Agricultural commodities derivatives markets in India

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The development of Indian agricultural derivatives markets

- Local markets for futures on agricultural commodities have been recorded to be around from the 1800.
- These were banned in the late ’60s, and revived in the early ’80s.
- After the successful equity market reforms of ’90s, the commodities derivatives regulator tried to replicate similar reforms for the commodity derivatives markets.
- This effort got significant support in 1999 when the Government of India (GOI) suggested that the Minimum Support Price (MSP) as a price hedging instrument could be replaced with derivatives markets.
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State of the Indian commodity derivatives markets

- Three national, multi-commodity exchanges from end 1994.
  These compete on trading commodities: for example, both MCX and NCDEX trade guar seed, both NCDEX and NMCE trade pepper.
- Local exchanges trading a single commodity still exist.
  Initial evidence: local exchanges that were successful before the national exchanges were established, continue to retain their business.
  However, recent evidence suggests that local exchanges are steadily losing to the national, multi-commodity exchanges.
- The institutions at the national commodity exchanges: electronic, transparent trading and clearing with novation – same as equity.
- Commodity derivatives are physically settled – different from equity.

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Average daily volumes on financial markets

Market	Average Daily Volumes (in Rs. crore)	
Equity spot	9,000	
Equity derivatives	35,000	
Bond market	4,500	
Commodity derivatives	15,000	
of which		
Agriculture	3,900	(26%)
Non-agriculture	11,100	(74%)

Linking arbitrage to hedging efficiency

Can the commodity derivatives be used for hedging price risk?

- Derivatives contracts can be good hedging instruments when they are efficiently priced.
- We measure efficiency as the outcome of a no-arbitrage condition.
- In the context of commodity futures, no-arbitrage is defined when the futures and the spot price move in tandem.

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Basis and basis risk behaviour

- We operationalise this as analysing the behaviour of returns on the futures contract vis-a-vis returns on the spot. If the no-arbitrage condition is satisfied, then there should be a very high correlation between the two.
- We define **basis** as

$$\text{Basis} = r_{\text{futures}} - r_{\text{spot}}$$

- Basis should be very small, and have a low volatility if no-arbitrage conditions hold.

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Efficiency on the traditional futures markets

- Thomas and Karande (1999) examined efficiency of the castor-seed futures markets in India. The examination included identifying:
  1. The flow of information between futures and spot prices, as well as,
  2. The behaviour of the basis and basis risk

  across two different markets, one export-oriented and another production-oriented.
  They find that futures dominate spot prices, and that the export-oriented market prices dominate production-oriented market **except** in the harvest season when the relation was reversed.
- Ramaswamy and Singh (2006) examine the use the soyoil futures contract for hedging purposes, using the same principle of no-arbitrage conditions being satisfied.
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Examining basis for contracts on the new exchanges

We analyse the basis for five commodities that trade on the national multicommodity exchanges. These are:

1. Guar seed: This is the commodity where there has been the longest period with significant liquidity.
2. Wheat: One of the essential commodities where the government maintains a minimum support price (MSP).
3. Pepper: Pepper futures has been traded on an international exchange in Cochin since the eighties.
4. Channa : A commodity that does have an MSP, but it is not a binding constraint in the price discovery process.
5. Jeera : This is one of the newest contracts on the electronic exchange in terms of it's liquidity buildup.

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Organising the commodities by age, liquidity

Commodity	Age	Liquidity	MSP
Guar seed	Old	High	No
Wheat	Old	Low	Yes
Pepper	Old	Low	No
Jeera	New	Low	No
Channa	Old	RecentHigh	Yes

- We use data for these contracts from December 2004 to end 2006.
  Except for Jeera and Channa, where prices are available only from 2005 onwards.

Comparitives

- Since efficiency and liquidity is best understood as a relative measure, we identify some other Indian markets to provide benchmarks for the above commodities.
- The longest running as well as the most liquid derivatives Indian market is the futures market on the market index, Nifty.
  However, the risk of this is that of a diversified portfolio.
- Another comparitive can be the most liquid single stock futures contract.
  We use the futures on the Tata Steel stock.
- Both these financial futures are very different from the commodities contracts because they are cash-settled.
- A last comparitive that we use is the gold futures contract, which is very liquid **and** is physically settled.

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Results

Simple correlations between r_{futures} and r_{futures}

Following are the correlations calculated using the entire set of data on futures and spot returns for a given commodity.

Commodity	ρ
Guar seed	0.672
Wheat	0.427
Pepper	0.577
Jeera	0.549
Channa	0.515

Problems with the above

- A raw correlation includes both the systematic and the unsystematic correlation between the two.
- What we would prefer to use is a regression of the futures returns on the spot returns.
  The OLS coefficient would tell us the systematic comovement between the futures and spot returns.
  The OLS R^2 would tell us how much of the variance of the futures return is being captured by the spot (or vice-versa).
- Thus, we examine the OLS regression of futures on spot returns for the above.

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Regression of r_{futures} on r_{futures}

Commodity	β	Adjusted R^2
Guar seed	0.813**	0.50
Wheat	0.453**	0.24
Pepper	0.884**	0.33
Jeera	0.893**	0.30
Channa	0.515**	0.26

Problems with interpreting the above

- One problem is that the entire period of data includes highly variable periods of liquidity for each commodity. This implies that at different periods, there would be different amounts of arbitrage available.
- Another problem is that there are often contract specification changes. These are adjustments made to the contract by the exchange in response to poor liquidity on an existing contract.
  Eg., wheat.
- Therefore, we examine just the last two months of futures trading for each of the above.

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$r_{futures}$ on $r_{futures}$ for the last two months

Commodity	β	Adjusted R^2
Guar seed	1.009**	0.62
Wheat	0.611**	0.25
Pepper	0.991**	0.33
Jeera	0.710	0.06
Channa	0.455**	0.22

Comparing with benchmarks

Commodity	β	Adjusted R^2
Guar seed	1.009**	0.62
Wheat	0.611**	0.25
Pepper	0.991**	0.33
Jeera	0.710	0.06
Channa	0.455**	0.22
TataSteel	1.003**	0.99
Nifty	1.056**	0.98

Inferences

- Guar Seed shows the best signs of low arbitrage opportunities and good hedging prospects.
- Wheat and Channa show the worst signs of poor hedging prospects.
- Both Jeera and Pepper have a high β but a low R^2 which is endemic of poor liquidity.
- The data above would suggest that cash-settled contracts tend to be more amenable to no-arbitrage conditions than physically settled contracts.

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