

Managing commodity price risk using derivatives

Nidhi Aggarwal
IIM Udaipur

**Roundtable meeting on
“Institutional participation in commodity derivatives markets”
Bombay**

June 20, 2017

Outline

Significance of the Indian commodities markets

Volatility in commodity prices

The impact of high volatility

The market landscape

Some facts

- ▶ More than 37% of India's GDP is commodity related. 17% is from agriculture.
- ▶ India has an explicit advantage in agri-commodities as producer and price-setter.
India is one of the largest producers of wheat, rice, pulses, cotton, sugar, and spices.
- ▶ In non-agri commodities,
 - ▶ In metals, India is one of the largest consumers of bullion – 11% of our imports.
 - ▶ Petroleum and petroleum products account for 35% of our imports and 18% of our exports.

Outline

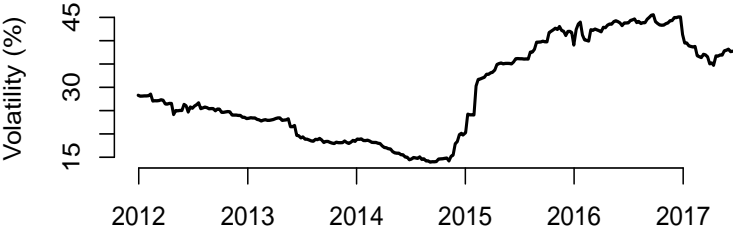
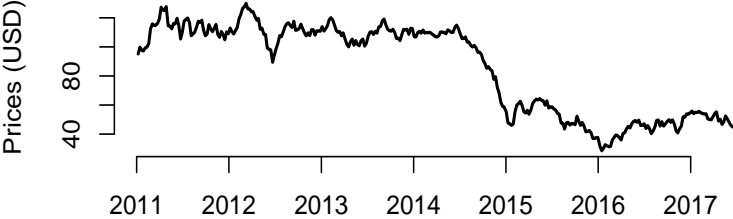
Significance of the Indian commodities markets

Volatility in commodity prices

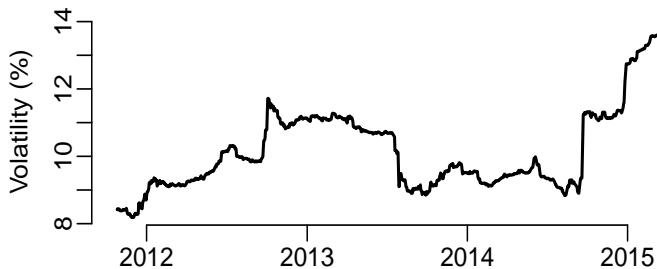
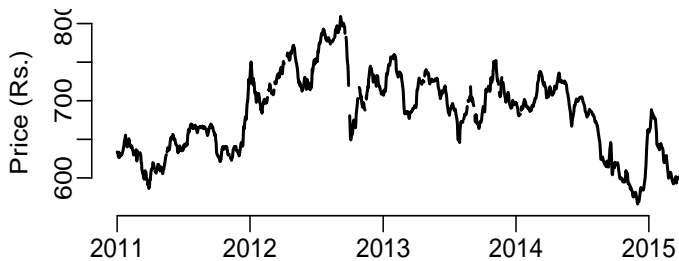
The impact of high volatility

The market landscape

Crude oil



Soy Oil



Outline

Significance of the Indian commodities markets

Volatility in commodity prices

The impact of high volatility

The market landscape

Entities affected by high commodity price volatility

- ▶ Direct impact:

Entities affected by high commodity price volatility

- ▶ Direct impact:
 1. Producers (farmers)

Entities affected by high commodity price volatility

- ▶ Direct impact:
 1. Producers (farmers)
 2. Traders, millers, food processing units

Entities affected by high commodity price volatility

- ▶ Direct impact:

1. Producers (farmers)
2. Traders, millers, food processing units
3. Consumers

Entities affected by high commodity price volatility

- ▶ Direct impact:

1. Producers (farmers)
2. Traders, millers, food processing units
3. Consumers
4. Governments

Entities affected by high commodity price volatility

- ▶ Direct impact:
 1. Producers (farmers)
 2. Traders, millers, food processing units
 3. Consumers
 4. Governments
- ▶ **Direct exposure** to commodity price risk: Unknown.

Entities affected by high commodity price volatility

- ▶ Direct impact:
 1. Producers (farmers)
 2. Traders, millers, food processing units
 3. Consumers
 4. Governments
- ▶ **Direct exposure** to commodity price risk: Unknown.
- ▶ Indirect impact on financial institutions

Entities affected by high commodity price volatility

- ▶ Direct impact:
 1. Producers (farmers)
 2. Traders, millers, food processing units
 3. Consumers
 4. Governments
- ▶ **Direct exposure** to commodity price risk: Unknown.
- ▶ Indirect impact on financial institutions
 - ▶ As an example, 15% of gross bank credit directly exposed to agri-commodity prices as on Apr 28, 2017.

Entities affected by high commodity price volatility

- ▶ Direct impact:
 1. Producers (farmers)
 2. Traders, millers, food processing units
 3. Consumers
 4. Governments
- ▶ **Direct exposure** to commodity price risk: Unknown.
- ▶ Indirect impact on financial institutions
 - ▶ As an example, 15% of gross bank credit directly exposed to agri-commodity prices as on Apr 28, 2017.

Thus, the need for risk management.

Outline

Significance of the Indian commodities markets

Volatility in commodity prices

The impact of high volatility

The market landscape

Instruments to hedge risk

- ▶ **Markets:** OTC, Exchange traded
- ▶ **OTC:** Primarily offshore (Chicago, New York, London and Singapore).
- ▶ **Exchange traded:**
 1. Onshore: Futures
 - NCDEX ● MCX

Instruments to hedge risk

- ▶ **Markets:** OTC, Exchange traded
- ▶ **OTC:** Primarily offshore (Chicago, New York, London and Singapore).
- ▶ **Exchange traded:**
 1. Onshore: Futures
 - NCDEX ● MCX

Recently permitted by SEBI: Options

Instruments to hedge risk

- ▶ **Markets:** OTC, Exchange traded
- ▶ **OTC:** Primarily offshore (Chicago, New York, London and Singapore).
- ▶ **Exchange traded:**
 1. Onshore: Futures
 - NCDEX ● MCXRecently permitted by SEBI: Options
 2. Offshore: Futures, options and swaps
 - CME ● DCE ● ZCE ● LME ● ICE

Rules governing participation in domestic exchange traded commodities markets

- ▶ Who is permitted?
Firms and individuals, subject to position limits

Rules governing participation in domestic exchange traded commodities markets

- ▶ Who is permitted?
Firms and individuals, subject to position limits
- ▶ Currently, domestic FIs are not permitted to participate:
 - ▶ Mutual funds, insurance and pension firms not permitted.
 - ▶ Banks – not permitted by RBI (Banking Regulation Act, 1949 – Section 8).

Rules governing participation in domestic exchange traded commodities markets

- ▶ Who is permitted?
Firms and individuals, subject to position limits
- ▶ Currently, domestic FIs are not permitted to participate:
 - ▶ Mutual funds, insurance and pension firms not permitted.
 - ▶ Banks – not permitted by RBI (Banking Regulation Act, 1949 – Section 8).
- ▶ Foreign participation not permitted.

Rules governing participation in domestic exchange traded commodities markets

- ▶ Who is permitted?
Firms and individuals, subject to position limits
- ▶ Currently, domestic FIs are not permitted to participate:
 - ▶ Mutual funds, insurance and pension firms not permitted.
 - ▶ Banks – not permitted by RBI (Banking Regulation Act, 1949 – Section 8).
- ▶ Foreign participation not permitted.
- ▶ Large public sector organizations like FCI, STC, MMTC etc. do not participate.

Rules governing participation in domestic exchange traded commodities markets

- ▶ Who is permitted?
Firms and individuals, subject to position limits
- ▶ Currently, domestic FIs are not permitted to participate:
 - ▶ Mutual funds, insurance and pension firms not permitted.
 - ▶ Banks – not permitted by RBI (Banking Regulation Act, 1949 – Section 8).
- ▶ Foreign participation not permitted.
- ▶ Large public sector organizations like FCI, STC, MMTC etc. do not participate.
- ▶ Large oil companies or Gol take positions in offshore markets due to lack of depth in domestic markets.

The RBI circular of May 2015

Banks – no means to hedge the indirect commodity price risk exposure.

RBI circular in May '15:

“With a view to developing strong risk management capabilities to manage agri- commodity price risk, it is felt that banks should encourage hedging by the agri- borrowers by creating awareness amongst them regarding the utility and benefits of hedging through agri-commodity derivatives. At the same time, banks must keep the sophistication, understanding, scale of operation and requirements of their agri- borrower in mind while advising on the availability and use of these instruments.”

The RBI circular of May 2015

Banks – no means to hedge the indirect commodity price risk exposure.

RBI circular in May '15:

“With a view to developing strong risk management capabilities to manage agri- commodity price risk, it is felt that banks should encourage hedging by the agri- borrowers by creating awareness amongst them regarding the utility and benefits of hedging through agri-commodity derivatives. At the same time, banks must keep the sophistication, understanding, scale of operation and requirements of their agri- borrower in mind while advising on the availability and use of these instruments.”

Not clear how banks are expected to fulfil the above objective.

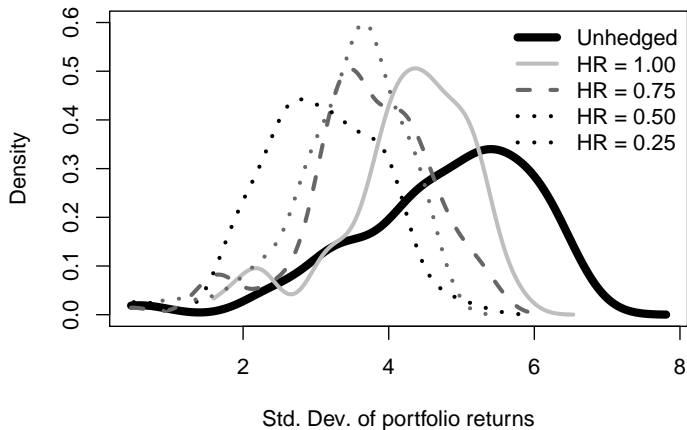
Hedge effectiveness of domestic commodity exchanges

Testing hedge effectiveness: Approach

For each commodity:

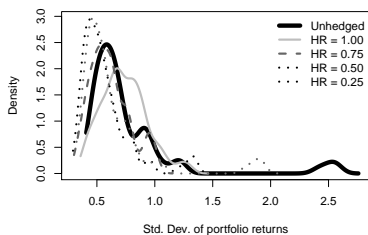
- ▶ Calculate the volatility (standard deviation) of the unhedged position (spot).
- ▶ Calculate the volatility of hedged positions where we use four values of hedge ratios: $HR = 1, 0.75, 0.50, 0.25$.
- ▶ Compare the average volatility of the hedged and the unhedged positions.

A benchmark: hedging benzene positions using CME Crude oil contracts

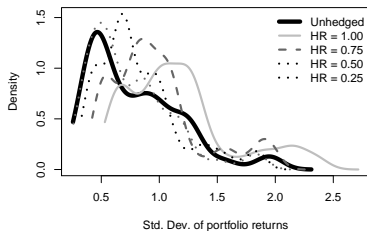


Agri commodities

Soya Oil

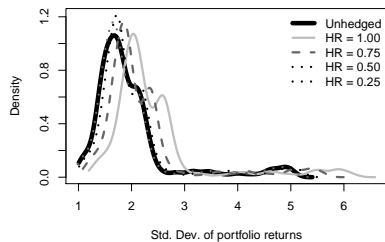


Wheat

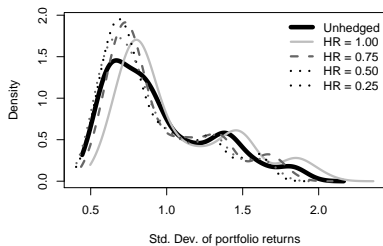


Non-agri commodities

Crude oil



Gold



Delving deeper

- ▶ Hedging effectiveness of commodity futures on Indian exchanges is low.

Delving deeper

- ▶ Hedging effectiveness of commodity futures on Indian exchanges is low.
- ▶ A probable reason: weak force of arbitrage between spot and futures market.

Delving deeper

- ▶ Hedging effectiveness of commodity futures on Indian exchanges is low.
- ▶ A probable reason: weak force of arbitrage between spot and futures market.
- ▶ The ability of any instrument to act as a hedge against the underlying depends on the degree of price convergence between the two markets over short horizons.

Delving deeper

- ▶ Hedging effectiveness of commodity futures on Indian exchanges is low.
- ▶ A probable reason: weak force of arbitrage between spot and futures market.
- ▶ The ability of any instrument to act as a hedge against the underlying depends on the degree of price convergence between the two markets over short horizons.
- ▶ Correlations between spot and futures returns is significantly low,

Delving deeper

- ▶ Hedging effectiveness of commodity futures on Indian exchanges is low.
- ▶ A probable reason: weak force of arbitrage between spot and futures market.
- ▶ The ability of any instrument to act as a hedge against the underlying depends on the degree of price convergence between the two markets over short horizons.
- ▶ Correlations between spot and futures returns is significantly low, which translates into higher basis and basis risk,

Delving deeper

- ▶ Hedging effectiveness of commodity futures on Indian exchanges is low.
- ▶ A probable reason: weak force of arbitrage between spot and futures market.
- ▶ The ability of any instrument to act as a hedge against the underlying depends on the degree of price convergence between the two markets over short horizons.
- ▶ Correlations between spot and futures returns is significantly low, which translates into higher basis and basis risk, and reduces the risk transferability function of futures market.

Thank you.