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

Bahattin Büyükşahin

Thomas Lee

Jim Moser

Michel Robe*

Brent WTI - Büyükşahin, Lee, Moser & Robe 2012
Physical Market Conditions, Paper Market Activity & the WTI-Brent Spread

Bahattin Büyükşahin  Thomas Lee  Jim Moser  Michel Robe*


Brent WTI - Büyükşahin, Lee, Moser & Robe 2012
I. Outline of Today’s Talk

- **Provide visual & statistical evidence of breaks in crude oil benchmark price Spreads**
  - WTI-Brent nearby futures spread = “Landlock” spread + “Transatlantic” Spread + Brent nearby spread
  - → Question: Which of these three spreads have experienced structural breaks?
  - → Robustness checks: Inland “quality” spread (WTI-WTS); Near-dated WTI calendar spread

- **Provide evidence on Economic, Infrastructure and Financial Variables linked to Spreads**
  - Demand-side fundamentals: World, US
  - Supply-side factors: Output capacity (OPEC, Brent); Output (Canada, US);
    - Infrastructure bottlenecks: Storage capacity and utilization (Cushing, OK); Pipelines (land to sea)
  - Financial variables: Paper market liquidity; stress; CIT long positions; “insider” net positions

- **Econometric analysis**
  - Energy Fundamentals or Trading Activity?
    - → Which of those variables help predict long run variations in WTI-Brent spreads?
Background: How Life Was

Pre – Feb.’07: WTI at modest premium
Fundamentals: *February/March 2007*

Spring & Summer 2007: WTI at discount

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Fundamentals: **2008 Crisis**

Fall ‘08 & Spring ‘09: Choppy ride

- CL1-CO1 (O)-based
- CL1-CO1 (date-based roll)
Fundamentals: *Political Shocks 2011-2012*

Dec. 18, 2010: Tunisian Revolt

Feb. 11, 2011: Hosni Mubarak resigns
Observation: *WTI Futures Expiry is Special*

**Sept. 22, 2008**

**Dec. 19, 2008**

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Observation: **WTI Futures Expiry is Special**

WTI-Brent Price Spread – Most Active Near-term Contracts

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Observation: *Expiry Issues Matter*...

WTI-Brent Price Spread – Prompt Contracts (calendar-based roll)

WTI-Brent Price Spread – Most Active Near-term Contracts

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But Something Extra Is Afoot in 2011-2012

Dec. 18, 2010: Tunisian Revolt
Feb. 11, 2011: Hosni Mubarak resigns

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Background: *Landlocked vs. Seaborne Crudes*
Background: *Landlocked vs. Seaborne Crudes*

![Graph showing comparison between landlocked and seaborne crudes](image)

- **WTI-LLS**
- **LLS-Brent** as before

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Background: *Landlocked vs. Seaborne Crudes*

WTI-LLS

LLS-Brent as before

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Further Background: *Crude Quality*

WTI-WTS

WTI-LLS

WTS-LLS

Brent WTI - Büyükşahin, Lee, Moser & Robe 2012
Further Background: *Crude Quality*

Quality spread WTI-WTS is positive throughout.
Further Background: *Crude Quality*

Quality spread WTI-WTS is positive throughout.

Early in 2007, WTI starts trading at discount to LLS.
Further Background: *Crude Quality*

Quality spread *WTI-WTS* is positive throughout.

Early in 2007, *WTI* starts trading at discount to *LLS*.

*WTS-LLS* discount is also huge after Dec. 2010.
Remainder of the Presentation

✓ Provide visual & statistical evidence of **breaks** in crude oil benchmark price **Spreads**
  - WTI-Brent nearby futures spread = “Landlock” spread + “Transatlantic” Spread + Brent nearby spread
  - → Question: Which of these three spreads have experienced structural breaks?
  - → Robustness checks: Inland “quality” spread (WTI-WTS); Near-dated WTI calendar spread

○ **Provide evidence on Economic, Infrastructure and Financial Variables** linked to Spreads
  - Demand-side fundamentals: World, US
  - Supply-side factors: Output capacity (OPEC, Brent); Output (Canada, US);
    - **Infrastructure bottlenecks**: Storage capacity and utilization (Cushing, OK); Pipelines (land to sea)
  - Financial variables: Paper market liquidity; stress; CIT long positions; “insider” net positions

○ **Econometric analysis**
  - Energy Fundamentals *or* Trading Activity?
    - → Which of those variables help predict long run variations in WTI-Brent spreads?

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II. Structural Break Tests

- **Structural break tests**
  - *Spread decomposition:*
    
    $$ WTI_1 - Brent_1 = (WTI_1 - LLS_0) + (LLS_0 - BRENT_0) - (BRENT_1 - BRENT_0) $$

    WTI-Brent nearby futures spread =
    
    “Landlock” spread
    
    + “Transatlantic” Spread
    
    + Brent nearby spread

  - *Interpretation?*

  - *Statistical approach:*
    
    Simple *(deterministic)* time trend in the spread, Look for single break per test
    
    → Choose date *(based on graphs and known events)*, Test for break in mean
Commodity Spreads: Fall 2008

Hypothesis 1: The Brent-WTI ($BRENT_t - WTI_t$) spread levels experience structural breaks in late Fall 2008; so does the “landlock” spread ($WTI_t - LLS_0$). Neither the Transatlantic spreads ($LLS_0 - BRENT_t$ or $LLS_0 - BRENT_0$) nor the West Texas quality spreads ($WTI_t - WTS_0$ or $WTI_0 - WTS_0$) do.

- Rationale:
  - LLS, Brent seaborne $\Rightarrow$ easy to transport/store ($Plante & Yucel '11$)
  - Cushing storage OK for sweet&sour ($Pirrong '10, Genscape 2012$)
  - WTI landlocked after 2007 ($Cushing bottleneck – Fattouh ’07$)
  - Recession starts in Fall 2008
### Table 1A: Commodity Spreads (calendar roll)

<table>
<thead>
<tr>
<th></th>
<th>November 2008 Break</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Constant Time Trend</td>
<td>Time Trend With Weekends</td>
</tr>
<tr>
<td><strong>$Brent_1 - WTI_1$</strong></td>
<td>8.37*** (0.0002)</td>
<td>7.56*** (0.0005)</td>
</tr>
<tr>
<td><strong>$WTI_1 - LLS_0$</strong></td>
<td>5.83*** (0.0030)</td>
<td>4.40** (0.0123)</td>
</tr>
<tr>
<td><strong>$LLS_0 - Brent_1$</strong></td>
<td>0.83 (0.4365)</td>
<td>2.58* (0.0759)</td>
</tr>
<tr>
<td><strong>$WTI_1 - WTS_0$</strong></td>
<td>1.83 (0.1611)</td>
<td>0.75 (0.4708)</td>
</tr>
</tbody>
</table>

Brent WTI - Büyüksahin, Lee, Moser & Robe 2012
### Table 1A: Commodity Spreads (Open Int. roll)

**November 2008 Break**

<table>
<thead>
<tr>
<th></th>
<th>Constant Time Trend</th>
<th>Time Trend With Weekends</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Brent(_1) - WTI(_1)</strong></td>
<td>6.51*** (0.0015)</td>
<td>4.71*** (0.0091)</td>
</tr>
<tr>
<td><strong>WTI(_1) - LLS(_0)</strong></td>
<td>6.56*** (0.0014)</td>
<td>5.26*** (0.0053)</td>
</tr>
<tr>
<td><strong>LLS(_0) - Brent(_1)</strong></td>
<td>1.00 (0.3671)</td>
<td>2.71* (0.0667)</td>
</tr>
<tr>
<td><strong>WTI(_1) - WTS(_0)</strong></td>
<td>1.38 (0.2519)</td>
<td>1.17 (0.3120)</td>
</tr>
</tbody>
</table>
Hypothesis 2: The level of the WTI time spread (measured as the slope of the near-dated term structure of crude oil futures prices, net of interest costs) experiences a structural break in Fall 2008. The structural break is less significant for contracts further along the WTI futures maturity curve.

• Rationale:
  ○ Cushing storage is limited (*Pirrong ’10, Borenstein & Kellog ‘12, Genscape 2012*)
  ○ Dearth of storage matters
Table 1D: Calendar Spreads *(calendar roll)*

<table>
<thead>
<tr>
<th>November 2008 Break</th>
<th>Constant Time Trend</th>
<th>Time Trend With Weekends</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{WTI_2 - WTI_1}{WTI_1} )</td>
<td>5.17*** (0.0050)</td>
<td>5.53*** (0.0040)</td>
</tr>
<tr>
<td>( \frac{WTI_2 - WTI_1}{WTI_1} - LIBOR )</td>
<td>6.62*** (0.0014)</td>
<td>7.05*** (0.0009)</td>
</tr>
<tr>
<td>( \frac{WTI_3 - WTI_2}{WTI_2} )</td>
<td>3.64** (0.0263)</td>
<td>3.91** (0.0202)</td>
</tr>
<tr>
<td>( \frac{WTI_3 - WTI_2}{WTI_2} - LIBOR )</td>
<td>3.86** (0.0213)</td>
<td>4.52** (0.0110)</td>
</tr>
</tbody>
</table>
Table 1E: Calendar Spreads (*Open Int. roll*)

<table>
<thead>
<tr>
<th>Expression</th>
<th>Constant Time Trend</th>
<th>Time Trend With Weekends</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{WTI_2 - WTI_1}{WTI_1} )</td>
<td>4.81*** (0.0082)</td>
<td>5.22*** (0.0055)</td>
</tr>
<tr>
<td>( \frac{WTI_2 - WTI_1}{WTI_1} - LIBOR )</td>
<td>6.37*** (0.0017)</td>
<td>6.02*** (0.0025)</td>
</tr>
</tbody>
</table>

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Hypothesis 3: The Brent-WTI spread level experienced a structural break in December 2010.

Rationales:

- **Physical**: Revolution in Tunisia (Dec. 18, 2010)
  Fukushima disaster (February 2011)
  Libya goes offline (February 2011)
  Cushing still “landlocked”

- **Financial**: WTI (*Brent*) weight in S&P GSCI drops (*increases*)
  Brent included for 1st time in DJ-UBS
### Table 1A: Commodity Spreads *(calendar roll)*

<table>
<thead>
<tr>
<th></th>
<th>Constant Time Trend</th>
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</thead>
<tbody>
<tr>
<td><strong>December 2010 Break</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Brent₁ - WTI₁</strong></td>
<td>8.10*** (0.0003)</td>
<td>4.25** (0.0143)</td>
</tr>
<tr>
<td><strong>WTI₁ - LLS₀</strong></td>
<td>10.78*** (0.0000)</td>
<td>8.02*** (0.0003)</td>
</tr>
<tr>
<td><strong>LLS₀ - Brent₁</strong></td>
<td>2.96* (0.0522)</td>
<td>1.77 (0.1712)</td>
</tr>
<tr>
<td><strong>WTI₁ - WTS₀</strong></td>
<td>0.21 (0.8127)</td>
<td>0.04 (0.9571)</td>
</tr>
<tr>
<td><strong>Brent₁ - Brent₀</strong></td>
<td>8.09*** (0.0003)</td>
<td>11.45*** (0.0000)</td>
</tr>
<tr>
<td><strong>Brent₁ – WTI₁</strong></td>
<td>8.14*** (0.0003)</td>
<td>4.69*** (0.0093)</td>
</tr>
<tr>
<td><strong>Brent₁</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Brent WTI - Büyükşahin, Lee, Moser & Robe 2012
Table 1A: Commodity Spreads *(Open Int. roll)*

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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Constant Time Trend</td>
</tr>
<tr>
<td><strong>Brent$_1$ – WTI$_1$</strong></td>
<td>10.98*** (0.0000)</td>
</tr>
<tr>
<td><strong>WTI$_1$ – LLS$_0$</strong></td>
<td>6.94*** (0.0010)</td>
</tr>
<tr>
<td><strong>LLS$_0$ – Brent$_1$</strong></td>
<td>1.28 (0.2781)</td>
</tr>
<tr>
<td><strong>WTI$_1$ – WTS$_0$</strong></td>
<td>0.38 (0.6852)</td>
</tr>
<tr>
<td><strong>Brent$_1$ – Brent$_0$</strong></td>
<td>11.59*** (0.0000)</td>
</tr>
<tr>
<td><strong>Brent$_1$ – WTI$_1$</strong></td>
<td>9.78*** (0.0001)</td>
</tr>
</tbody>
</table>

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III. Fundamentals & Financials

- Evidence on **Economic, Infrastructure and Financial Variables** linked to Spread
  - **Demand**-side fundamentals: World, USA
  - **Supply**-side factors:
    - Brent-relevant output capacity (OPEC, Brent)
    - WTI-relevant production (US output + Canadian imports to PADD2)
      - *Infrastructure bottlenecks*:
        - Storage capacity and utilization (*Cushing, OK*)
        - Pipelines (*land to sea*)
  - **Financial** variables:
    - Paper market liquidity
    - Stress
    - CIT long positions
    - “Insider” net positions

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1. Macro Fundamentals: **SHIP (World)** & **ADS (US)**
2a. Oil Supply: Non-Saudi OPEC Spare Capacity

**Rationale:** matters for Brent once Cushing is landlocked

→ Interact with dummy for directionality of Cushing bottleneck
2b. Oil Supply: Brent Output

- **Rationale**: “BFOE” output drops matter, especially if ROW substitutable output is constrained.
3a. Oil Supply – WTI: US Rigs & Canadian Imports

**Rationale:** Domestic output & imports end up in Cushing → glut (*e.g.,* Fattouh ’07, Pirrong ’10, Borenstein & Kellog ’12)
Rationale: Genscape data exist only since 2009 → we use a proxy = slope of the WTI term structure (Fama-French ’88)
4a. Paper Market: Overall OI (<3 months)

Figure 7: WTI and Brent Near-Dated Open Interest
(First three Calendar Months)

- **Rationale**: OI is a signal of rising commodity prices (Hong & Yogo ‘11) – different patterns for WTI (-) vs. Brent (+)
4b. Paper Market: Financial Stress

- **Theory**
  - Arrival of less-constrained traders (value arbitrageurs) should reduce mispricing
    - e.g., Rahi & Zigrand (*RFS* 2009); Başak & Croitoru (*JFE* 2006)
  - Limits to arbitrage
    - Questions about such traders’ behavior in periods of market stress
      - Leverage constraints, wealth effects, portfolio rebalancing needs, etc.

  - **Our paper: empirical** analysis, using energy benchmark spreads
4b. Paper Market: Financial Stress

- **Empirics**
  - Financial stress should matter – evidence on extreme linkages:
    - *Bond-equity* returns extreme linkages in G-5 countries
    - *International equity* market correlations increase in bear markets
    - *Commodity-equity* linkages went up in Fall 2008

- **Our measure**: TED Spread
  - *Robustness*: VIX?
• **Rationale**: Commodity Index Traders (CITs) contribute to liquidity *(Büyükşahin et al, 2009; Brunetti & Reiffen, 2011)*
4c. Paper Market: CIT Long Positions (<3 months)

Source of the data?

- Evidence that who trades helps predict oil price spreads
  - In general, difficult to test the theory
  - Unlike most authors, we have access to comprehensive daily data on
    (i) trader-level (i.e., individual) positions
    (ii) each trader’s main of business & underlying motive for trading
        (i.e., hedging or not)
    (iii) over an entire decade (July 2000 to July 2012)
  - The composition of the open interest helps predict an important aspect of
    the distribution of energy returns
Idea?

- Identify 89 companies linked to Cushing infrastructure
  - Owners of refineries, pipelines, storage, etc. linked to Cushing
  - Related entities
- A majority of those companies hold reportable positions in WTI futures
- Test whether, as a whole, their net short position helps predict the WTI-Brent spread
- Findings: in the aggregate, no predictive power → not reported
IV. Econometric Analysis

- Evidence on Economic, Infrastructure and Financial Variables linked to Spread
  - Demand-side fundamentals:
    - World, USA
  - Supply-side factors:
    - Brent-relevant output capacity (OPEC, Brent)
    - WTI-relevant production (US output + Canadian imports to PADD2)
      - Infrastructure bottlenecks:
        - Storage capacity and utilization (Cushing, OK)
        - Pipelines (land to sea)
  - Financial variables:
    - Paper market liquidity
    - Stress
    - CIT long positions
    - “Insider” net positions
A. Dependent Variable:

*WTI*-Brent Nearby Futures Spread
*(calendar-based roll)*
B. What Predicts the Spread: Trading Activity *or* Fundamentals?
C. What Really Matters?
ARDL Regressions
B. Accounting for WTI-Brent Spread

- Regress the spread on...
  - ...trader position data
    - Each trader category entered separately
      - WTI actual & Brent imputed positions (< 3 months)
  - ...real-sector variables
  - ...market stress proxies

- Technical issue
  - Some series are I(0), others I(1); also, endogeneity?
  - ARDL model, Pesaran-Shin (1999) approach
  - Lagged values of variables to deal with AC and endogeneity
A. Fundamentals Matter
## Economy, Supply side, Cushing (Table 4)

<table>
<thead>
<tr>
<th></th>
<th>I-FC</th>
<th>II-FC</th>
<th>III-FC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intercept</strong></td>
<td>-292.839 (259.4)</td>
<td>-202.840 (296.8)</td>
<td>-209.944 (255.8)</td>
</tr>
<tr>
<td><strong>TIME</strong></td>
<td>-0.004777** (0.002437)</td>
<td>-0.00319242 (0.002936)</td>
<td>-0.004414*** (0.001524)</td>
</tr>
<tr>
<td><strong>SHIP</strong></td>
<td>-0.0493147 (0.03559)</td>
<td>-0.0543983 (0.04083)</td>
<td>-0.0398034 (0.03529)</td>
</tr>
<tr>
<td><strong>ADS</strong></td>
<td>0.655218* (0.3543)</td>
<td>0.364546 (0.4378)</td>
<td>0.509077 (0.3543)</td>
</tr>
<tr>
<td><strong>SPARE</strong></td>
<td>-0.600090 (0.4885)</td>
<td>-0.638268 (0.5597)</td>
<td>-1.02213** (0.4609)</td>
</tr>
<tr>
<td><strong>BFOE</strong></td>
<td>-0.615093 (2.303)</td>
<td>0.586638 (2.663)</td>
<td>1.37549 (2.589)</td>
</tr>
<tr>
<td><strong>US STOCKS</strong></td>
<td>-</td>
<td>-</td>
<td>0.0127566 (0.007882)</td>
</tr>
<tr>
<td><strong>LAND</strong></td>
<td>-5.92892*** (1.526)</td>
<td>-6.55721*** (1.751)</td>
<td>-4.84989*** (1.696)</td>
</tr>
<tr>
<td><strong>LAND x SHIP</strong></td>
<td>0.0542900 (0.03958)</td>
<td>0.0483747 (0.4528)</td>
<td>0.0402615 (0.03886)</td>
</tr>
<tr>
<td><strong>Canada Imports</strong></td>
<td>-0.149349** (0.07370)</td>
<td>-0.129496 (0.08416)</td>
<td>-</td>
</tr>
<tr>
<td><strong>RIGS</strong></td>
<td>0.000353558 (0.003469)</td>
<td>0.000379972 (0.004503)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Cushing STOCKS</strong></td>
<td>-</td>
<td>-</td>
<td>-0.076846 (0.06587)</td>
</tr>
<tr>
<td><strong>WTI SLOPE</strong></td>
<td>-</td>
<td>-56.5533* (31.86)</td>
<td>-</td>
</tr>
</tbody>
</table>
**Trading Matters! Expected Signs**

<table>
<thead>
<tr>
<th></th>
<th>Fundamentals + Financials</th>
<th>Fundamentals + Financials + CIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I-FF</td>
<td>II-FF</td>
</tr>
<tr>
<td><strong>DISCOUNT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>213.857</td>
<td>105.619</td>
</tr>
<tr>
<td></td>
<td>(371.7)</td>
<td>(411.8)</td>
</tr>
<tr>
<td><strong>WTI OI</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.033770***</td>
<td>-0.030512***</td>
</tr>
<tr>
<td></td>
<td>(0.007096)</td>
<td>(0.007665)</td>
</tr>
<tr>
<td><strong>Brent OI</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.043394***</td>
<td>0.041662***</td>
</tr>
<tr>
<td></td>
<td>(0.008563)</td>
<td>(0.009393)</td>
</tr>
<tr>
<td><strong>TED</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.678246</td>
<td>0.577481</td>
</tr>
<tr>
<td></td>
<td>(0.7292)</td>
<td>(0.8291)</td>
</tr>
<tr>
<td><strong>WTI CIT Long</strong></td>
<td></td>
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<td>–</td>
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<tr>
<td><strong>Brent CIT Long</strong></td>
<td></td>
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<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Brent vs. WTI Weights</strong></td>
<td>18.5229***</td>
<td>16.4915***</td>
</tr>
<tr>
<td></td>
<td>(2.750)</td>
<td>(3.442)</td>
</tr>
</tbody>
</table>

Brent WTI - Büyükşahin, Lee, Moser & Robe 2012
VI. Conclusion
Findings

- “Breaks”
  - Breaks in Fall-2008 and End-2010
  - *Drivers appear different*

- “Financialization”
  - Increase in overall OI predict increases in the WTI-Brent spread
  - CIT activity inversely related with relevant component of spread
    - *Liquidity? Causality?*

- Information on OI composition is relevant
  - CFTC decision to disaggregate more – trader type & maturity
Further Work

- **Technical:**
  - Out-of-sample predictions
  - Causality
  - Short-term responses
    - Individual traders?

- **Conceptual:**
  - Storage utilization and capacity constraints
    - Longer sample with Genscape data
    - Physical quantities vs. price signals (slope)
II. Trading Facts

Financialization of Energy Futures Markets
A. Position Data

- **Publicly available data**
  - CFTC Commitments of Traders (COT) Reports (Weekly since 1990’s)
  - Highly aggregated
    - All maturities are lumped together
    - Traders grouped in just 2 bins (“Commercials” vs. “Non-Commercials”)

- **vs. Our data**: Large Trader Reporting System (LTRS)
  - End-of-day positions of every individual large trader (Daily)
    - Non-public, CFTC only
      - For every contract maturity
      - Every day from July 1, 2000 to February 26, 2010
  - Information on each trader’s line of business
Our Detailed Data: Main Sub-Categories (*Oil*)

- **Non-commercials**
  - **Hedge Funds** (includes Commodity Pool Operators (CPOs), Commodity Trading Advisors (CTAs), Associated Persons who control customer accounts, and other Managed Money traders)
  - **Floor Brokers & Traders**
  - **Non-Registered Participants** (Traders not registered under the Commodity Exchange Act (CEA); category includes non-MMT financial traders)

- **Commercials**
  - “**Traditional**”
    - **Producers**
    - **Manufacturers** (refiners, etc.)
    - **Dealers** (energy wholesalers, exporter/importers, marketers, etc.)
  - **Commodity Swap Dealers** (includes arbitrageurs and CITs)
B. Measurement Issues

- **Traders’ shares in short-term & long-term contracts**
  - For each category of traders, we get
    - Share of the total open interest (all contract months)
      - Average of long & short positions divided by open interest
    - Share of the open interest in first 3 contract months
      - Commodity indices focus on near-dated contract

- **Speculators**
  - Hedge funds?
    - Register with CFTC → detailed data
  - CITs (Commodity Index Traders)?
    - Detailed data at quarterly frequency & only since 2008.
      - we proxy their market share by share of commodity swap dealers
        - Best we can do (Why?), but imperfect
          - Approximation is better for short-term contracts (why?)
  - Overall importance?

Brent WTI - Büyükşahin, Lee, Moser & Robe 2012
Overall vs. Near-dated Swap Dealer Positions (% of OI), 2000-2010