Physical Market Conditions, Paper Market Activity and the WTI-Brent Spread

Discussion by:

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Crude Oil is Not Perfectly Homogeneous

- Differences in:
  - Composition
  - Location

- Traditional approach:
  Use of Benchmarks (WTI, Brent)

- What explains the growing spread of Brent over WTI crude oil?

- Is the WTI price unusually low or the Brent price unusually high?
Source: Baumeister and Kilian (2012)
Candidate Explanations

● Regional supply shocks:
  Libyan supply disruption (temporary)
  Strikes affecting North Sea fields (temporary)
  U.S. shale oil (persistent)

● Regional demand shocks
  Arab Spring (political risk, persistent?)
  Growing European demand for diesel fuel (persistent)
  Fukujima (temporary?)
  U.S./Euro Financial Crisis (persistent?)
• International transmission complicated by
  - Bottleneck in European refinery processing capacity
  - Bottlenecks in transportation infrastructure limiting trade in crude oil or in refined products
Data

Daily oil price data: June 2000-July 2012

WTI
Brent
Louisiana Light Sweet (LLS)

Regression analysis:

Daily data
Weekly and monthly aggregates of the daily data
Decomposing the Spread

Proposal in paper:

\[ f_t^{WTI} - f_t^{Brent} = \left( f_t^{WTI} - S_t^{LLS} \right) + \left( S_t^{LLS} - S_t^{Brent} \right) - \left( f_t^{Brent} - S_t^{Brent} \right) \]

Alternative proposal:

\[ f_t^{WTI} - f_t^{Brent} = \left( f_t^{WTI} - S_t^{WTI} \right) + \left( S_t^{WTI} - S_t^{LLS} \right) + \left( S_t^{LLS} - S_t^{Brent} \right) - \left( f_t^{Brent} - S_t^{Brent} \right) \]

Q: Note that there is no landlock spread for Brent. Why?

Q: Is the landlock spread influenced by differences in crude quality?

=> It would have been great to see plots of each spread over time.
Structural Break Tests for Spreads

- One-Time Mean Shifts in Spread at Known Dates
  November 2008, December 2010, (late) Fall 2008

- Is the Date Really Known Precisely?
  Endogenous break point selection
  Bootstrap critical values? (Diebold and Chen JoE 1996)

- One Break or More?
  Temporary shifts in demand or supply call for multiple breaks; so do multiple events.

- Rationale for Deterministic Time Trend in Spread?
Alternative Regression Models?

Statistical Models:
  Deterministic Break Models with Multiple Breaks
  TVP Model

State-Dependent Models for Mean
  Threshold Models (in terms of observables)
  Models with common factors and idiosyncratic factors
Findings

Breaks only in *Brent nearby spread* and in *U.S. landlock spread*. No break in *transatlantic spread*. 
Explaining the Evolution of the Spread

1. Regional macroeconomic business cycle
   1. SHIP (global) versus Aruoba-Diebold-Scotti (U.S.)
   2. SHIP (global) versus U.S. stock of crude oil

=> As a measure of U.S. macroeconomic health? Really?

Q: Shifts in relative “demand” needed for explaining the relative price (spread)? => Perez-Quiros: Index for Euro Area.
2. Lack of Physical Market Integration

- Brent Crude Oil Production
  
  Q: Don’t we need production relative to WTI crude oil?
  Q: What about European oil imports? Substitute?
  Q: What about Canada? Does the quality not matter?

- OPEC production spare capacity outside of Saudi Arabia
  
  Q: Rationale for excluding Saudi Arabia?
  Q: Differences in quality? (e.g., Libya versus Venezuela)
  Q: What about ROW oil producers? (e.g., Russia, Nigeria)
  Q: How does this capture market conditions for seaborne crude (and why would we care)?
• Storage Conditions in Cushing, OK (slope of WTI term structure adjusted for LIBOR)

Q: Why does this matter as opposed to the bottlenecks in getting the oil out of Cushing?
Q: How do we separate voluntary from involuntary storage?
Q: What about storage conditions in Europe? Slope of Brent term structure?
Q: Relative slopes needed for explaining the relative price?
3. Financial variables

- Does the financialization of oil futures markets explain the Brent-WTI spread?
  
  Liquidity in oil futures market

  Trader positions (long versus short)

Q: Correlation ≠ Causation. We need to ask why traders took those positions.

- Not related to financialization:
  
  Changes in financial market stress (Ted spread)

  Arab Spring Dummy (really an expected fundamental!)
ARDL Methodology for Causal Inference?

- Current spread regressed on own-lags and current and lagged values of selected explanatory variables.
- Causal structure imposed: Explanatory variables cause spread.
- Unless the explanatory variables are exogenous, one cannot compute dynamic effects from this regression. We need the full system of equations.
- The coefficients of the cointegrating vector are not the long-run response to exogenous variation in the explanatory variable.
Better question:
Can the evolution of these spreads be predicted?

This requires:
- Dropping the contemporaneous regressors
- Enforcing real-time data constraints

Alternative:
- Forecast combination model

Benchmark:
Random walk model of spread (Baumeister & Kilian 2012)