Quantitative Methods in Commodities

Course Overview
Your Lecturer

- Mark Higgins
- CEO, Washington Square Technologies
- Managing Director, JPMorgan Chase 2006-2014, co-headed Quantitative Research for all trading desks
- 8y at Goldman Sachs as a quant in FX/Rates
- PhD in astrophysics
Goals of the Course

- An introduction to commodities market fundamentals
- An understanding of the standard derivatives modeling approaches for the different commodity markets
- Some practical skills in solving common derivatives pricing and risk management problems.
Part I: Metals

- Precious metals
  - Closest to the normal financial markets like FX and equities because the metals can be easily stored, loaned out, etc.

- Base metals
  - Less storable than precious
  - Some multifactor behavior
Part II: Energy

- Oil
  - Significant multifactor dynamics
  - Nonseasonal

- Natural gas
  - Seasonal behavior in vol and correlation

- Power
  - Extreme jumps in short-term power prices
  - Seasonal, multifactor
Required Background

- Understanding of Black-Scholes-Merton derivative pricing theory
- Intermediate level stochastic calculus
- Familiarity with standard extensions to the BSM framework
  - Local vol, stochastic vol, jump models, etc.
- Reasonable Excel
If the stochastic differential equation below is meaningless to you, you’ll have trouble

\[
\frac{dF(t, T)}{F(t, T)} = \sigma(t) \left( e^{-\beta_1(T-t)} dz_1(t) + R e^{-\beta_2(T-t)} dz_2(t) \right)
\]

\[
< dz_1(t) dz_2(t) >= \rho dt
\]
Administrative Details

- Seven classes
- Final exam in last class on Wed Oct 15
- Six weekly assignments worth 25%
- Final grade is 75% final exam