The Role of Hedgers and Speculators in Liquidity Provision to Commodity Futures Markets

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Motivation

• Belief among many practitioners and academics that presence of speculative capital is important to the functioning of futures markets
  • Provision of insurance to short hedging by producers/merchants
  • Theory Normal Backwardation: speculators receive a risk premium

• Empirically:
  • Producers and merchants are indeed net short, and risk premium positive.
  • Speculators trade for other reasons besides to accommodate hedgers:
    • Capturing style premiums: trend following
    • Portfolio rebalancing

• Not clear who provides liquidity at the margin:
  • Examine rebalancing of positions of hedgers and speculators using public CFTC data and examine liquidity provision at the weekly horizon
  • We do not have data on who initiates position changes, but we use price predictability following position changes to infer who provides / consumes liquidity. (e.g. Kaniel, Saar, Titman (2008))
Main Findings

• Trading behavior:
  • Hedgers are contrarians, Speculators are momentum traders
  • Propensity to trade is higher for speculators than hedgers: specs are more “impatient”

• Prices predictably change following a trade:
  • Relative outperformance of commodities most heavily bought by hedgers
  • Relative underperformance of commodities most heavily bought by speculators

• The price effects are larger when:
  • Hedgers have recently suffered a large loss on their futures position (“collateral concern”)
  • Hedgers are trading in the same direction in consecutive weeks (“order imbalance”)
  • There are fewer speculators in the market (specs need to rely on hedgers to trade)
  • Positions are more unbalanced in the direction of the trade

• Speculators are short-term liquidity consumers, and hedgers are liquidity providers in commodity futures markets
Our “trading” measure

\[ Q_{i,t} = \frac{\text{netlong position}_{i,t} - \text{netlong position}_{i,t-1}}{\text{OI}_{i,t-1}} \]

• Trading measure = weekly change in the net long position, scaled by beginning of week open interest.

• We calculate this measure separately for
  – Commercials: “Hedgers”
  – Non-Commercials: “Speculators”
  – Non-Reportables
using the weekly COT Reports of the CFTC between 1994-2012

• Matched sample of weekly price data for 26 commodity futures
Weekly positions data and return measurement

Positions measured

\[ t-1 \]

Tue

Week \( t \)

Positions measured

\[ t \]

Tue

Positions reported

Markets reflect report

Fri

Mon

Week \( t+1 \)

Tue

Trading behavior

\[ Q_{i,t} = \frac{\text{netlong position}_{i,t} - \text{netlong position}_{i,t-1}}{O_{i,t-1}} \]

Liquidity Provision

\[ R_{i,t+1} = \frac{F_i(t,T) - F_i(t-1,T)}{F_i(t-1,T)} \]
Net position changes (Q) by Hedgers

Average Absolute Value from Using Weekly Data (Table 1 C)
Propensity to change positions (Table 1D)

\[
PY_{i,t}^{Hedger} = \frac{\text{abs}(HL_{i,t} - HL_{i,t-1}) + \text{abs}(HS_{i,t} - HS_{i,t-1})}{HL_{i,t-1} + HS_{i,t-1}}
\]
Table 2: Returns and contemporaneous position changes

Fama-MacBeth: \[ Q_{i,t} = a_{0,t} + a_{1,t} R_{i,t} + \varepsilon_{i,t} \]

<table>
<thead>
<tr>
<th>Trader</th>
<th>Hedgers</th>
<th>Speculators</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>( R_{i,t} )</td>
<td>-0.0066</td>
<td>0.0052</td>
<td>0.0014</td>
</tr>
<tr>
<td>(</td>
<td>-46.95</td>
<td>)</td>
<td>(43.77)</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>20.9%</td>
<td>17.4%</td>
<td>6.1%</td>
</tr>
</tbody>
</table>

- **Speculators**: shift positions towards commodities with increasing prices that exhibit relative strength (price momentum)
- **Hedgers**: shift away from commodities that experience relative price strength: contrarians
- **Non-reportables**: behave like small speculators
Table 3: Returns and past position changes

Fama-MacBeth:  
\[ R_{i,t+1} = b_0 + b_1 Q_{i,t} + b_2 B_{i,t} + b_3 S_{i,t} \hat{\epsilon}_i,t + b_4 R_{i,t} + \epsilon_{i,t+1} \]

Controls for x-sectional differences in expected returns

<table>
<thead>
<tr>
<th>Trader</th>
<th>Full Sample Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hedgers</td>
</tr>
<tr>
<td>( Q_{i,t} )</td>
<td>4.58</td>
</tr>
<tr>
<td>[ (5.93) ]</td>
<td>[ (-6.68) ]</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>11.7%</td>
</tr>
</tbody>
</table>

- **Speculators:** Commodities that are most heavily bought by speculators earn lower return in the subsequent week.

Return Impact for typical position change (3.1%)  
\[ = 5.36\% \times 3.1\% = 0.17bp / week or 8.6\% annualized \]
Table 4 A: Portfolios sorted on net position changes of hedgers

- t=0 date of CFTC position measurement, sort commodities based on hedger Q into halves or quintiles
- Track return for 20 days after portfolio formation
- Days 1-4: pre-release of the report

<table>
<thead>
<tr>
<th>Top / Bottom 50% sorts</th>
<th>day -10 to -1</th>
<th>day 1-20</th>
<th>day 1-4</th>
<th>day 5-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portfolio 1 (smallest Q)</td>
<td>0.929%</td>
<td>0.182%</td>
<td>0.010%</td>
<td>0.171%</td>
</tr>
<tr>
<td>Portfolio 2 (largest Q)</td>
<td>-0.575%</td>
<td>0.612%</td>
<td>0.212%</td>
<td>0.400%</td>
</tr>
<tr>
<td>Portfolio 2- Portfolio 1</td>
<td>-1.503%</td>
<td>0.431%</td>
<td>0.202%</td>
<td>0.229%</td>
</tr>
<tr>
<td>(t-statistics)</td>
<td>(-20.08)</td>
<td>(4.16)</td>
<td>(4.20)</td>
<td>(2.42)</td>
</tr>
</tbody>
</table>

Notes:
- Hedgers buy commodities that rank low on relative price strength
- About 1/2 of the 20-day excess return occurs prior to the release of the report

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Alternative Explanation: Private information?

Return to Portfolios sorted on Hedger Position Changes

Day relative to sorting

-10 to -1 days
1-20 days
1-4 days
5-20 days

Small Q (Hedger sells)  Big Q (Hedger buys)
Table 4 A: Portfolios sorted on net position changes of hedgers

- Quintile sorts:

<table>
<thead>
<tr>
<th>Quintile sorts</th>
<th>-10 to -1 days</th>
<th>1-20 days</th>
<th>1-4 days</th>
<th>5-20 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portfolio 1 (smallest Q)</td>
<td>1.554%</td>
<td>0.092%</td>
<td>-0.019%</td>
<td>0.111%</td>
</tr>
<tr>
<td>Portfolio 2</td>
<td>0.759%</td>
<td>0.220%</td>
<td>0.023%</td>
<td>0.198%</td>
</tr>
<tr>
<td>Portfolio 3</td>
<td>0.084%</td>
<td>0.430%</td>
<td>0.112%</td>
<td>0.318%</td>
</tr>
<tr>
<td>Portfolio 4</td>
<td>-0.461%</td>
<td>0.477%</td>
<td>0.225%</td>
<td>0.252%</td>
</tr>
<tr>
<td>Portfolio 5 (largest Q)</td>
<td>-1.032%</td>
<td>0.759%</td>
<td>0.215%</td>
<td>0.544%</td>
</tr>
<tr>
<td>Portfolio 5 - Portfolio 1</td>
<td>-2.587%</td>
<td>0.667%</td>
<td>0.234%</td>
<td>0.433%</td>
</tr>
<tr>
<td>(t-statistics)</td>
<td>(-22.89)</td>
<td>(4.02)</td>
<td>(3.12)</td>
<td>(2.92)</td>
</tr>
</tbody>
</table>

Notes:
- 0.67% excess return between quintile portfolios
- About 1/3 of the 20-day excess return occurs prior to the release of the report
Commodity portfolios sorted on Hedger Buying

Market-adjusted cumulative returns in 20 days following a trade
Table 4 B: Portfolios sorted on net position changes of speculators

- t=0 date of CFTC position measurement, sort commodities based on speculator Q into halves or quintiles
- Track return for 20 days after portfolio formation
- Days 1-4: pre-release of the report

<table>
<thead>
<tr>
<th>Top / Bottom 50% sorts</th>
<th>day -10 to -1</th>
<th>day 1-20</th>
<th>day 1-4</th>
<th>day 5-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portfolio 1 (smallest Q)</td>
<td>-0.643%</td>
<td>0.542%</td>
<td>0.207%</td>
<td>0.336%</td>
</tr>
<tr>
<td>Portfolio 2 (largest Q)</td>
<td>0.997%</td>
<td>0.252%</td>
<td>0.016%</td>
<td>0.236%</td>
</tr>
<tr>
<td>Portfolio 2 - Portfolio 1</td>
<td>1.640%</td>
<td>-0.290%</td>
<td>-0.191%</td>
<td>-0.099%</td>
</tr>
<tr>
<td><em>(t-statistics)</em></td>
<td><em>(23.45)</em></td>
<td><em>(−2.72)</em></td>
<td><em>(−4.05)</em></td>
<td><em>(−1.05)</em></td>
</tr>
</tbody>
</table>

Notes:
- Speculators buy commodities that exhibit relative price strength
- 2/3rd of the 20-day excess return occurs prior to the release of the report
Table 4 B: Portfolios sorted on net position changes of speculators

- Quintile sorts:

<table>
<thead>
<tr>
<th>Quintile sorts</th>
<th>-10 to -1 days</th>
<th>1-20 days</th>
<th>1-4 days</th>
<th>5-20 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portfolio 1 (smallest Q)</td>
<td>-1.133%</td>
<td>0.752%</td>
<td>0.273%</td>
<td>0.479%</td>
</tr>
<tr>
<td>Portfolio 2</td>
<td>-0.385%</td>
<td>0.362%</td>
<td>0.130%</td>
<td>0.232%</td>
</tr>
<tr>
<td>Portfolio 3</td>
<td>0.002%</td>
<td>0.382%</td>
<td>0.134%</td>
<td>0.248%</td>
</tr>
<tr>
<td>Portfolio 4</td>
<td>0.837%</td>
<td>0.393%</td>
<td>0.049%</td>
<td>0.343%</td>
</tr>
<tr>
<td>Portfolio 5 (largest Q)</td>
<td>1.599%</td>
<td>0.098%</td>
<td>-0.036%</td>
<td>0.134%</td>
</tr>
<tr>
<td>Portfolio 5 - Portfolio 1</td>
<td>2.732%</td>
<td>-0.654%</td>
<td>-0.309%</td>
<td>-0.345%</td>
</tr>
<tr>
<td>(t-statistics)</td>
<td>(25.00)</td>
<td>(-4.15)</td>
<td>(-4.25)</td>
<td>(-2.40)</td>
</tr>
</tbody>
</table>

Notes:
- 0.66% excess return between quintile portfolios
- About 1/2 of the 20-day excess return occurs prior to the release of the report
Table 5: Drivers of liquidity provision by hedgers

Panel: 

$$R_{i,t+1} = b_1 Q_{i,t}^{hedger} + b_2 Dm(·)Q_{i,t}^{hedger} + controls + u_i + \varepsilon_{i,t+1}$$

<table>
<thead>
<tr>
<th></th>
<th>Capital Constraint</th>
<th>Order Imbalance</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Q_{i,t}^{hedger}$</td>
<td>2.68</td>
<td>1.40</td>
</tr>
<tr>
<td></td>
<td>(5.18)</td>
<td>(1.76)</td>
</tr>
<tr>
<td>$Q_{i,t}^{hedger} \times \ Dummy$</td>
<td>3.47</td>
<td>2.40</td>
</tr>
<tr>
<td></td>
<td>(2.01)</td>
<td>(2.66)</td>
</tr>
<tr>
<td></td>
<td>(1.57)</td>
<td>(1.23)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.33%</td>
<td>0.33%</td>
</tr>
</tbody>
</table>

Capital Constraint Dummy:
- Calculate the capital loss for hedgers in commodity $i$ in week $t$
- Set $D = 1$ for the decile of largest capital losses

Order Imbalance Dummy:
- $D = 1$ if hedgers trade in the same direction for 2 consecutive weeks
Table 6: Drivers of liquidity consumption by speculators

\[ R_{i,t+1} = b_0 + b_1 Q_{i,t}^{spec} + b_2 Dm(\cdot)_{i,t} \cdot Q_{i,t}^{spec} + controls + \varepsilon_{i,t+1} \]

<table>
<thead>
<tr>
<th>Speculative Ratio</th>
<th>Speculative Imbalance</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Q_{i,t}^{spec} )</td>
<td>-2.846 (-4.74)</td>
</tr>
<tr>
<td>( Q_{i,t}^{spec} \times Dm(FRatio1)_{i,t} )</td>
<td>-2.981 (-2.44)</td>
</tr>
<tr>
<td>( Q_{i,t}^{spec} \times Dm(SpecPosition)_{i,t} )</td>
<td></td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

Speculative ratio:
- Define speculative ratio \( F_{i,t-1}^1 = \frac{(SL_{i,t-1} + SS_{i,t-1})}{(HL_{i,t-1} + HS_{i,t-1})} \)
- Set \( Dm(FRatio1)_{i,t} = 1 \) when \( F_{i,t-1}^1 \) is below the median for commodity \( i \)

Speculative Imbalance:
- \( Q_{i,t}^{spec} > 0 \), and \( (SL_{i,t-1} - SS_{i,t-1}) / OI_{i,t-1} \) in top quintile
- \( Q_{i,t}^{spec} < 0 \), and \( (SL_{i,t-1} - SS_{i,t-1}) / OI_{i,t-1} \) in bottom quintile
Conclusions

• We characterize the trading behavior of hedgers and speculators around net position changes.
  • Hedgers are contrarians, Speculators are momentum traders
  • Propensity to trade is higher for speculators than hedgers: specs are more “impatient”

• Prices predictably change following position adjustments, in a manner that is consistent with hedgers providing liquidity to speculators.