



**AgEcon** SEARCH

RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

*No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.*

# CHANGING PRICE DYNAMICS IN AGRICULTURAL COMMODITY MARKETS

Günther Filler

Department für Agrarökonomie, Humboldt-Universität zu Berlin

Steffen Volkenand

Humboldt-Universität zu Berlin

Martin Odening

Department für Agrarökonomie, Humboldt-Universität zu Berlin

Kontaktautor: [guenther.filler@agrار.hu-berlin.de](mailto:guenther.filler@agrار.hu-berlin.de)



Poster anlässlich der 53. Jahrestagung der  
Gesellschaft für Wirtschafts- und Sozialwissenschaften des Landbaues e.V.  
**„Wie viel Markt und wie viel Regulierung  
braucht eine nachhaltige Agrarentwicklung?“**

Berlin, 25.-27. September 2013

## 1. Background

- Commodity prices are hypothesized to tend back to an equilibrium level after stochastic disturbances.
- Does this behavior still hold after 'financialization' and coupling of agricultural and energy markets?

## 2. Objectives

- To detect mean reversion using term structure models
- To test, if there is evidence for a change in the dynamics of spot prices and convenience yields

## 3. Methodology

- Schwartz (1997) Two-factor model

$$dS = (\mu - \delta)Sdt + \sigma_1 S dz_1$$

$$d\delta = \kappa(\alpha - \delta)dt + \sigma_2 dz_2$$

$$dz_1 dz_2 = \rho dt$$

S = Spot price,  $\mu$  = Drift parameter of S

$\delta$  = Convenience yield,  $\alpha$  = Mean-level of  $\delta$

$\kappa$  = Speed of mean reversion of  $\delta$

$dz$  = Increment to a standard Brownian Motion

$\rho$  = correlation coefficient between S and  $\delta$

$\sigma_1, \sigma_2$  = Diffusion parameter of S and  $\delta$

- Proxy for S: Nearby futures
- To compute  $\delta$ : Futures with different maturities
- State space form
- Kalman Filter
- R package 'schwartz97'

## 4. Empirical Application

- Wheat, Corn, Soybeans (CBOT, Cents/bu.); Sugar (ICE-US, Cents/lb); Lean Hogs (CME, Cents/lb.) Crude Oil (NYMEX, USD/barrel); Copper (COMEX, USD/lb.); 4 to 6 Futures contracts; Wednesdays
- Jan 1989 - Dec 2012, Two sub-periods

## 5. Preliminary Results

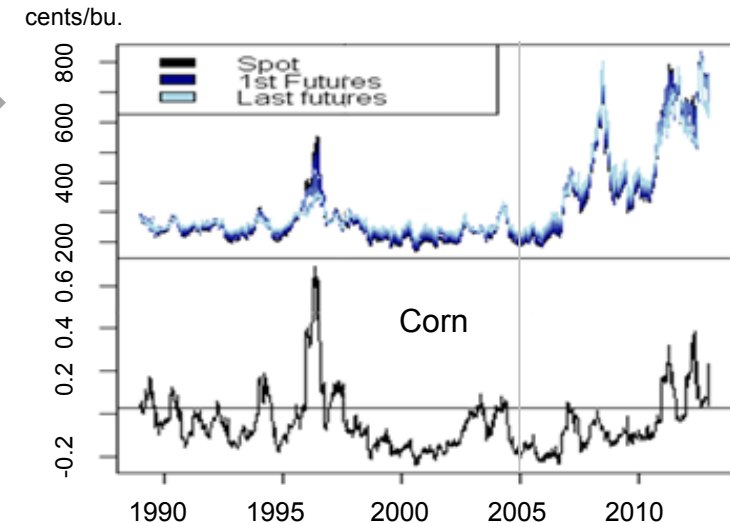
- State variables  
Spot price (upper), Convenience yield
- Mean reversion parameter for  $\delta$

| $\kappa$ | 89-12 | 89-04   | 05-12   |
|----------|-------|---------|---------|
| Wheat    | 0.512 | 0.815   | 0.003   |
| Corn     | 0.753 | (0.982) | 0.125   |
| Soybeans | 0.207 | 0.393   | 0.486   |
| Sugar    | 1.582 | 1.225   | (1.095) |
| Hogs     | 4.165 | 4.517   | (1.088) |
| Oil      | 1.351 | 1.829   | 0.385   |
| Copper   | 1.474 | 1.336   | 1.726   |

(not significant)

- Spot price volatility

| $\sigma_1$ | 89-12 | 89-04 | 05-12 |
|------------|-------|-------|-------|
| Wheat      | 0.334 | 0.282 | 0.376 |
| Corn       | 0.288 | 0.253 | 0.309 |
| Soybeans   | 0.244 | 0.235 | 0.319 |
| Sugar      | 0.402 | 0.323 | 0.406 |
| Hogs       | 0.435 | 0.492 | 0.452 |
| Oil        | 0.288 | 0.280 | 0.331 |
| Copper     | 0.380 | 0.430 | 0.367 |



## 6. Conclusions

- 5 out of 7 commodities show an attenuation of mean reverting behavior compared to the pre energy period.
- The spot price volatility of most commodities (except hogs and copper) has increased.
- Our method does not allow for a causal explanation of observed changes in the prices dynamics (e.g. financialization or bioenergy markets).