

Informed trading in oil futures market

10th Financial Risks International Forum

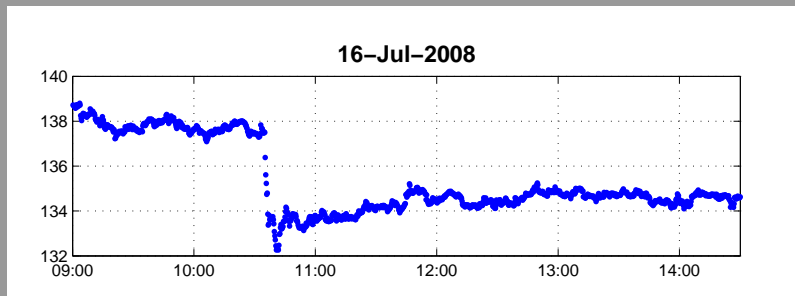
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Stock level announcement and oil price



- Median estimate: -2,200; Actual: 2,952 (thousands of bl.)
- Announcement at: 10:35

The importance of inventories for oil price determination: theory and empirics

- Deaton and Laroque (1992, 1996)
- A series of papers by Pindyck (1994, 2001, 2004)
- Knittel and Pindyck (2016)
- Kilian and Murphy (2013) and Kilian and Lee (2014) (global)
- Unalmis, Unalmis, Unsal (2012) (U.S.)

The impact of macro or energy-specific news on energy prices (daily data)

- Barnhart (1989): some impact of monetary surprises.
- Kilian and Vega (2011): no effect of macro news.
- Bu (2014) : effect of inventory shocks on volatility.
- Datta et al. (2014): events can be related to implied-density.
- Berk and Rauch (2016) study the impact of CFTC announcements.

The impact of macro or energy-specific news on energy prices (intraday data)

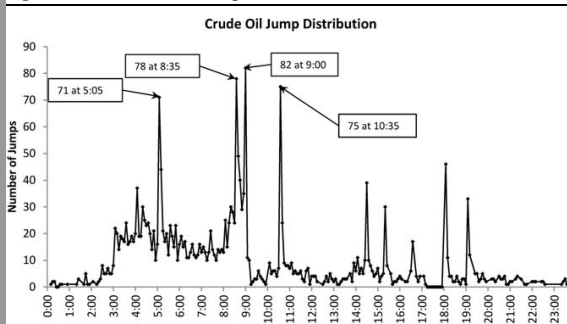
- Chatrath et al. (2012): very weak effect of macro news.
- Basistha and Kurov (2015) and Rosa (2014): significant intraday effect of monetary policy surprises .
- Chiou-Wei et al. (2014): effect on spot futures gas prices (effect on futures first).
- Halova Wolfe and Rosenman (2014): significant effect of oil and gas news on oil and gas prices.
- Halova et al. (2014): stronger effect of announcements once EIV issue is taken into account
- Ye and Karali (2016): strong impact of EIA announcement compared to API releases (short period of study: Aug 2012 - Dec 2013)

Sudden price variations (jumps) and inventory news

- Extending Andersen et al. (2003, 2007), some authors focused on oil to link surprises and large price variations
- Elder et al. (2013): 64 jumps associated with announcements (not surprise) over the Jan 2005 - December 2010 period
- Bjursell et al. (2015) found that jumps are not systematically associated with surprises. Over the May 2003 - December 2007 period
 - ⇒ 234 announcements
 - ⇒ 75 surprises
 - ⇒ 20 jumps whose 11 are associated to surprises
- Note that jumps can emerge without identified news but because of liquidity variations (Jiang et al., 2011)

Jumps following announcements (Elder et al., 2014)

Figure 1: Distribution of Jumps across Time Intervals



This figure reports the number of jumps at each five-minute interval during the trading day.

- Sample period: Jan 2005 - Dec 2010.
- Most of the jumps can be matched with news (either macro or oil-specific).

Motivation

- Most of the literature focuses on the impact of news on returns.
- We extend this literature in examining potential informed trading in the CME futures contracts for WTI in relation with a burgeoning field:
 - Christophe et al. (2010) provide evidence of abnormal short-selling before corporate downgrades
 - Hendershott et al. (2014) show abnormal institutional trading before unscheduled earning announcements
 - Kurov et al. (2016) demonstrate that news are partly incorporated in price before the announcement time for half macro news in the U.S.
 - Bernile et al. (2016) show that informed trading occurs during lock-up periods of FOMC announcement
 - ...

Aim and sketch of the results

- We investigate potential suspicious trading behavior **before** the release of inventory level by the DOE each Wednesday.
- We show average price patterns consistent with informed trading
⇒ 25 bps mean drop in the 2.5 hours before the news release.
- We provide evidence of large (and significant) order imbalances in days with positive surprises.

How to define a surprise? Bloomberg survey content

DOEASCRD Index

Release Date	7/16/2008
Time	10:35
Country	US
Event	DOE U.S. Crude Oil Inventories
Period	jul-11
Actual	2952
Prior	-5840
Revised	NaNQ

Summary

Median Estimate	-2200
Average Estimate	-1863
High Estimate	3000
Low Estimate	-3900
Number of Estimates	14
Qualified Economists	11
Standard Deviation	1670

Economist Estimates

Economist	Firm	Estimate	As of
Jim Ritterbusch	Ritterbusch & Assoc.	0	15-jul-08
Drew Wozniak	ICAP Energy	-2700	16-jul-08
Brad Samples	Summit Energy	-3400	14-jul-08
Addison Armstrong	TFS Energy	-2200	15-jul-08
Kristi Jones	J.P. Morgan Chase	-3600	15-jul-08
Andy Lebow	Man Financial Inc.	-1000	16-jul-08
Peter Beutel	Cameron Hanover Inc.	-2500	14-jul-08
Tim Evans	Citi Futures Perspective	-1500	14-jul-08
Remy Penin	Societe Generale	-2280	16-jul-08
James Crandell	Lehman Brothers	-1800	15-jul-08
Kyle Cooper	IAF Advisors	-2000	15-jul-08
Phil Flynn	PFGBest	3000	14-jul-08
Antoine Halff	Newedge USA	-3900	14-jul-08
Mike Fitzpatrick	MF Global	-2200	15-jul-08

How to define a surprise? Bloomberg survey content

- Sample period: January 2007 to October 2014.
- 402 announcements.
- Surprise definition: actual inventory is beyond +/- 3 or 4 standard deviations from the median of forecasts
- Futures prices data from TickData stamped at the second; a continuous time series is formed using the nearby futures contract.

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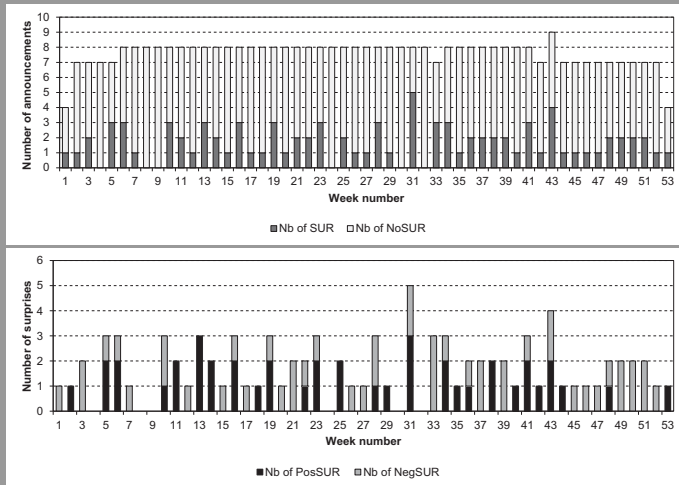
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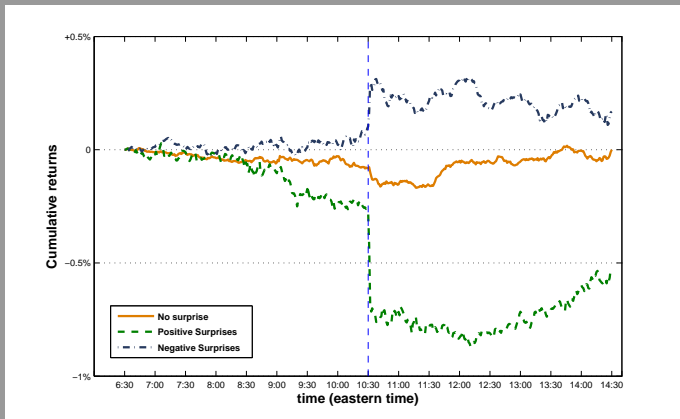
Statistics on surprises

	Year	2007	2008	2009	2010	2011	2012	2013	2014	Total
	No. news	47	53	51	52	52	52	52	43	402
3σ	NoSUR	37	40	40	43	40	41	39	32	312
	SUR	10	13	11	9	12	11	13	11	90
	PosSUR	3	8	5	4	5	6	5	7	43
	NegSUR	7	5	6	5	7	5	8	4	47
	% NoSUR	78.72%	75.47%	78.43%	82.69%	76.92%	78.85%	75.00%	74.42%	77.61%
	% SUR	21.28%	24.53%	21.57%	17.31%	23.08%	21.15%	25.00%	25.58%	22.39%
	% PosSUR	6.38%	15.09%	9.80%	7.69%	9.62%	11.54%	9.62%	16.28%	10.70%
% NegSUR	14.89%	9.43%	11.76%	9.62%	13.46%	9.62%	15.38%	9.30%	11.69%	
4σ	NoSUR	40	46	46	48	47	47	46	37	357
	SUR	7	7	5	4	5	5	6	6	45
	PosSUR	3	4	2	2	1	4	2	5	23
	NegSUR	4	3	3	2	4	1	4	1	22
	% NoSUR	85.11%	86.79%	90.20%	92.31%	90.38%	90.38%	88.46%	86.05%	88.81%
	% SUR	14.89%	13.21%	9.80%	7.69%	9.62%	9.62%	11.54%	13.95%	11.19%
	% PosSUR	6.38%	7.55%	3.92%	3.85%	1.92%	7.69%	3.85%	11.63%	5.72%
% NegSUR	8.51%	5.66%	5.88%	3.85%	7.69%	1.92%	7.69%	2.33%	5.47%	

Distribution of surprises over time



How do oil futures price behave around releases?



- The announcement definitely is a news! 50 bps drop on average at 10:30.
- But ... 25 bps decrease on average before a positive surprise.

Measuring informed trading empirically

- As in Bernile et al. (2016), we compute the order-imbalance as:

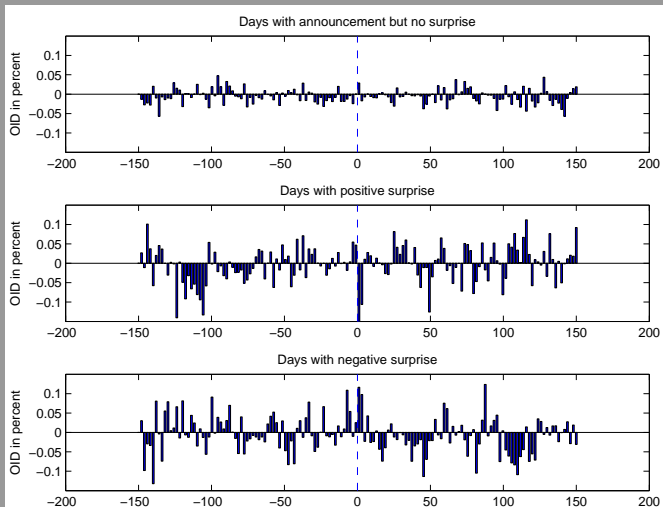
$$\frac{B - S}{B + S}$$

- with $B(S)$ the buyer(seller)-initiated trading volume.
- Volume can be either the notional value in dollars (OID) or the number of trades (OIN).

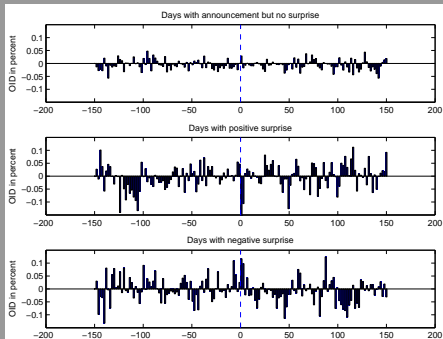
Measuring informed trading empirically (II)

- The transaction-level data from the CME do not provide information about the direction of the transaction → we use the tick rule.
- Data are only stamped at the second → we compute the volume-weighted price and then apply the tick rule.
- OID and OIN are calculated for short periods of time (1,2,5 minutes) from 2 hours and a half before to 2 hours and a half after the announcement time.

Order imbalances (2 minutes)



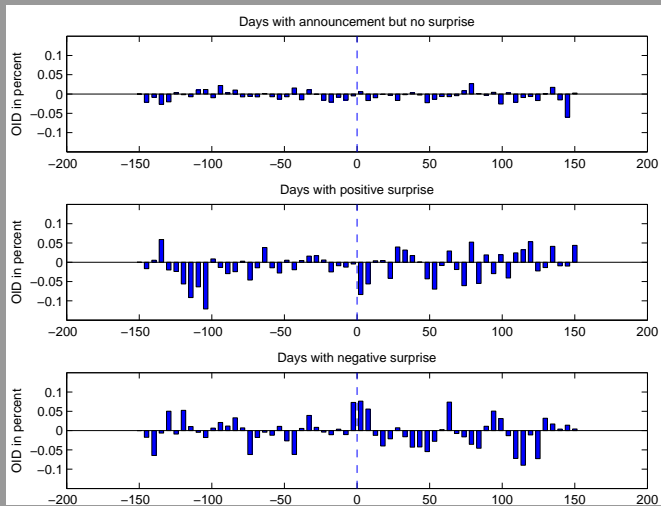
Statistical significance

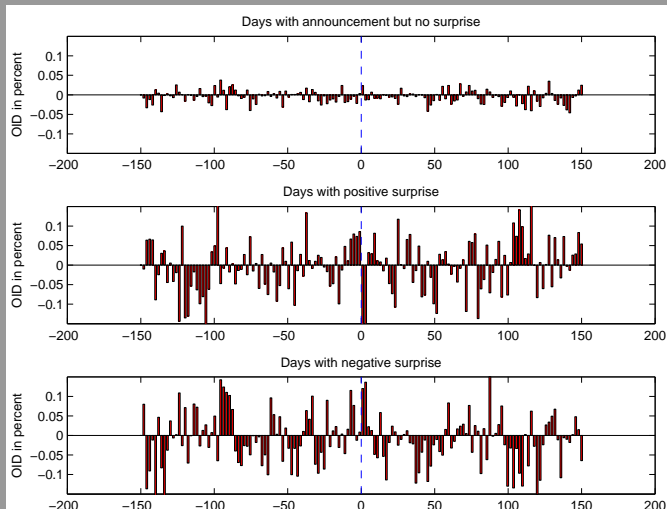


$$OI_t = \alpha + \beta \cdot I(SUR > 0) + \gamma \cdot I(SUR < 0) + \varepsilon_t$$

Event windows	Intercept	PosSUR	NegSUR
$[-240, -120]$	-0.639 (-1.412)	0.630 (0.469)	0.135 (0.105)
$[-240, 0]$	-0.438 (-1.747)	-0.568 (-0.767)	0.300 (0.420)
$[-120, -60]$	0.212 (0.522)	-3.529 (-3.154)	-0.009 (-0.008)
$[-120, 0]$	-0.221 (-0.820)	-1.758 (-2.304)	0.389 (0.588)
$[-60, 0]$	-0.628 (-1.886)	0.433 (0.458)	0.717 (0.778)

Order imbalances (5 minutes)



Order imbalances (2 minutes) with surprises $\pm 4 \sigma$ 

Concluding remarks

- Suspicious trading behavior in the pre-announcement period.
- Do we highlight information leakage or superior forecasting ability?
 - we do not consider systematic error in forecasts.
 - Chang et al. (2009) and Gay et al. (2009) show that best forecasters have not good performance.
- Potential future research:
 - analysis of the impact on the term structure.
 - the economic value of over-reaction.
 - is the drift also present in oil-related markets?
 - are options used to benefit from the surprises?

Literature

- Bernile, G., Hu, J., Tang, Y., 2016. Can information be locked-up? Informed trading ahead of macro-news announcements. *Journal of Financial Economics* 121, 496-520.
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