

Commodity Futures Markets

Rodney Beard

March 6, 2017



- ▶ H. Geman, Ch.2. Agricultural Commodity Spot Markets, in: *Agricultural Finance*, John Wiley & Sons, 2015.
- ▶ L. Nijs, Ch.14. Commodities I: Derivatives Markets, in: *The Handbook of Global Agricultural Markets: The Business and Finance of Land water and Soft Commodities*, Palgrave MacMillan, 2014.

What drives spot prices?

- ▶ Supply
- ▶ Demand
- ▶ Inventory + Perishability

Metals vs Agricultural Commodities

Commodity
Futures Markets

Rodney Beard

Price formation in
commodity
markets

Volatility

Metals prices driven more by demand

Agricultural commodities driven more by supply factors

Why?

Quality and type

- ▶ Robusta vs Arabica coffee
- ▶ Kansas city wheat vs Chicago wheat
- ▶ Basis risk can arise because of price differences between different grades of a standardized futures contract and a commodity whose price risk one is trying to hedge against

Crop acreages

Crop	World acreage (million hectares)
Wheat	217
Corn	162
Rice	153.6
Soybeans	102.4
Barley	48
Sorghum	40.5
Millet	35.1
Cotton	32.1
Rapeseed (Canola)	31.7
Groundnuts	24.1
Sugarcane	23.8
Sunflower	23.1
Oil palm	15.0
Coffee	10.2
Cocoa	8.9

Supply components

- ▶ Current year production
- ▶ “Carry-in” from the previous year
- ▶ Imports from other regions or countries

Carry-in = remaining supply from previous year plus current year production plus imports minus consumption

Demand components

Commodity
Futures Markets

Rodney Beard

Price formation in
commodity
markets

Volatility

- ▶ domestic use
- ▶ exports

Stock to use ratio

- ▶ $\frac{\text{current year ending stocks}}{\text{current use}}$
- ▶ measure of shortage of supply (important in technical analysis)
- ▶ high impact on price volatility

Stock to use ratio

- ▶ No underground reserves for agriculturals unlike metals
- ▶ Inventory links harvest from year to year
- ▶ Stock to use ratio is the ratio of inventory to consumption
- ▶ Information about scarcity or abundance

Pricing

Commodity
Futures Markets

Rodney Beard

Price formation in
commodity
markets

Volatility

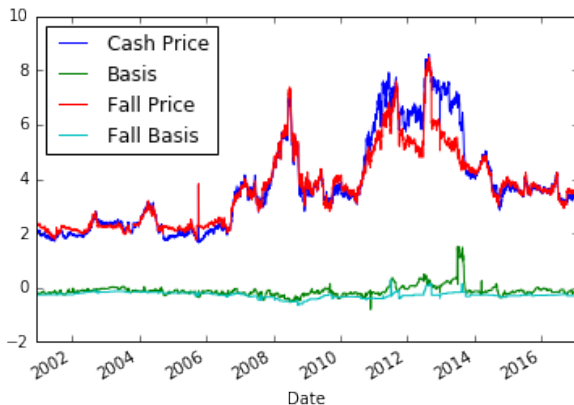


Figure: Corn prices

Price volatility

Commodity
Futures Markets

Rodney Beard

Price formation in
commodity
markets

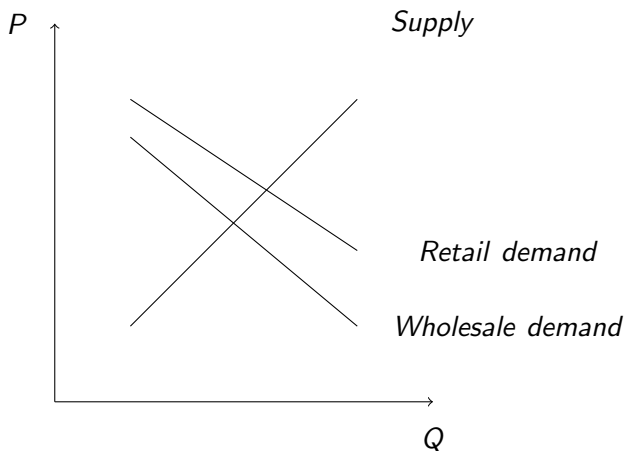
Volatility

The dispersion of prices around the mean

Price volatility

- ▶ Low volatility price results in low change in prices (Why?)
- ▶ High volatility large price changes
- ▶ High volatility harms consumers and producers
- ▶ Price transmission from commodities to consumer products moderate in developed countries
- ▶ Price averaging and price levelling

Price levelling



Gap between wholesale and retail prices is smaller at higher than at lower prices. Wholesale prices more volatile than retail prices. Developed country prices less volatile than developing country prices.

Volatility

- ▶ volatility → more risk
- ▶ farmer investments postponed during periods of high volatility due to inability to forecast
- ▶ Flow-on impact to ag machinery and technology and agribusiness

How to detect multiple structural breaks?

- ▶ Log data to get something close to normal
- ▶ Linear regression model
- ▶ Calculate SSR for different horizons
- ▶ Solve dynamic programming problem to identify breakpoints.

Definition

Volatility is the standard deviation of returns (in finance)

$$\text{Returns} = \frac{P_t - P_{t-1}}{P_{t-1}}$$

Returns matter to stock investors (they want the value of stocks to go up).

Coefficient of variation

Farmers and commodity buyers are concerned with the price level not the return

$$CV = \frac{\sqrt{\sum_{i=1}^{12} (P_i - \bar{P})^2 / 12}}{\bar{P}}$$

Factors driving volatility

Micro-factors

- ▶ storage
- ▶ trade restriction

Macro-factors

- ▶ Business cycle
- ▶ Growth
- ▶ GDP
- ▶ CPI

Exercise - 1 pt

Calculate the coefficient of variation for corn and soybeans and add it to your report! (Hint: Check if there is a Numpy command for this). Don't forget you should generate your report in such a way so that it is reproducible, i.e. no cutting and pasting of graphs.

The End

Commodity
Futures Markets

Rodney Beard

Price formation in
commodity
markets

Volatility

Thanks for listening!

