program. For the intra-state trading across mandis to succeed, modern assaying facilities will have to be established in mandis. Once this system stabilizes, trading of stocks kept in WDRA accredited warehouses should be possible through e-NAM. This has the potential to reduce the stronghold of commission agents in mandis who generally do not encourage transparent price discovery. Once the system is in place on a larger scale futures trading can be done through the platform of e-NAM.

The paper is organized as follows: In Section 2, we study the agricultural futures market in India and assess the factors responsible for its lackluster performance. In this section, we also discuss the existing criteria used for selection of commodities in which future trading is undertaken by the exchanges. We discuss futures market in China and USA in Section 3 and identify characteristics of highly traded commodities in these countries. In Section 4, we propose our strategy and use it to categorize commodities. We present our conclusions in Section 5.

2. Agricultural futures market in India

Indian agricultural futures market is more than a hundred years old. The first futures trade was recorded in 1875 in cotton in Bombay Cotton Exchange, just ten years after it was first consummated in USA. Markets were liquid with high turnover before the Second World War (Bhattacharya, 2007). Commodities such as rice, wheat, sugar, oilseed complex (groundnut, groundnut oil, and castor seed), cotton, raw jute and jute products were traded before the Second World War (Bhattacharya, 2007). Suspensions and interventions started around the Second World War because of shortage in essential commodities. After independence, suspensions on futures trading continued and by 1977 trading was allowed in only two commodities, viz. pepper and turmeric (Bhattacharya, 2007).

Several Government committees were set up since independence to evaluate the feasibility and benefits of futures trading in the Indian context like Shroff Committee (1950), Dantwala

Committee (1956), Khusro Committee (1980), Kabra Committee (1994), Habibullah Committee (2003) and Abhijit Sen Committee (2008), among others. These studies assessed the role of futures trading in Indian markets, evaluated its impact on prices, explored if futures market has fulfilled the objectives of price discovery and price risk management, proposed commodities in which trading must be allowed, scrutinized the regulatory framework, suggested amendments to the existing Act, reviewed the working of the regulatory bodies and suggested measures for strengthening the Forward Markets Commission. All these studies made several recommendations to deepen the market. Some of the recommendations were to improve and modernize the infrastructural facilities of exchanges, strengthen the regulatory body, improve supply side management, modernize warehouses, better designing of contracts, removal of weaknesses in the spot market, ensure convergence of spot and futures market, ensure that farmers are connected to the futures market, ensure availability and accessibility of information, and transparency in information dissemination.

Among all these Committee reports, Khusro Committee (1980) and Kabra Committee (1994) Committee reports discuss the criteria used while permitting futures trade in commodities. It is widely documented that all commodities are not fit for futures trade (Silber, 1981, Tashjian, 1995, among others). Khusro Committee (1980) and Kabra Committee (1994) have made recommendations based on the criteria suggested by Baer and Saxon (1949). The characteristics include (1) homogeneity, (2) susceptible to standardization, (3) large supply and demand, (4) uncertain supply and demand, (5) supply must flow naturally to markets and (6) non-perishable commodity. Following this strategy, Kabra Committee recommended futures trading in 17 commodity groups.

Although these criteria cover vital commodity specific characteristics, it lacks an empirical basis. For example, one of the characteristics is that supply and demand must be large. But this criterion does not specify the numerical definition of large. It also does not clarify the basis of definition of large i.e. large with respect to the world demand/supply or large with respect to some other variable. Our review shows inconsistency in findings from the two Committees based on the same criteria and hence contradictory recommendations. The comparison of the reports of the two Committees is provided in Annexure 1. The inconsistency is because of lack of empirical basis in the definition of the variables.

These inconsistencies in the findings along with uncertainty in futures trade and frequent suspension of commodities over the years suggest that commodities have to be reweighted so that those which do not have high prospects in futures trade are not permitted. To address this issue, SEBI, in January 2017 recommended a list of criteria for commodities to be permitted in futures trade (Table 1). Here, parameters are broad characteristic groups and particulars are variables of interest within a particular parameter. According to SEBI's criteria, the commodity should be homogeneous so that participants are able to clearly understand its quality and characteristics. The commodity should be durable and storable for better price discovery. Commodities with high volatility in prices, higher seasonality and having a strong correlation with changes in global market are favorable for derivatives trading. Larger size of

physical market could create higher futures trading volume by attracting more hedgers and speculators into the market. However, commodities prone to price control and those which have excessive restrictions may be less conducive for derivatives markets.

Table 1: Criteria suggested by SEBI (January 2017)

Parameter	Particular
Commodity fundamentals	Size of commodity (production, imports, carryover stock), Volume in cash market, Storability, Homogeneous
Ease of doing business	Price controls, MSP, Stock limits, Govt policy, Applicability of other laws
Trade factors	Import/ export, Domestic market/geographical coverage, value chain, supply demand
Risk management	correlation, seasonality, basis risk, volatility, hedging incentive, liquidity
Benchmark potential	Existence of forward trading in over the counter markets, suitability for futures trading, potential to create domestic & global benchmark

Source: SEBI

SEBI asked exchanges in January, 2017 to assign weights and commodity specific sub-scores for each item in each parameter. Following which commodity specific scores were to be calculated by taking a weighted sum of these sub-scores assigned by the exchanges. These commodity specific scores were to be submitted by the exchanges to SEBI for approval of commodities. Following these recommendations, NCDEX has come up with three alternate weighting strategies (table 2). The first variant (original weights) gives highest weight to risk management and least weight to benchmark potential. The second strategy once again gives highest weight to risk management and ease of doing business. It gives the least weight to trade factors. The third strategy gives higher weight to benchmark potential compared to earlier strategies but gives risk management the highest weight.

Table 2: Weight strategy given by NCDEX after SEBI directive in 2017

Parameters	Original weights (percentage)	Variant 1 (percentage)	Variant 2 (percentage)
Commodity fundamentals	20	16	20
Ease of doing business	20	25	20
Trade	20	13	10
Risk management	24	30	30
Benchmark potential	16	16	20

Source: NCDEX

NCDEX has also assigned its own sub-scores and calculated commodity specific scores (Table 3). The cutoff score for a commodity is 3. If the commodity specific score is greater than 3, then the commodity has high prospects and must be allowed to be traded. The scores given in Table 3 show that irrespective of the weight strategy used, all commodities have high prospects in futures trade. However, these scores do not seem to capture the extent of intervention and hence overestimate their potential.

For example, these scores show that chana has high prospects in futures trade. However, trade in chana was suspended for a year (from July 2016 to July, 2017) and had to face suspension previously as well in 2008. Its margins were raised to 95 percent in June 2016. Given the significance of chana in terms of food security, it will continue to attract government attention more frequently than indicated by these scores. Similarly, there have been several interventions in the futures trade of sugar. Margins on the long side for sugar were increased to 70 percent in September, 2016 which reduced its traded volume. The margins were again reduced in January 2017. These examples of frequent regulatory interventions raise a doubt on the criteria, weights and scores assigned. It shows that these parameters have to be recalibrated and different weights assigned in such a way that only such commodities which have high potential in futures market are taken up. We discuss our proposed criteria in details in Section 4.

Table 3: Scores given by NCDEX

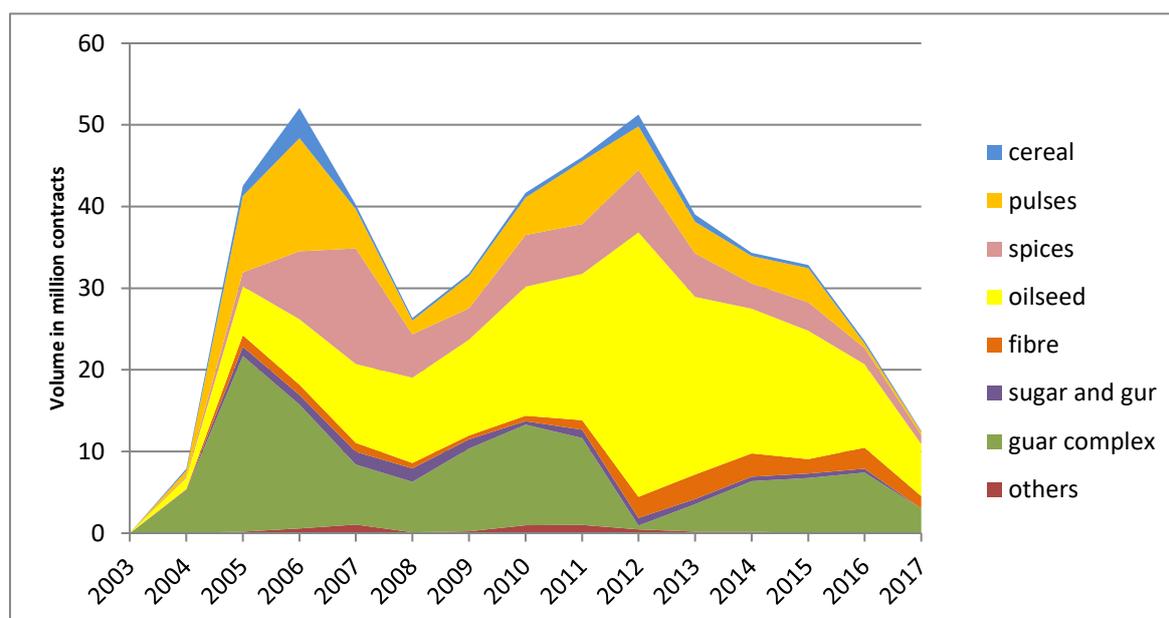
Commodity	Original weights	Variant 1	Variant 2
Chana	3.85	3.64	3.82
Soybean seed	4.22	4.09	4.19
Soybean oil	4.26	4.14	4.23
Pepper	4.02	4.17	4.17
Rape and Mustard seed	4.01	3.9	4
Sugar	4.07	3.88	4.07

Source: NCDEX

Presently, there are three national exchanges in India, viz. National Commodity Derivative Exchange (NCDEX), Multi Commodity Exchange (MCX) and National Multi Commodity Exchange (NMCE) and two regional exchanges, viz. Chamber Of Commerce, Hapur for rapeseed and mustard seed and Rajkot Commodity Exchange Limited for castor seed (SEBI Annual Report-2016-17). The national exchanges were formed in 2003 when major initiatives were taken to revamp the futures market. Among the three exchanges, 87 percent of the total value of agricultural commodity trade took place in NCDEX in 2015-16 (SEBI Annual Report, 2015-16). Forward Contracts Regulation Act, 1952 (FCRA) was repealed and SEBI took over from Forward Market Commission as the regulator in September, 2015. Futures market currently falls under the purview of Securities Contracts Regulation Act (SCRA), 1956.

Figure 2 shows that composition of high traded commodity groups have changed over the years. Pulses and guar complex were the highest traded among all agricultural futures trade in the earlier years. However, over the later years, the highest traded commodity groups in India were oilseed complex and guar gum complex. Table 4 reports the highly traded commodities in India in TE-2016 which include soybean complex (21 percent), guar gum complex (22 percent), chana (9 percent), castor oil complex (8 percent), cotton fiber (8 percent), rapeseed (9 percent) and cotton oil seed complex (7 percent).

Figure 2: Evolution of futures trade in agricultural commodities in India



Source: NCDEX and MCX

Some of the common characteristics of these commodities are as follows- (1) use of commodities for feed or other commercial purposes. Oilseeds and guar gum account for the largest share in total trade. While oilseeds are used mainly to produce meal (used as feed), guar gum is used for commercial purpose. (2) None of the commodities currently traded are sensitive from the perspective of food security and Government intervention. The only exception was chana which is consumed as food and (3) these are globally traded.

Table 4: High traded commodities in India in TE-2016

Commodities	% share in global production	% share in global trade	Use
Soybean	3	32 (import of oil)	Feed
Chana*	68	28 (imports)	Food
Castor oilseed*	86	87 (export)	Feed
Rapeseed	9	10 (export of meal)	Feed
Guar gum complex#		72.4 (Export)	Commercial use
Cotton oilseed complex	29	13 (export of oil cake)	Feed
Cotton	25	13 (export)	Commercial use

Source: USDA-FAS- data for TE-2016. *Data on production and trade from FAO-STAT and pertains to TE-2013 since that is the latest available data. # data from APEDA for TE-2015. Note- These commodities form more than 80% of volume of agricultural contracts in TE-2016

The above discussion on evolution gives evidence of lack of consistency of Indian agri-futures market and shows that it has not been able to recover, particularly post 2012. So what

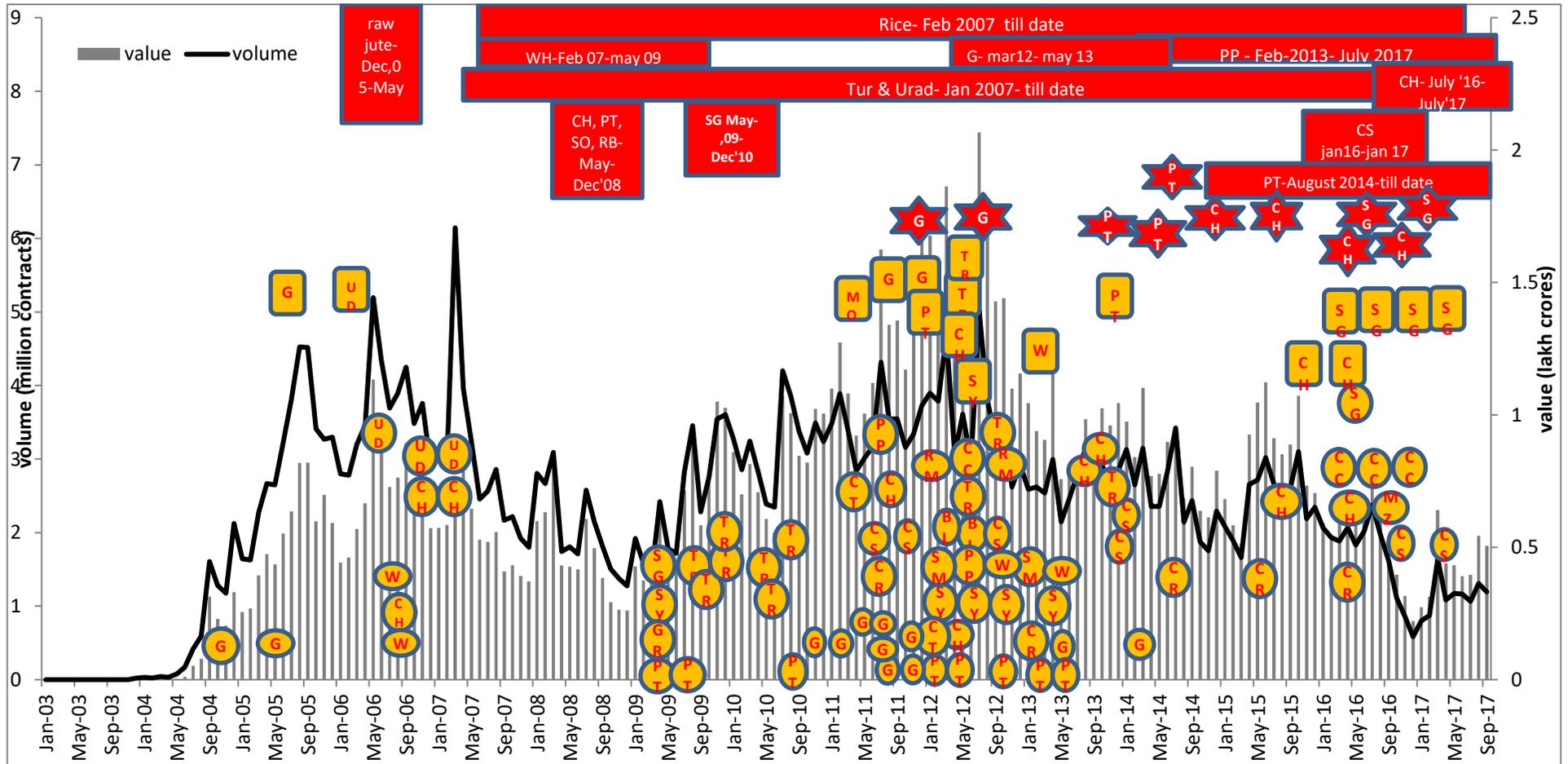
went wrong with agricultural futures in India? Tracing the evolution of Indian futures market, we find that there were several incidents post 2012 which could have contributed to the crash.

- Firstly, regulatory interventions such as changes in margins were more frequent post 2012 compared to the period before that. Figure 3 reports the imposition of suspensions and margins at NCDEX (the largest agri-futures exchange) since 2003. The topmost red bars/boxes report the suspensions since 2003, red stars show margins higher than 50 percent and yellow boxes show margins between 25-49 percent since 2003. The exact dates for imposition of margins are given in Annexure 3 and duration of suspension is given in Annexure 2. Some takeaways from the figure are-
 - Suspensions have been targeted more towards commodities sensitive from the perspective of food security like all types of pulses, rice and wheat.
 - Duration of suspensions has also been more for these commodities. For example, commodities like tur, urad, rice have been suspended for more than a decade now.
 - The quantum of margins is also biased against these commodities. For example, 100 percent for potato since 2014, 95 percent for chana in June, 2016 and 80 percent for sugar in September 2016. Such high margins transmit negative signals to the market and have a detrimental impact on trade. Less sensitive commodities like oilseed complex can be seen to have lower margins on an average. For example, out of 11 instances of red star in Figure 3, 9 cases are for sensitive commodities
 - The quantum and frequency of margins have increased post 2012. Figure 3 shows that the number of yellow squares is more post 2012 compared to earlier years. Margins above 50 percent can be seen only after 2012.

The consequence of these interventions can be seen in the small share of cereals pulses and other highly sensitive commodities high share of oilseed complexes and guar gum complex in the total agricultural contracts traded. This has to be kept in mind while designing policies to revamp the market.

- Secondly, the infamous National Spot Exchange Limited (NSEL) scam came to light around 2012 when FMC sought clarifications from NSEL for violating certain conditions of exemptions granted to them under Section 27 of FCRA. Allegations were that the board of directors allowed short selling, and there was no system in place to verify physical possession of goods by sellers before allowing them to trade and settlement of all contracts was allowed beyond the permissible limit of 11 days. The investigations are still going on and several key persons from exchange, NSEL management and Government officials have been questioned. Scams like these demoralize genuine traders and instill a feeling of fear and mistrust in the system. It is conceivable that all these developments could have together contributed in the crash of agricultural futures trading in India.

Figure 3: Interventions in Indian agri-futures market (NCDEX)



Source: Authors' compilation. Note- suspension- red bars over the corresponding period in x axis, margins less than 25%- yellow circle, margins between 25% and 50%- yellow square, margins greater than 50%- red star. Commodity - codes. BL-Barley, CC-Cotton seed oil cake, CH-Chana, CR-Coriander, CS-Castor, CT-Cotton, G-Guar Complex, GR-Gur, MO- Mentha Oil, MZ-Maize, PP-Pepper, PT-Potato, RB-Rubber, RM-Rape & Mustard seed, SG-Sugar, SM-Soy bean Meal, SO-Soybean oil, SY-Soybean, TR-Turmeric, UD-Urad, W-Wheat

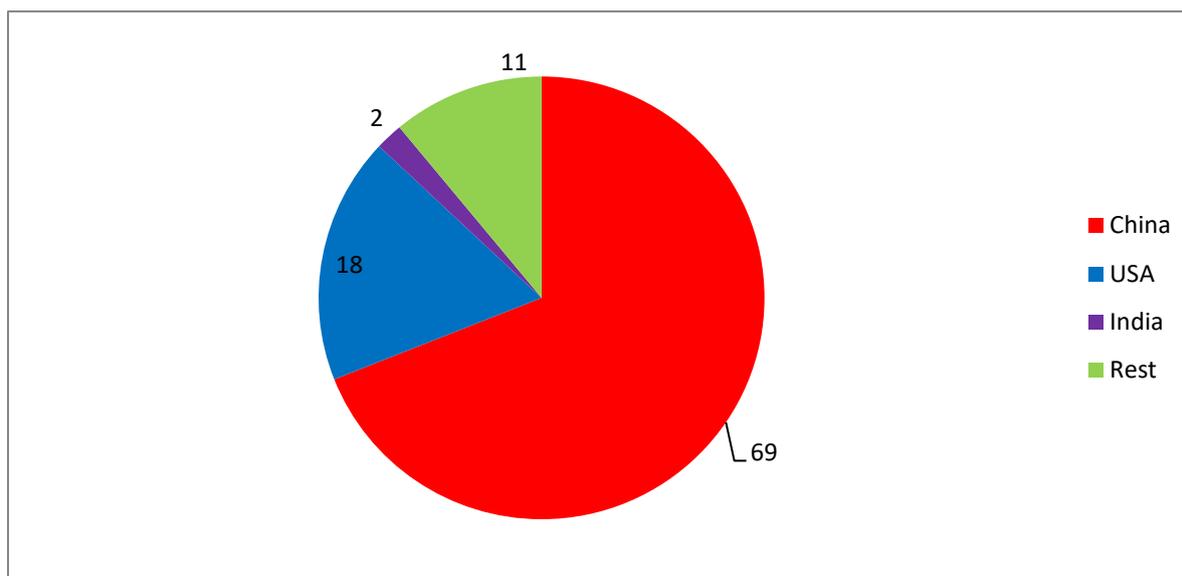
- Thirdly, Commodity Transaction Tax (CTT) of 0.01 percent was imposed on non-agro commodity futures trading in the Union Budget 2013-14 and was implemented from July 2013. The objective behind imposing CTT was to regulate the activities of speculators and also mobilize revenue. Ray and Malik (2014) conducted two event studies, one for 50 day period and the other for 120 day period before and after CTT implementation on July 1, 2013 to test the impact of CTT on trading volume and open interest. They found that there was a significant drop in volumes traded of commodities such as gold, copper, crude oil and mentha oil, which were all subject to CTT. Although agricultural commodities were mostly exempt from CTT, the list of exempt commodities was revised several times. Initially, 23 agricultural commodities were exempted from CTT in June 2013 and then the numbers of exempted commodities were increased to 61 in February 2015. It is plausible that this also led to uncertainty among market participants and therefore resulted in low volume of trade.
- Finally, the idea of transition of regulatory power from FMC to SEBI was conceived and implemented during this phase. It is conceivable that the process of transition which created uncertainty among stakeholders of the market resulted in decline in trade.

To restore agri-futures trade in India, it is necessary that market sentiments are turned favorable and confidence is restored among market players. Given the history of interventions against sensitive commodities, one of the ways to do this would be by focusing on commodities which have a higher potential in futures market. Once futures markets are deepened for these high potential commodities, stakeholders will be more confident which will increase participation and volumes of trade. However, once commodities with higher potential are identified, the onus falls on the regulator and policymakers to help develop the market by giving a clear direction in terms of choice of commodities, and then stay the course by adopting a stable policy with minimal interventions. To identify commodities with high potential, we study global commodity markets as well as look at domestic conditions, and based on that identify commodities which can be potential winners for agri-futures markets.

3. Global agri-futures markets and some takeaways for India

Overall 1.6 billion agricultural futures contracts were traded across the world in TE-2016. China and USA are the frontrunners accounting for 69 percent (1.1 Billion contracts) and 18 percent (0.28 Billion contracts) of the total global agricultural futures trade, respectively (Figure 4). Having started in 1993, China has exhibited an outstanding performance in terms of its contribution to the global agricultural futures trade.

Figure 4: Share of China, USA and India in global agri-futures trade in TE- 2016



Source: FIA (several years),

3.1 Futures market in China

China currently trades the largest number of agricultural futures contracts in the world. Unlike USA and India, the origin of Chinese derivative market is recent. Organized futures trading started in China only in 1993. A unique feature of the development of Chinese commodity futures trade is that it was a deliberate but cautious attempt and was extensively based on pilot projects and experimentation. Experts from CBOT advised the Chinese that spot or wholesale market of sufficient size and efficiency have to be developed before establishing futures market (Peck, 2001).

China Zhengzhou Grain Commodity Exchange (CZCE) was set up in 1990, first as a wholesale market. Organized futures trading started in CZCE later in 1993. This was followed by setting up of Dalian Commodity Exchange (DCE) in 1993 and Shanghai Commodity Exchange (SCE) in 1996. The first commodities introduced for trade in China were mung beans, wheat, corn, soybean and sesame (Zhao, 2015).

In the initial years, futures trade was looked at as a means of making fast profits in China. This led to formation of numerous exchanges around the country and introduction of several new contracts. According to some studies, more than 33 exchanges developed around this time in China (Peck, 2001). However, lack of proper understanding of the market and weak regulatory framework resulted in massive speculation and non-standard trading practices. These chaotic tendencies were curbed through state induced reforms in 1993 and 1998 referred to as ‘the first rectification’ and ‘the second rectification’ respectively. These reforms were aimed to reduce the number of exchanges in China so that manipulative tendencies could be controlled. The State administration announced new regulations in these

reforms to govern the disordered markets leading to shut down of most of the exchanges and suspension of most of the products.

The regulatory body, China Securities Regulatory Commission (CSRC) was set up in 1992 to regulate and clean up the futures market. Currently, there are four commodity trading exchanges in China - China Zhengzhou grain Commodity Exchange (CZCE), Dalian Commodity Exchange (DCE), Shanghai Commodity Exchange (SCE) and China Financial Futures Exchange (CFFE). Out of these, CZCE, DCE and SCE trade in agricultural commodities. The largest agricultural exchange is DCE where 52 percent of all agricultural contracts were traded in TE-2016. Comparative picture of all exchanges is provided in Annexure 4.

An interesting feature of the Chinese agri-futures market which might have aided in its development is participation of State Trading Enterprises for example China National Cereals, Oils and Foodstuffs Corporation (COFCO) Futures Group in China. It has two shareholders, COFCO which owns 65 percent of total shares and China Life which has 35 percent share. COFCO, founded in 1952 is state owned food processing holding company and is the largest food processor, manufacturer and trader in China. It is directly administered by China's state council and is the sole agricultural products importer and exporter operating under direct control of the central Government. COFCO Futures was formed in 1996 and has full membership of all domestic futures exchanges. Their services include futures brokerage, investment consulting, overseas futures business among many others. COFCO's volume traded has increased over the years and they trade in agricultural commodities like soybean oil and meal, palm oil, cotton, sugar, etc in the last ten years². Participation of state enterprises like COFCO in futures market instills positive sentiments and reliability among other players in the market.

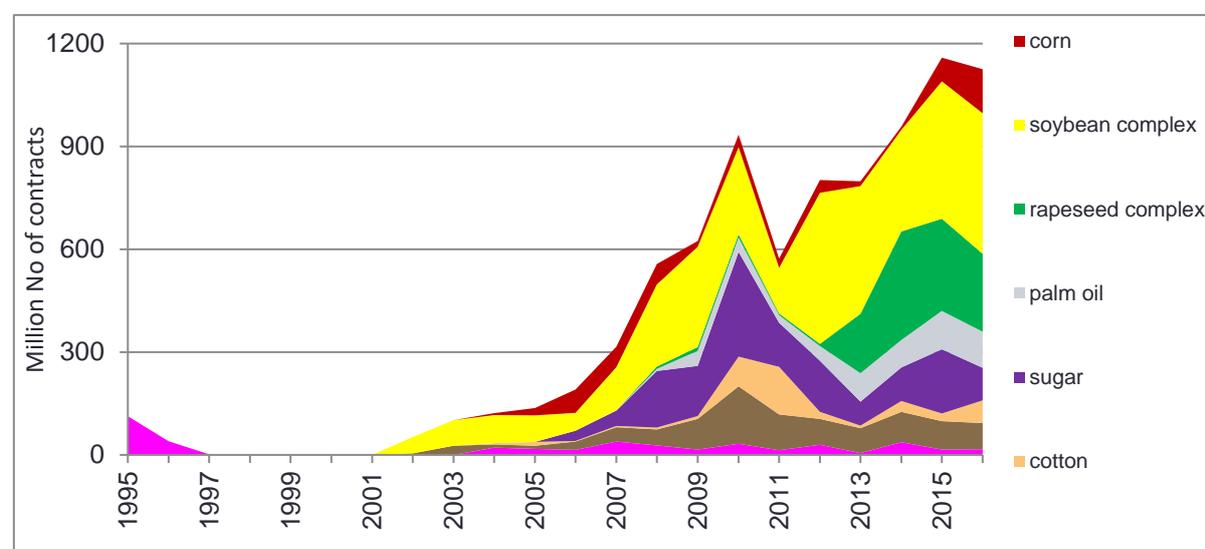
Another interesting aspect of the Chinese futures markets is that contracts are compulsory delivery based contracts. All agri-commodities traded in the Dalian Commodity exchange, viz. soybean complex, corn, corn starch, eggs, palm oil are compulsory delivery based. This helps the control the level of speculation in the market and makes policymakers and the regulator comfortable with the functioning of the market. Both state participation and the assurance of delivery are features which we believe makes the state comfortable by controlling speculation and encourage hedgers in the market.

Figure 5 shows the major agricultural commodities traded in China between 1995 and 2016. The history of Chinese future trade shows that it was only in the last decade (post 2003) that futures market grew exponentially. The trade volume in 2016 was 11 times higher than that in 2003. The number of commodities traded increased from 2 in 1995 to 4 in 2003 and 19 in 2016. The major agricultural commodities traded in China in TE-2016 were soybean complex, palm oil, corn and corn starch, sugar and rubber (Figure 5). Oilseed complex alone forms 68 percent of all agricultural contracts traded in China. The share of oilseed complex has been always high accounting for 92 percent of total agricultural futures trade in 2002. Its

² Source: <http://www.zlqh.com/file/Image/2015/07/12/20150712143251840.pdf>

share fell to 28 percent in 2006 when trade in other commodities like rubber, sugar and corn started in the exchanges. Soybean complex was the only oilseed traded till 2007 post which trading of rapeseed and palm oil started. Currently, rapeseed is the second highest oilseed traded in China after soybean.

Figure 5: Futures trade in China



Source: FIA (several years)

The highest traded commodities are- soybean complex (34 percent), rapeseed complex (25 percent), sugar (12 percent) and palm oil (9 percent). These commodities form 80 percent of agricultural futures trade in China in TE-2016 (Table 5). Some of the common features of these commodities are: i) all these commodities are not sensitive in terms of food consumption; ii) these are mostly used as feed material (for example, oilseed complex); iii) these commodities have a high domestic demand for non-food use (being a predominantly meat eating population, there is high domestic demand for feed material in China), and iv) all these commodities are globally traded. China has a high share in global import of these commodities. For example, import share of China in global import of soybean oilseed is 63 percent.

Table 5: High traded commodities in China in TE-2016

Commodities	% share global production	% share global trade	Use
Soybean oilseed	3	63 (import)	Feed
Palm oil	0	15 (import)	Feed
Rapeseed	21	17 (import)	Feed
Sugar	7	10 (import)	Commercial use

Source: USDA-FAS, several years

3.2 *Futures market in USA*

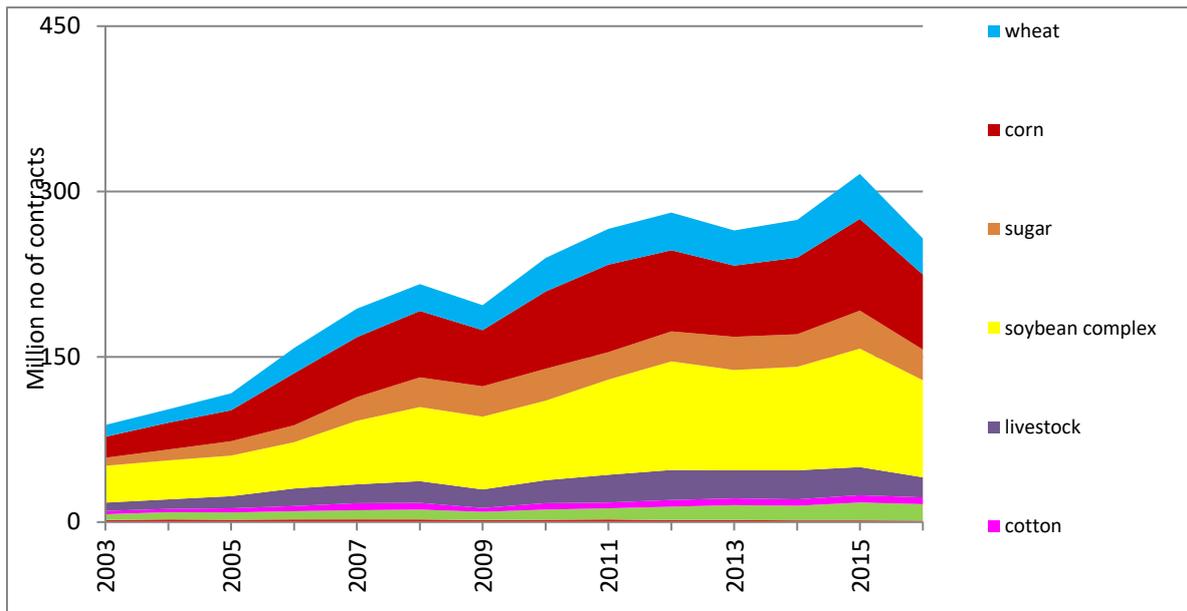
USA is the oldest player in agricultural derivative market. The origins of organized futures trade in the world have been recorded in Chicago Board of Trade (CBOT) in USA in 1865. CBOT was initially established as a spot wheat market in 1848. Irwin (1954) documents that a flourishing wholesale spot market for grains surrounded by grain producing areas, with large scale inventories along with well-developed rail, road and water connectivity and exposure to financial risk were some of the reasons why futures trade first started in Chicago.

Grains such as corn and wheat were first traded in the spot market in CBOT. Both these crops being seasonal resulted in high price volatility. A large-scale grain inventory developed because of well-developed transportation and abundant grains produced in the neighboring areas. This large-scale grain inventory gave rise to the need for hedging which was met through futures trade. Cotton is another commodity in which futures trade started very early in New York Cotton Exchange in 1870 because of trade between English and American traders.

Some of the other commodities in which futures trade developed in due course were eggs, butter and soybean. Forward trading in eggs started in 1880 while organized futures trading began in 1919. Price was volatile for eggs because of seasonality in production during that period and fairly uniform annual demand. The period of evolution was very slow compared to that of grains possibly because technological advancements required to store eggs were slower. Trading in soybean started in 1936 after it achieved commercial success around 1935. Price volatility led to risks for farmers, traders, and resellers. Although grown in the same area as corn, development of futures trading was much slower and came around much later compared to corn possibly because soybean as a crop attained commercial success much later.

Commodity Futures Trading Commission (CFTC), the regulatory body in USA was established in 1974 as an independent agency of the US Government that regulates both the futures and options market. CFTC has exclusive jurisdiction over futures trading in all commodities. The major exchanges trading in agricultural commodities are Chicago Board of Trade (CBOT), Chicago Mercantile Exchange (CME), Minneapolis Grain Exchange (MGE) and Intercontinental Exchange (ICE) Futures US (refer to Annexure 5 for details). With 73 percent of the total agricultural contracts in USA being traded in CBOT, it is the largest exchange in terms of agricultural futures trade. Currently, USA ranks second after China in terms of volume of trade in agricultural commodities. The most important commodities traded in USA are soybean complex and corn. Figure 6 gives the break-up of agricultural contracts traded in USA since 2003. The share of soybean complex is 34 percent of overall agricultural futures trade while the second highest traded commodity is corn (26%) in TE-2016. The number of commodities traded has been stable in the last decade- 16 in 2003 and 19 in 2016.

Figure 6: Futures trade in USA



Source: FIA (several years)

Table 6 lists the highly traded commodities in the futures market in USA. These commodities are- soybean complex (34 percent), corn (26 percent), wheat (13 percent) and sugar (11 percent). They formed 84 percent of agricultural futures trade in USA in TE-2016. Similar to China, all these commodities are not sensitive from the perspective of food security of an average American consumer. These are primarily used as feed material or for other commercial purposes. Although wheat is used as food, it is not sensitive from the perspective of food security in USA, given that USA has large surplus of wheat to export. Also, these commodities account for high volume of production and trade in the global market. USA is a net exporter of soybean, corn and wheat and is a net importer of sugar in addition to being one of the largest producers of these commodities. For example, USA is the largest producer of maize (36 percent of global production) and soybean (34 percent of global production).

To summarize, some of the common characteristics of high performing commodities in USA are: i) used as feed material, ii) not sensitive from the perspective of food security of an average American iii) high share in global trade and iv) high share in global production.

Table 6: High traded commodities in USA in TE-2016

Commodities	% share in global production	% share in global trade	Use
Soybean complex	34	40 (export)	Feed
Corn	36	36 (export)	Feed
Wheat	8	14 (export)	Food-but not sensitive
Sugar	5	7 (import)	Commercial use

Source: USDA-FAS, several years

To conclude, the experience of futures trading in the three countries, viz China, USA and India brings out that China has been the star performer in the last decade. Despite being one of the most recent entrants in the futures market, 69 percent of all agricultural contracts are traded in China in TE-2016. The beginning of futures trade in China was a very cautious attempt with pilot projects and experiments. It went through chaos and confusion in the initial years. Government cracked down on exchanges to ensure that market is regulated. Unlike China, origins of India's future trading are more than hundred years old. Despite such a long history, Indian agricultural futures trade form only 2 percent of all agricultural contracts traded globally. It is noteworthy that despite being similar to China in terms of dominance of small and marginal farmers, there is a stark difference between the two economies in terms of deepening of futures markets. Indian markets have a lot to learn to develop itself into a mature market in the next five to ten years. Some of the key takeaways from the Global experience are-

- First, suspension of trading in commodities has been a rare event only in situations of extreme diplomatic or political or military emergencies. For India, on the other hand, suspensions and extremely high margins have been very frequent recurrences. In the Indian context, commodities have been suspended because of issues with quality (pepper) and price volatility, especially upswing (pulses, sugar, rice and guar gum complex). Comparing the trajectory of number of commodities traded across these three countries, it is observed that the number of traded commodities increased over the years in China and USA while in India, it went the other way round.
- Second, these countries have focused on commodities which are not sensitive from the perspective of food security of a common man and almost all of them are non-staple food commodities. Further, it is found that these countries have a large share in either import or export of all these commodities.
- Third, futures contracts traded in China are all compulsory delivery based. This controls the level of speculation in the market and makes the regulator and policymakers comfortable with the market functioning. This is a significant takeaway for Indian markets where contracts for several commodities do not assure delivery as delivery is based on seller's intention or intention matching.
- Fourth, participation of state enterprises like COFCO for China in futures market instills positive sentiment and brings stability among other players in the market.

4. Our proposed criteria

We develop our criteria based on characteristics of highly traded commodities identified in Section 3. As discussed earlier, some of the characteristics which are common among all highly traded commodities are: (1) its use as food or feed, (2) commodity surplus, (3) its share in global trade, (4) its price volatility and (5) sensitivity of commodity. We study 14 commodities, viz. rice, wheat, maize, chana, soybean complex (seed, oil and meal), mustard and rapeseed complex (seed, oil and meal), palm oil, sugar, pepper and cotton. These

commodities form 60 percentage of total volume of agricultural futures trade in India in TE-2013. The time period of our analysis span over four years, viz. 2010, 2011, 2012 and 2013. We first discuss the parameters which we use in our criteria in this section and methodology to develop our scores has been discussed next. Finally, we discuss the results of our analysis.

4.1 Parameters chosen

Use of the Commodity- One crucial common characteristic feature across all highly traded commodities is their use as feed material. If the commodity traded is used as a feed material or is not important from the perspective of food security, fluctuation in its prices may not be of immediate concern to the Government and therefore it will be less prone to Government intervention. Sensitive commodities attract Government attention and increase the chances of abrupt suspensions. In our strategy, we differentiate the commodities in three broad groups, viz. staple food, non-staple food items and feed material. We give sub-score of 1 to staple food commodities like rice, wheat and pulses. We give sub-score of 3 to non-staple food commodities like oil, spices, sugar etc. and sub-score of 5 to commodities not used as food material like cotton or feed material like oilseed meals. This characteristic feature of a commodity has been overlooked in the criteria suggested by SEBI. We give the comparison of our proposed criteria with that of SEBI's criteria in Annexure 6.

Commodity surplus- Performance of commodity in the futures market is dependent on its fundamental characteristics like its supply and its share in consumption basket, etc. It is conceivable that higher the surplus of the commodity in the country, higher will be its prospect of success in the futures market. Low surplus will attract Government concern and intervention and may make futures trade uncertain. To compute commodity specific sub-score, we use domestic surplus of the commodity, which is measured as the ratio of production to quantity available. Since data on net availability of a commodity is not available annually, we calculate quantity available as follows: Availability = 87.5 percent of Production + Imports - Exports (Agricultural Statistics at a glance, 2007). 12.5 percentage of production is assumed to be seed, feed and wastage. Data on production, import, export have been collected from FAO-STAT and USDA as applicable³.

Trade Related- The third common characteristic feature is that all these commodities are globally traded. The importers and exporters hedge their risk by trading in the futures market. Therefore, higher the share in global trade (import or export), higher is the probability of having a good prospect in futures market. For example, USA is the largest exporter of soybean and forms 40 percent of global export while China is the largest importer of soybean and forms 63 percent of global import. In our analysis, we use India's share of import and export in global trade of the commodity as the measure of trade. Data for quantity imported

³ Data for oilseed complex and sugar has been collected from USDA-FAS and for other commodities data have been collected from FAOSTAT. USDA-FAS data was compiled from <https://apps.fas.usda.gov/psdonline/app/index.html#/app/advQuery> and FAO-STAT from <http://www.fao.org/faostat/en/#data>

and exported has been collected from FAO-STAT and USDA as applicable.⁴ 2013 is last year of our analysis since it the last year for which data on global trade is available from FAOSTAT. To maintain parity with other variables, we collect data for oilseed complex and sugar from USDA-FAS and rest from FAOSTAT.

Price Volatility- Another extremely crucial factor is price fluctuation. If there is no fluctuation in prices, the need to hedge risk is minimal and therefore the volume of futures trade will remain thin. SEBI's criteria assume that higher the volatility more is the prospect of the commodity in futures trade. Our hypothesis is that the relationship is inverse U-shaped. Higher the CV more is the attractiveness of the commodity in futures market but after a certain point, a high CV becomes a concern for the Government and is likely to attract intervention. For example, commodities like chana, rice, wheat, guar gum, etc have been suspended when their prices increased beyond a certain range. We use monthly commodity level Wholesale Price Index (WPI) data⁵ to calculate the Coefficient of Variation (CV) for last three years as a measure of price fluctuation.

Sensitivity of Commodity- In India, regulatory intervention has been a pertinent feature of futures trade. Commodities have been abruptly suspended whenever there has been a situation of price volatility and supply-demand imbalance. Therefore, in our view, sensitivity of a commodity from the perspective of Government attention is a crucial factor while determining its prospect in the futures market. We use two measures of sensitivity of the commodity: i) procurement at MSP/ Market intervention schemes/ other Government support schemes and ii) average monthly positive price (WPI) deviation from the trend for the commodity in the last five years.

Union Government announces minimum support prices (MSP) for several commodities (MSPs were announced for 28 commodities for the kharif and rabi marketing seasons of 2016-17⁶). Procurement of commodities on the basis of minimum support prices prevents wide fluctuations in prices and reduces its prospects in future market. However, procurement on the basis of MSP is commodity specific. Some commodities are procured regularly for example- wheat, rice and sugarcane⁷. Cotton is also procured from time to time when prices are below MSP. However, despite announcement of MSPs every year, commodities such as pulses, oilseeds, onion, etc. are procured occasionally. SEBI has considered MSP in its criteria but has ignored the point that announcement of MSP does not actually lead to procurement of the commodity at that price. We include this aspect in our criteria. A score of 1 is given if the commodity is regularly procured, 3 if occasionally procured and 5 if not.

⁴ We use these data sources because of availability of comparable data on Indian and Global trade for these commodities the same sources

⁵ Data Source: <http://eaindustry.nic.in/home.asp>

⁶ Source: <http://cacp.dacnet.nic.in/ViewContents.aspx?Input=1&PageId=36&KeyId=0>

⁷ It must be noted that the price support mechanism is different across different crops in India. For example, rice and wheat are procured at Minimum Support Prices announced every year. Sugar cane, on the other hand is procured at Fair and Remunerative Prices (FRP). However, some states also announce State Advised Prices and procure sugar cane at these prices.

The second measure of sensitivity is average positive price deviation from trend of monthly WPI for the last five years. Lower is the price rise from trend (or positive deviation of price from its trend), lower will be the Government's concern and hence possibility of intervention. Further, the tolerable range of positive range of deviation varies with sensitivity of the commodity. For example, even a small positive price deviation for staple food item like rice from its trend will invite attention of policy makers while the margin of tolerance will be higher for less sensitive commodities like soybean meal which is primarily used as feed material. In case of a price rise, attention of the Government turns towards that commodity. However, a price fall, unfortunately, has mostly not been so much of a concern for the Government. SEBI-criteria do not consider the role of price rise on the prospect of a commodity in futures market.

We use average positive deviation of monthly WPI data from its trend for previous five years in our analysis. So, to construct the variable for say, year-2010, we need data on monthly WPI from 2005 to 2009. We first plot the data for the five years, estimate its trend and then compute the deviation of the actual WPI from its trend. Average of positive deviations in these five years has been used for the analysis. WPI data for palm oil and soybean meal are only available from 2005. Hence, to ensure consistency in our analysis, we start our analysis from 2010. In our criteria we consider the fact that tolerable range of the deviations will be commodity specific. Therefore we give cutoffs for different commodities according to conceivable tolerable range. Table 7 summarizes the relationship between these parameters and potential of a commodity in futures market. For each commodity, we compute values of each parameter for our period of study. We then generate sub-scores on the basis of these values and conceivable relationship between these parameters and the prospect of a commodity. The cut-offs and respective sub-scores for all variables are given in Annexure 7. These cut-offs have been finalized after detailed discussion with experts in the field.

Table 7: Rules used for sub-scores

Parameter	Variables used	Commodity specific scoring Strategy	Data Source
Commodity surplus	Surplus = Production /consumption	High sub-score if high share	FAO-STAT and USDA as applicable
Use of commodity	Used as food or feed	High sub-score if used as feed & low if used as food	Use of the commodity
Sensitivity	Procurement at MSP/ other interventions	High sub-score if no procurement	Agricultural Statistics at a Glance
	Average positive monthly price deviation from trend (last five years)	High sub-score if low deviation and tolerable range of deviation varies with sensitivity of the commodity.	Office of the Economic Advisor, Ministry of Commerce and Industry, Government of India
Global trade	Import or export /global trade (percentage)	High sub-score if high share in trade	FAO-STAT and USDA as applicable
Price volatility	CV of WPI in the last three years (percentage)	High sub-score if variation is greater up to 10 percent and then low sub-score for higher variation	Office of the Economic Advisor, Ministry of Commerce and Industry, Government of India

Source: Authors' calculations

4.2 Commodity-wise scores

We use Principal Component Analysis to identify the prospect of a commodity in the Indian futures market. We estimate our PCA model on sub-scores generated for each commodity and parameter on the basis of the conceivable relationship between the parameters and prospect in futures market (Annexures 6 and 7). Principal component analysis (PCA) is a mathematical procedure that transforms a number of (possibly) correlated variables into a (smaller) number of uncorrelated variables called principal components. The first principal component accounts for as much of the variability in the data as possible, and each succeeding component accounts for as much of the remaining variability as possible⁸. It must be noted that although we have computed commodity specific scores for some commodities, scores can be calculated for any other commodity following our methodology.

Table 8 gives commodity wise scores. A higher score indicates higher potential of the commodity to be traded in the futures market. It shows that commodity wise scores are not constant across years and are a function of economic characteristics at different points of time. For example, everything else remaining similar, a higher share in global trade for rice in the latter years has increased its score compared to the earlier years. Overall, the analysis shows that rice and wheat are not promising among cereals while maize has high prospects in futures market. That is because maize is not procured by the Government, is used largely as feed, is surplus in the country and therefore is not a sensitive commodity for the Government. Rice and wheat are basic staple food commodities and are extremely sensitive from the perspective of food security and even political stability. Because of this, price fluctuation in wheat and rice is a concern for the Government and is likely to invite attention at even small deviation in prices.

Chana is the only pulse traded in futures market in India or any other country in the world. Chana has lower scores and lower prospects because of its high significance in terms of food security and Government intervention, comparatively low domestic surplus and high average positive price fluctuations from trend. High scores for all oilseeds show that they have better prospects in futures trade. That is because they are mostly used as feed material and therefore are not sensitive commodities for the Government. For oil and meals, we find that both have high prospects for futures trade. However, since oil is used as food as well, prospects of futures trading are higher for meal compared to oil extracted from oilseeds.

Sugar is a sensitive commodity from the perspective of food security and sugarcane is procured at Fair and Remunerative Price (FRP) declared by Government of India or State Advised Price (SAP) declared by some states. India has a low share in global exports and a low surplus in most years. Our weighting strategy shows that sugar has low prospect in futures market and may attract Government intervention whenever prices fluctuate. For example, in August 2017, states have been asked to impose stock limits for sugar by the central Government for the months of September and October, 2017 to control rising in sugar

⁸ Methodology has been discussed in the Annexure 8

prices⁹. This would imply that any sugar producer owning quantities beyond these limits would have to off-load given the current situation. These abrupt Government interventions discourage genuine stakeholders and hamper market sentiments. Among spices, we compute scores for pepper. Our results show that pepper has high prospects in futures market despite being used as food since it is not a sensitive commodity from the perspective of food security and therefore Government intervention is unlikely. Cotton also shows high potential for futures trade.

We find that commodity groups like oilseed complex, spices and fiber have high prospects in futures trade while basic staple food commodities like rice, wheat, sugar and chana have comparatively lower prospects. Our results show that the commodity has a high potential if it is used as feed, has low sensitivity in terms of food security and likely Government intervention and has high share in global trade. Further, positive price fluctuations must be in the ‘tolerable’ range and price volatility must be high but once again below the ‘tolerable’ cut-off. It must be noted that as our results show, prospect of these commodities are function of the performance of the commodity in a particular year. Therefore it is necessary that prospect of these commodities is reviewed at regular intervals, preferably say on annual basis, but definitely one in three years.

Table 8: Results of Principal Component Analysis

Commodity Group	Commodity	Year-2010	Year-2011	Year-2012	Year-2013
Cereal	Rice	0	2	10	10
Cereal	Wheat	1	1	7	7
Cereal	Maize	82	82	80	88
Pulse	Chickpeas	17	17	20	6
Oilseed Complex	Oil, Palm	49	47	48	49
Oilseed Complex	Oilseed, Soybean	41	56	56	53
Oilseed Complex	Oil, Soybean	55	56	57	49
Oilseed Complex	Meal, Soybean	96	96	95	94
Oilseed Complex	Oilseed, Rapeseed	55	55	55	53
Oilseed Complex	Oil, Rapeseed	55	54	55	54
Oilseed Complex	Meal, Rapeseed	97	99	100	99
Spices	Pepper	59	78	56	63
Fibre	Cotton Lint	73	73	59	66
Sugar	Sugar	4	12	14	19

Source: Authors’ calculations

5. Conclusion

Agriculture futures trade in India has gone through a roller coaster ride since its revival in 2003. With consistently declining volume and value of trade, this uncertainty has become particularly worse post 2012. Our review shows that abrupt suspensions and interventions could have been one of the principal reasons driving the descent. The number of interventions and quantum of margins became more recurrent post 2012, compared to earlier years. Several

⁹ <http://pib.nic.in/newsite/mbErel.aspx?reid=170325>

commodities like chana, castor seeds, guar gum and pepper were suspended in this period. These interventions invite suspicion and insecurity among stakeholders and do not allow futures trading from achieving its principal objectives of risk management and price discovery. The margins as seen in Annexure Table 3 have been steeper for commodities like chana, sugar and potato which are sensitive from the perspective of food security and Government intervention. Other factors like NSEL scam, transition of regulatory authority from FMC to SEBI and imposition of CTT have possibly hampered trust in the market and contributed in the descent.

Against this background, the objective of the study is to identify measures to deepen agri-futures market in India. We recommend that it can be done by identifying and focussing initially on certain commodities which have high prospects of success in futures trading. Only when markets for these commodities are developed with minimal regulatory intervention, favourable market sentiment will get promoted among market players. We propose a set of criteria for success in agricultural commodity futures trade and we identify potential winners on the basis of these criteria. Identification of such criteria will enable policy makers and exchanges to understand which commodity to introduce, when to introduce, which ones to scale up and sustain and which ones to withdraw and suspend.

Recognizing this issue, SEBI introduced a list of criteria for eligibility of commodities in January 2017. SEBI has asked exchanges to assign weights against each parameter. NCDEX has assigned weights and commodity specific scores and has computed commodity specific scores. NCDEX finds that some commodities like chana and sugar have good prospect of success in futures trade. With chana being suspended from trade for over a year and frequent steep margins for sugar and chana, these high scores overestimate the potential of these commodities.

Our review of SEBI-criteria shows that although they have covered several aspects, it has overlooked certain fundamental factors and relationship between potential of a commodity in futures market and the variables used to calculate the potential. Our criteria is based on the following characteristics of high traded commodities in the best performing countries across the globe (China and USA) - (1) These commodities are not sensitive from the perspective of food security and Government intervention, (2) almost none of them are basic staple food commodities for a common man's food security basket, (3) the country has large share in global trade of these commodities and (4) these countries are large producers and consumers of these commodities. Based on these takeaways the parameters in our criteria are-commodity surplus related, use of the commodity, its sensitivity, trade related and price volatility.

We compute commodity specific scores for rice, wheat, maize, chana, soybean complex, rapeseed and mustard oil complex, palm oil, sugar, pepper and cotton for four years, 2010 to 2013 using Principal Component Analysis. We find that commodities which are not staple food and therefore not sensitive from the perspective of Government intervention and food security and those in which India has a high share in global trade could be potential winners in futures market. Commodities with high volatility in prices are good candidates for futures

trading but their volatility must not be beyond a certain range. Our results show that rice, wheat, chana and sugar have low prospects while commodities like maize, oilseed complex, fibre and spices have higher prospects. Our results for all four years show that potential of a commodity is not constant over time and is a function of the economic scenario including domestic and global situation at that point of time.

Some of the limitations of the present study have to be kept in mind while drawing conclusions. One limitation is that the use of PCA has often been criticised as it is not econometrically robust compared to other methodologies like regression. Yet, it is the most widely used econometric technique to compute indices in studies pertaining to social sector. Estimating a regression model to select commodities with high prospects in futures trade can be a promising way forward. Nevertheless, to the best of our knowledge there is no existing literature in public domain, which answers the questions that we ask in this paper. We hope that our results provide a new dimension to this area of research.

Therefore, to deepen the agricultural futures market, India must do the following-

- First, stay away from sensitive commodities (e.g., common rice, wheat, most pulses, and even sugar), at least for some time. Better focus and develop less sensitive commodities like oilseed complex (oilseeds, meals, and oils), feed (maize), cotton, basmati rice, spices, etc. Once markets are developed and the regulator has higher degree of comfort, then India can diversify to other commodities in agri-futures portfolio. This points to the important role that regulator has to play, by giving a clear direction in terms of choice of commodities, and then stay the course by adopting a stable policy with minimal interventions.
- Second, given the fluctuations in domestic production, consumption and global trade, these prospects need to be reviewed at regular intervals.
- Third, for government to have high level of comfort that speculators are not rigging markets, it may be useful if the regulator allows only delivery based contracts, at least till markets deepen.
- Fourth, Government of India can encourage its State Trading Enterprises (STEs) to trade on agri-futures platform. This will boost Government's confidence in agri-futures as it will have ample information from its STEs.
- Fifth, another strategy would be to make futures market in India more attractive for global players and Indian importers currently hedging in exchanges in foreign countries. For example palm oil importers of India are hedging their risk in Malaysia Derivatives Exchange in Malaysia. Out of overall trade of 13 million futures contracts in Malaysia, 11 million contracts (85 percent) are in crude palm oil in TE-2016. Futures trade in Indian exchanges for importers of major commodities can be incentivized by the Government by having a stable import export regime, appropriate duty structure and stability in Government policies related to futures trading.

- Lastly, it must be noted that markets will not deepen only by the initiatives of the exchanges. The Government can play an important role in this regard by formulating stable policies relating to export, import, stocking, and movement and trading of agricultural commodities. In the long run, an efficient and stable futures market for agricultural commodities will help the farmer by providing advance information about prices. This can be used by farmers to make informed decisions on planting of crops. The State Governments can also play a meaningful role by improving the functioning of mandis and implementing e-NAM in its true spirit.

It has to be recognized that developing agri-futures is as much the responsibility of the policy maker and the regulator as that of Commodity Exchanges, and both need to work in harmony for the benefit of various stakeholders, especially peasants who need useful information about future prices for their products while they are planting those crops.

References

- Antony, G. M. & Rao, K. V. (2007).** A composite index to explain variations in poverty, health, nutritional status and standard of living: Use of multivariate statistical methods. *Public Health*, 121, 578-587.
- Baer, J. B., & Saxon, O. G. (1949).** Commodity Exchanges and Futures Trading.
- Bhattacharya, H. (2007).** Commodity derivatives market in India. *Economic and Political weekly*, 1151-1162.
- Government of India (1966).** The Forward Markets Review Committee (Dantawala Committee Report).
- Government of India (1979).** Report of the Committee on Forward Markets (Khusro Report)
- Government of India (1993).** Report of the Committee on Forward Markets (Kabra Report)
- Government of India (2001).** Report of Expert Committee on Strengthening and Developing of Agricultural Marketing (Shankarlal Guru Committee)
- Government of India (2014).** (Kolamkar Committee)
- Gray, R. W., & Peck, A. E. (1981).** The Chicago Wheat futures market: Recent problems in historical perspective. *Food Research Institute Studies*, 18(1), 89-115.
- Hou, V. L. (1997).** Derivatives and dialectics: The evolution of the Chinese futures market. *NYUL Rev.*, 72, 175.
- Irwin, H. S. (1954).** Evolution of futures trading.
- Keaveny, J. (2004).** In Defense of Market Self-Regulation-An Analysis of the History of Futures Regulation and the Trend toward Demutualization. *Brook. L. Rev.*, 70, 1419.
- Krishnan, V. (2010).** Constructing an area-based socioeconomic index: A principal components analysis approach. *Edmonton, Alberta: Early Child Development Mapping Project.*
- Mohan, G., & Reddy, B.V.C (2017).** Influence of Allied and Non-farm activities on the Agricultural Transformation in Karnataka State: An Economic analysis. *Economic Affairs*, 62(3), 555-562.
- Naik, G., & Jain, S. K. (2002).** Indian agricultural commodity futures markets: a performance survey. *Economic and Political weekly*, 3161-3173.

- Nair, C. K. G. (2004).** Commodity Futures Markets in India: Ready for “Take off?”!. National Stock Exchange of India Limited, Mumbai, India.
- Peck, A. E. (1980).** The role of economic analysis in futures market regulation. *American Journal of Agricultural Economics*, 62(5), 1037-1043.
- Peck, A. E. (2013).** The development of commodity futures exchanges in Kazakhstan and China. *Models of Futures Markets*, 42.
- Ray, S., & Malik, N. (2014).** Impact of transaction taxes on commodity derivatives trading in India. *Indian Council for Research on International Economic Relations*.
- Saltelli, A., Nardo, M., Saisana, M., & Tarantola, S. (2004).** Composite indicators-The controversy and the way forward, OECD World Forum on Key Indicators, Palermo, 10-13 November.
- Sahadevan, K. G. (2002).** Sagging agricultural commodity exchanges: growth constraints and revival policy options. *Economic and Political Weekly*, 3153-3160.
- Sahadevan, K. G. (2005).** Derivatives and Price Risk Management: A Study of Agricultural Commodity Futures in India.
- Sahadevan, K. G. (2012).** Commodity Futures and Regulation. *Economic & Political Weekly*, 47(52), 106-12.
- Sen, A. (2008).** Report of the expert committee to study the impact of futures trading on agricultural commodity prices. *Ministry of Consumer Affairs, Government of India*.
- Silber, W. (1981).** Innovation, Competition, and New Contract Design in Futures Markets. *Journal of Futures Markets*, 1, 123-155
- Tashjian, E. (1995).** Optimal Futures Contract Design. *Quarterly Review of Economics and Finance*, 35, 153-162.
- Thomas, S. (2003).** Agricultural commodity markets in India: Policy issues for growth. *Derivatives Markets in India*.
- Vyas, S. & Kumaranayake, L. (2006).** Constructing socioeconomic status indices: How to use principal components analysis. *Advance Access Publication*, 9, 459-468.
- Williams, J., Peck, A., Park, A., & Rozelle, S. (1998).** The emergence of a futures market: Mungbeans on the China Zhengzhou Commodity Exchange. *Journal of Futures Markets*, 18(4), 427-448.

Annexure

Annexure 1: Comparison of Committee recommendations on commodity selection

Sr. No	COMMODITY	KHUSRO COMMITTEE (1980)	KABRA COMMITTEE (1994)
1	Cereals (Wheat, Rice, Maize)	not allowed - consumption, buffer stock, export, history, supply	Allowed for Basmati Rice and not others production , supply/ demand, import/export,
2	Pulses (Gram, Arhar)	not allowed - shortages, price, buffer stock	not allowed - price, supply
3	Fibre (Cotton, Kapas, raw Jute & Jute products)	Allowed for all - buffer stock , price export	allowed for Cotton -Price fluctuation, , supply,
4	Sugar Complex (Sugar & gur, khandsari)	Not allowed - government control, fluctuations in production, Wide variation in acreage	not allowed - govt. control on price & distribution
5	Spices (Turmeric, Pepper, Cardamom, Chillies)	allowed : supply, price, buffer stock, export	not allowed -prod , export, domestic prices
6	Edible Oilseed complex	not allowed shortage, price fluctuation, mass consumption	allowed - price fluctuations, price discovery, allowed for oil cake
7	Linseed oil and complex	Allowed for seed – surplus, used for industrial purpose, no relation with price of other edible oils Not permitted for oil - no export, narrow market	Allowed for seed - production, small share in production, price fluctuation, Khusro Committee recommended futures trading Oil not considered
8	Castor oil seed complex	Allowed for seed – export, prices determined in international market Not allowed for oil - export, market for oil is very narrow	Not considered
9	Plantation (Tea)	allowed - export potential , supply, buffer stock, price fluctuations	not allowed - increasing trend in prices, no regulated futures market history, Branded commodity
10	Others (Onion & Tobacco)	allowed Onion -supply glut , seasonal price fluctuation Allowed for Tobacco - Exports potential ,forex earner.	Allowed for Onion -price fluctuations-certain centre, perishable good

Source: Khusro Committee (1980) and Kabra Committee (1993)

Annexure 2: Commodities suspended in India for future trading since 2003

Sr. No	Commodity group	Commodity	Year	Frequency	Duration
1	Cereals	Rice	2007	Never revoked	10 years
2	Cereals	Wheat	2007	1	27 months
3	Pulses	Chana	2008, 2016	2	6 months, 1 year
4	Pulses	Tur	2007	Never revoked	10 years
5	Pulses	Urad	2007	Never revoked	10 years
6	Oilseed complex	Soya Oil	2008	1	6 months
7	Oilseed complex	Castor seed	2016	1	1 year
8	Spices	Pepper	2013	Never revoked	5 years
9	Sugar	Sugar	2009	1	16 months
10	Plantation	Rubber	2008	1	16 months
11	Fibre	Raw Jute	2005	1	7 months
12	Vegetables	Potato	2008, 2014	2	16 months, 1 month (collapse of trade as margins are now 100 percentage on both long & short side)
13	Others	Guar Complex	2012	1	14 months

Source: Based on data from “Report of the Committee to suggest steps for fulfilling the objectives of Price-discovery and Risk Management of Commodity Derivatives Market” 2014 & circulars accessed from NCDEX and MCX

Annexure 3: Interventions in Indian futures market (margins greater than 10%) and suspensions

date	commodity	margins	date	commodity	margins	date	commodity	margins	date	commodity	margins
Oct-04	guar	10	Feb-10	turmeric	10	Jul-12	turmeric	25	Jun-16	maize	15
Apr-05	guar	30	Mar-10	turmeric	20	Jul-12	potato	30	Jun-16	chana	55
May-05	guar	20	Jul-10	turmeric	15	Jul-12	soybean	40	Jun-16	chana	95
Dec-05	raw jute	suspend	Aug-10	potato	15	Jul-12	turmeric	40	Jul-16	chana	suspend
Apr-06	Urad	25	Nov-10	guar	10	Aug-12	soybean	20	Aug-16	coriander	10
May-06	raw jute	Launch	Dec-10	guar	20	Aug-12	soybean meal	20	Aug-16	cotton seed oil cake	20
May-06	urad	10	Dec-10	Sugar	launch	Aug-12	wheat	30	Aug-16	sugar	45
Jun-06	wheat	10	Feb-11	cotton	15	Aug-12	castor	15	Sep-16	sugar	70
Aug-06	chana	15	Mar-11	guar	10	Sep-12	potato	20	Dec-16	cotton seed oil cake	15
Aug-06	wheat	20	Mar-11	mentha oil	30	Sep-12	turmeric	20	Dec-16	sugar	30
Oct-06	chana	20	May-11	pepper	10	Oct-12	chana	10	Jan-17	sugar	50
Oct-06	urad	20	Jul-11	guar	15	Oct-12	wheat	20	Jan-17	castor	launch
Jan-07	urad	10	Jul-11	castor	10	Jan-13	coriander	10	Mar-17	castor	20
Jan-07	chana	15	Jul-11	guar	10	Feb-2013	Pepper	suspend	Mar-17	sugar	40
Jan-07	Tur	suspend	Jul-11	coriander	10	Mar-13	potato	35	Apr-17	sugar	30
Jan-07	urad	suspend	Aug-11	guar	10	Mar-13	turmeric	10	Jul-17	chana	launch
Feb-07	rice	suspend	Sep-11	chana	10	Apr-13	soybean	10	Jul-17	Pepper	launch
Feb-07	wheat	suspend	Dec-11	guar	10	Apr-13	soybean meal	10	Aug-17	castor	10
May-08	potato	suspend	Dec-11	guar	20	May-13	potato	20			
May-08	soy oil	suspend	Dec-11	guar	30	May-2013	Guar	Launch			
May-08	chana	suspend	Jan-12	cotton	10	May-13	guar	launch			
May-08	rubber	suspend	Mar-12	guar	suspend	Jul-13	chana	15			
Dec-08	chana	launch	Jan-12	guar	40	Aug-13	chana	10			
Dec-08	potato	launch	Jan-12	guar	60	Aug-13	turmeric	10			
Dec-08	Rubber	Launch	Feb-12	guar	50	Sep-13	guar	10			
Dec-08	soy oil	launch	Mar-12	chana	15	Dec-13	castor	10			
Dec-08	rubber	launch	Mar-12	pepper	15	Dec-13	castor	15			
Apr-09	potato	10	Mar-12	potato	25	Dec-13	guar	10			
Apr-09	soybean	10	Mar-12	r&m seed	10	Aug-14	Potato	suspend			
Apr-09	sugar	10	Mar-12	soybean	10	Aug-14	coriander	10			
Apr-09	gur	10	Apr-12	barley	20	May-15	coriander	15			

date	commodity	margins	date	commodity	margins	date	commodity	margins	date	commodity	margins
May-09	Wheat	Launch	May-12	chana	35	Sep-15	chana	20			
May-09	Sugar	suspend	Jun-12	barley	10	Sep-15	chana	25			
Jun-09	potato	20	Jun-12	potato	15	Nov-15	chana	50			
Jul-09	turmeric	10	Jun-12	chana	20	Jan-16	castor	suspend			
Aug-09	turmeric	20	Jul-12	r&m seed	15	Mar-16	cotton seed oil cake	10			
Oct-09	turmeric	10	Jul-12	soybean	20	Apr-16	sugar	15			
Oct-09	turmeric	20	Jul-12	cotton seed oil cake	20	Apr-16	chana	20			

Source: Authors' compilation

Annexure 4: Exchanges trading agricultural commodities in China

Sr. No	Features	Dalian Commodity Exchange (DCE)	Zhengzhou Commodity Exchange (ZCE)	Shanghai Commodity Exchange (SHCE)
1	Year of first trade	1993	1993	1999 (Born out of amalgamation of 3 exchanges)
2	Specialization	agriculture	agriculture & chemicals	metals
3	1 st commodities traded	Soybeans, Corn, Soybean meal, Green beans, Red beans and Rice	Wheat, corn, Soybean, green bean and sesame	Copper, aluminium, zinc, gold, steel rebar, steel wire rod, natural rubber, fuel oil
4	Total agricultural contracts traded (TE-2016)	559 Million contracts	439 Million Contracts	82 Million contracts
5	Market share in agri volume traded in china (TE-2016)	52 percentage	40 percentage	8 percentage
6	Agri commodity traded (TE-2016)	Soybean complex, palm oil, corn, egg,	Rice, Wheat, Sugar, Cotton, Rapeseed complex	Natural Rubber
7	Highest traded commodity	Soybean Meal (48 percentage of all agricultural contracts traded in DCE in TE-2016)	Rapeseed Meal (59 percentage of all agricultural contracts traded in ZCE in TE-2016)	Rubber (only agri commodity traded)

Source – FIA, China Security Regulatory Commission (CSRC) Annual Statistics

Annexure 5: Commodity exchanges trading agricultural commodities in USA

Sr No	Features	Chicago Board of Trade	Chicago Mercantile Exchange	Minneapolis Grain Exchange	ICE FUTURES US
1	1 st Organized futures trade	1865	1898	1883	1870
2	Origin	Wholesale market earlier	Trade in eggs with development of storage facility	Marketplace for Wheat, oats and corn	Formed by Cotton merchants
3	1 st commodities traded	Corn and Wheat	Butter and eggs	Wheat	Cotton
4	Currently traded commodities	Wheat, corn, Soybean complex, oats, Rice, dairy	Dairy, live animals, palm oil, cocoa, coffee, Cotton, orange juice concentrate and Sugar	Cocoa, coffee, Cotton Sugar	Sugar, Wheat, corn, Soybean complex, Cotton and apple juice concentrate
5	Commodity-largest volume	Soybean complex (47 percentage of agricultural contracts traded)	Sugar (40 percentage of its agricultural contracts traded)	Cocoa (44 percentage of agricultural contracts traded)	Wheat (96 percentage of agricultural contracts traded)
6	Share in overall agricultural contracts traded in USA TE-2016	73 percentage of agricultural contracts traded	27 percentage of agricultural contracts traded	1 percentage of agricultural contracts traded	Less than 0.1 percentage of agricultural contracts traded

Source: CFTC and Commodity exchange websites

Annexure 6: Comparison of our proposed criteria with SEBI's criteria

SEBI's Criteria			Authors' Criteria		
Criteria	Particular	Relationship assumed	Criteria	Particular	Relationship Assumed
Commodity Fundamentals	production, imports, carryover stocks	Proportional	Commodity surplus	Domestic production /domestic consumption	Proportional
	Volume in cash market	Proportional			
	Durability and Storability	Proportional			
	Homogeneous/ Standardization	Proportional			
			Commodity Use	Basic staples	1
				Non-staple food	3
				feed	5
Ease of doing business	Prevalence of price controls	Inverse	Sensitivity of commodity	Average percentage positive deviation of monthly WPI from its trend (previous 5 years)	permitted range will be different for different commodities
	Minimum Support Price (MSP)	Inverse			
	Storage controls/ Stock Limits	Inverse			
	Government. Policy	Inverse		procurement at MSP or other Govt. schemes	Higher prospects if no procurement
	Applicability of other laws	Inverse			
Trade factors	Global Trade - Imports or Exports	Proportional	Trade factors	Share of import or export in global trade (percentage)	Proportional
	Domestic market	Proportional			
	Presence of Value Chain participants	Proportional			
	Supply/ Demand	Proportional			
	commercialization	Proportional			
Risk Management	Correlation	Proportional	Price Volatility	CV in monthly WPI based on previous three years	Inverse U shaped
	Seasonality	Proportional			
	Basis risk	Proportional			
	Volatility	Proportional			
	Hedging incentive	Proportional			
	Liquidity	Proportional			
Benchmark Potential	Existence of forward trading - OTC mkt	Proportional			
	Suitability of futures trading	Proportional			
	Potential to create domestic benchmark	Proportional			
	Potential to create global benchmark	Proportional			

Source: Authors' compilation

Annexure 7: Sub-score strategy

Prod/cons		Import or export/ global trade (percentage)		CV in price (percentage)	
Range	Sub-score	Range	Sub-score	Range	Sub-score
0-0.5	1	0-5	1	0-3	1
0.5-1.0	2	6-10	2	4-6	2
1.0-1.25	3	11-15	3	7-10	3
1.26-1.50	4	16-20	4	11-15	2
>1.50	5	>20	5	>15	1
Positive deviation of prices-2012-2016 (percentage)		Procurement		Use	
Range	Sub-score	Range	Sub-score	Range	Sub-score
<8 percentage	5 (for all)	always	1	Basic staple food	1
12percentage>value>8percentage	1 for basic staples, else 5	Occasional	3	Non-staple food	3
16 percentage >value>12 percentage	5 for feed	never	5	Feed	5
Value>16 percentage	1 for all				

Source: Authors' calculations

Annexure 8: Principal Component Analysis (PCA)

PCA is a useful technique for transforming a large number of variables in a data set into a smaller and more coherent set of uncorrelated (orthogonal) factors, the principal components. The principal components account for much of the variance among the set of original variables. Each component is a linear weighted combination of the initial variables. The weights for each principal component are given by the eigenvectors of the correlation matrix or the covariance matrix, if the data were standardized. The variance for each principal component is represented by the eigenvalue of the corresponding eigenvector. The components are ordered so that the first component accounts for the largest possible amount of variation in the original variables. The second component is completely uncorrelated with the first component, and accounts for the maximum variation that is not accounted for the first. The third accounts for the maximum that the first and the second not accounted for and so on. PCA is computationally easy and also avoids many of the problems associated with the traditional methods, such as aggregation, standardization, and nonlinear relationships of variables affecting socioeconomic inequalities¹⁰.

Our results

We estimate our PCA model on sub-scores generated for each commodity and parameter on the basis of the conceivable relationship between the parameters and prospect in futures market (Annexure-Table 6 and Table 7). Annexure Table 7 gives the results of the PCA. Software STATA 11 was used for the analysis. Our results show that only two components have an eigenvalue (the variances extracted by the factors) greater than or equal to one. Therefore, based on Kaiser's criterion, we use these two components to construct our index. Together they explain 56percentage of the total variation. The first component can be seen to be highly correlated with surplus (production/consumption) and use as food or feed while the second factor is highly correlated with positive deviation of price and volatility in prices. We compute a non-standardized index (NSI) using the proportion of these percentages as weights on the component coefficients based on the formula below:

$$\text{Non Standardized Index} = \left(\frac{0.3142}{0.5653}\right) * \text{Component 1} + \left(\frac{0.2511}{0.5653}\right) * \text{Component 2}$$

This index measures the potential of one commodity relative to the other on a linear scale. The value of the index can be positive or negative, making it difficult to interpret. A similar procedure was adopted in previous research (Antony & Rao, 2007). Therefore, a Standardized Index (SI) was developed, the value of which can range from 0 to 100, using the formula below:

$$\text{Standardised Index (SI)} = \left(\frac{\text{NSI of commodity } i - \text{Min NSI}}{\text{Max NSI} - \text{Min NSI}}\right) * 100$$

¹⁰ Vyas & Kumaranayake, 2006, for an assessment of advantages and disadvantages of PCA and Saltelli, Nardo, Saisana, & Tarantola, 2004, for the pros and cons of composite indicators, in general

Annexure 9: Results of Principal Component Analysis

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6
prodconscode	0.5437	0.001	-0.0145	0.6912	-0.1598	-0.4483
tradesharecode	0.2676	-0.2499	0.8468	0.0672	0.0807	0.3713
priceposdecode	-0.2124	0.6022	0.3988	-0.0978	-0.6197	-0.199
wpicvcode	-0.3525	0.5105	0.0576	0.5582	0.4821	0.2606
msp	0.4393	0.4397	0.1245	-0.441	0.5359	-0.3413
foodfeed	0.5201	0.348	-0.3237	-0.0462	-0.2535	0.6612
Eigenvalues	1.88515	1.50677	0.990988	0.736028	0.490769	0.39029
proportion of variation explained	0.3142	0.2511	0.1652	0.1227	0.0818	0.065
Total no of observations	56					
Cumulative variation explained	0.5653					

Source: Authors' calculations

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