# Developing new futures contract versus cross-hedging: a study in the Brazilian rice market

**Daniel H. D. Capitani[(a)] and Fabio Mattos[(b)]**

(a) University of Sao Paulo, (b) University of Nebraska-Lincoln

*Poster prepared for presentation at the Agricultural & Applied Economics Association 2013 AAEA Annual Meeting*
*Washington D.C., August 04-06, 2013*

# Developing new futures contract versus cross-hedging: a study in the Brazilian rice market


**Daniel H. D. Capitani**
**University of Sao Paulo**

**Fabio Mattos**
**University of Nebraska**


## Introduction

- The growing importance of emerging markets has motivated research on their interaction with international markets. One of the issues is the use of derivatives markets to promote risk transfer and price discovery.
- In a risk management context this point leads to a debate of whether emerging economies should have their own hedging instruments or use existing cross-hedging alternatives.
- In Brazil government has been consistently eliminating or discouraging instruments such as production subsidies, storage and marketing loans, and minimum prices. This is leaving producers and processors exposed to more price risk and highlighting the need of new risk management tools.

## Objective

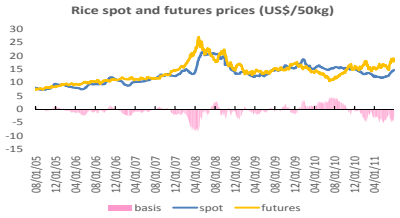
- To explore risk management alternatives in developing countries, focusing on Brazilian rice producers.
  - To investigate basis risk related to cross-hedging in the Brazilian rice market.
  - To investigate the effectiveness of cross-hedging for Brazilian rice producers

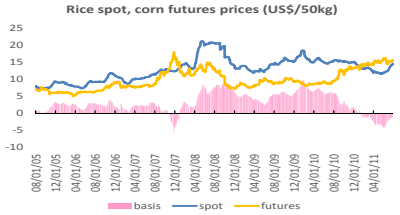
## Research method

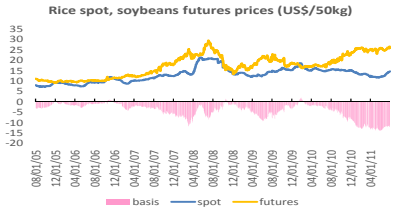
- Cross-hedging for rice producers is explored with three futures contracts:
  - rice (CME Group)
  - corn (BM&FBOVESPA)
  - soybeans (BM&FBOVESPA)
- Futures contracts expiration months
  - rice: Jan, Mar, May, Jul, Sep, Nov
  - corn: Jan, Mar, May, Jul, Aug, Sep, Nov
  - soybeans: Mar, Apr, May, Jun, Jul, Aug, Sep, Nov
- First step: evaluation of basis risk
  - coefficient of variation (CV)
  - lower partial moment (LPM): target=zero
  - value-at-risk (VaR)
  - expected shortfall (ES)
- Second step: cointegration procedures are adopted to:
  - test relationships between spot and futures prices
  - estimate optimal hedge ratios and hedging effectiveness (reduction in conditional variance of spot price change)

## Data

- Daily prices: 08/01/2005–07/29/2011 (6 crop years)
  - spot price for Brazilian rice: Cepea/Esalq
  - futures prices: CME Group and BM&FBOVESPA
  - all futures prices refer to nearby contract




## Results

Summary statistic for rice basis in Brazil with respect to futures contracts, 2005-2011

| US$/50kg | rice (CME) | corn (Brazil) | soybeans (Brazil) |
|---|---|---|---|
| Mean | -1.863 | 2.687 | -6.099 |
| Std. Dev. | 2.062 | 2.785 | 3.155 |
| Coeff. Var. | -1.125 | 1.047 | -0.518 |
| LPM | 2.690 | 0.873 | 6.831 |
| VaR | -5.254 | -1.893 | -11.287 |
| ES | -6.116 | -3.057 | -12.605 |

large downside variability

potential for large losses relative to the mean

large overall variability

Price relationships – preliminary analysis

Correlation between rice spot price and futures prices

| | rice (CME) | corn (Brazil) | soybeans (Brazil) |
|---|---|---|---|
| price level | 0.83 | 0.48 | 0.71 |
| p-value | 0.00 | 0.00 | 0.00 |
| price changes | 0.10 | 0.03 | 0.07 |
| p-value | 0.00 | 0.00 | 0.00 |

low correlations

Cointegration procedures

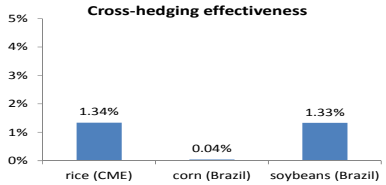
- All price series are non-stationary in levels and stationary in first differences.
- Rice spot price (Brazil) and rice futures price (CME) are cointegrated.
- No evidence of cointegration between rice spot price (Brazil) and corn and soybean futures prices (Brazil).

Hedging analysis

- Optimal hedge ratios for cross-hedging are very low
- Cross-hedging effectiveness is close to zero

| | rice (CME) | corn (Brazil) | soybeans (Brazil) |
|---|---|---|---|
| Optimal hedge ratio | 6.39% | 1.04% | 2.21% |
| p-value | 0.000 | 0.557 | 0.026 |

not statistically distinguishable from zero




## Conclusions and extensions

- No evidence that futures cross-hedge can be an effective risk management tool for Brazilian rice producers
  - high basis risk
  - almost no reduction in price risk
- Declining government support calls for the development of new instruments for risk management.
  - Brazilian futures contract for rice could emerge as a mechanism for risk transfer and price discovery
- There exists a daily spot price index for rice in Brazil
  - average of spot prices in the main producing area (75% of domestic production)
- A Brazilian futures contract for rice could be developed based on this spot price index
  - index could be reference for cash-settlement
  - advantages: grain quality and expiration months consistent with local market

## For further information


Daniel Capitani (danielcapitani@yahoo.com.br)

Fabio Mattos (fmattos@unl.edu)