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Information Arrival and the Oil Price Collapse

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Abstract

The price of West Texas Intermediate Crude (WTI) fell by almost 60% between late July 2014 and March 2015. Assuming that the oil market is relatively efficient, new information must enter the market in order for the price of crude to change more than a minimal amount associated with carrying costs. I use an event study methodology to analyze oil price changes in response to news disclosures over the analysis period. Not surprisingly, I found that most of the news releases coincident with large price movements pointed to positive supply surprises, *i.e.*, supply being greater than expected. However, I also found that, on a significant portion of such days, there was no release of news that contained fundamental information. This is consistent with the price behavior of financial asset markets, which often exhibit large price movements that are not supported by the arrival of new information, and also supports the view that a substantial fraction of oil price movements were instead related to factors such as investor sentiment and momentum trading. The future implications of the recent price collapse suggest that a sharp rebound is possible, but is likely capped by the effects of shale production.

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Between late July 2014 and March 2015, the price of West Texas Intermediate Crude Oil (WTI) fell by almost 60%. It is hardly surprising that such a dramatic drop in the price of an important resource led to a great deal of analysis regarding its cause and consequences. Examples include the work of Areski and Blanchard (2014), Baumeister and Kilian (2015), Cashin et. al. (2014), Kilian (2014) and the World Bank (2014). All of these papers are based on fundamental economic analysis in that they examine the factors that affect the supply and demand for oil such as GDP growth, the energy intensity of GDP, changes in oil production technology, the revenue requirements of producing nations, and geopolitical forces.

This short study takes a different approach by applying a finance perspective. As Areski, Loungani, van der Ploeg and Venables (2014) observe, oil can be thought of both as a fundamental commodity and a financial asset. From this perspective, the price of oil is like any other financial asset price. Assuming that the oil market is relatively efficient, new information must enter the market for the price of crude to change more than a minimal amount associated with normal carry. This leads to the question of the nature of the new information the market was responding to during the dramatic price collapse between late July 2014 and March 2015. This paper addresses the question by using a standard finance event study approach, which involves two steps. First, I identify the "large" price changes during the sample period. Second, I attempt to match those price changes to coincident news related to factors identified in the economic research as affecting oil prices.

The economic papers cited above all point to a similar list of potential factors as determinants of oil prices. According to the World Bank Report (2014), those factors are:

- Changes in OPEC objectives from stabilizing prices to maintaining market share;
- Persistent positive surprises with respect to U.S. shale oil production;
- The appreciation of the dollar against major currencies in trade weighted nominal terms;
- Changes in expected long-term world economic growth;
- Changes in the long-term expected energy intensity of GDP;[1]
- Geopolitical conflict affecting supply such as instability in Libya and sanctions associated with the conflict in the Ukraine; and
- Fiscal revenue requirements in oil producing countries such as Russia, Nigeria and Venezuela.

The optimal control solution for the exploitation of a natural resource also sheds light upon the how the price of oil should respond to information.[2] According to the optimal control solution, the price of oil is set today so that it rises over the life during which the resource is exploited at a rate the provides owners of the resource with a fair risk-adjusted return. This solution also suggests how equilibrium is achieved. If the current price falls below the equilibrium path due to a shock, owners of the asset will expect future appreciation to exceed the fair risk adjusted return. As a result, they will leave oil in the ground, which will cause the current price to rise until equilibrium is reestablished. Even

[1] Energy intensity is a measure of the energy efficiency of a nation's economy. It is calculated is units of energy used per unit of GDP.

[2] For a derivation of the optimal control solution see Perman and Ma (2012).

if actual producers fail to act in this fashion, finance theory predicts that financial investors will buy and store oil as long as it offers a superior risk-adjusted return. From a spot market standpoint, buying and storing oil is equivalent to reducing production and storing oil in the ground.

Data and Empirical Results

The event study conducted here uses daily price data for WTI crude over the period from January 1, 2014 to March 16, 2015 taken from the FRED database maintained by the St. Louis Federal Reserve Bank. Because the study is based on log returns (logarithmic changes in prices), the results would be virtually identical if Brent crude data were used rather than WTI. Although there is a price spread between the two crude types, it is relatively stable so that large changes in one price are matched by large changes in the other. The WTI price data are plotted in Figure 1, which shows that WTI crude traded above $100 per barrel until the end of July 2014 . At that point, prices began to collapse, falling to approximately $44 by March 16.

I employed the following procedure to match large movements in oil prices to news disclosures. First, I convert the price data to logarithmic returns. The average log return over the 302 trading day sample period was -0.26% with a standard deviation of 2.10%. However, the standard deviation was not constant during the sample period but increased once the oil price collapse began. I confirmed this by calculating the implied volatilities of oil futures options which were greater at the end of the sample period than at the beginning. The increase in volatility, while interesting, is not germane to the current study which is designed to associate large price movements with related news. Consequently, I define a large price movement as one that exceeds 1.95 times the full

period sample standard deviation in absolute value.[3] There are 24 such large movements during the sample period, which constitute 8.4% of the trading days. The number of large movements exceeds the expected number of 5% because of the increase in volatility noted above. Given the goal of matching large movements with news, designating more days than expected as "large" price movements is not a problem. In fact, doing so provides added assurance that days on which possibly important news arrived will not be overlooked.

Of these 24 days with "significant" price movements, 9 are positive and 15 are negative. The fact that there are more "significant" negative movements than positive ones is not surprising given that sample was selected to include what was known *ex ante* to be a major price drop. The cumulative decline on the 15 days with significant drops is 83.5% (continuously compounded). This is nearly identical to the total drop of 87.0% (measured on the same basis) from July 31, 2014 when the price collapse began through the end of the sample period.

Second, to match the price movements with news, I use the Dow Jones Institutional News service from Dow Jones Newswires as my source of relevant information. Dow Jones Institutional News provides trading professionals with real-time financial news delivery around the clock and draws on Dow Jones' global reporting capabilities, including *The Wall Street Journal* and *Barron's*. Because major movements in the price of oil are of such worldwide importance, I concluded that the Dow Jones Institutional News would report relevant news related to significant movements as it happened.

[3] If oil price changes are assumed to be normally distributed, i.e. they follow a standard "Bell curve," then one would expect approximately 5% of these price changes to be either greater than or less than 1.95 standard deviations away from the average price change for the dataset.

Turning to the individual days, Table 1 reports the news associated with each of the 24 significant returns. In most cases, the news was reported on the same day as the price movement. There were several instances, however, in which the newswire reported the news on the day after the price moved, perhaps because the price moved late in the day. Those news stories are included in Table 1 as well.

Table 1 groups the news announcements on these days into three categories. The first, color-coded red, are days during which I concluded that there was no meaningful economic news related to the fundamental factors that affect oil prices. One example is January 12, 2015 when WTI dropped 4.85%. In the absence of any fundamental news related to the drop, the Dow Jones Institutional News Wire related the move to a statement by Goldman Sachs analyst Jeffrey Currie that "There's no bottom in sight for oil prices." The article goes on to explain how Mr. Currie had revised his price forecast. It is hard to see this as anything other than a news service attempting to offer an *expost* explanation of a large price movement in the absence of fundamental information. Similarly, when the WTI price rose 4.47% four days later on January 16, 2015, the news wire attributed that increase to one international forecaster cutting its target for supplies in 2015. Finally, the wire offered no explanation whatsoever for price declines of 4.10% on January 22, 2015 and 5.31% on February 26, 2015. In total, there are 10 days on which there were significant price changes that could not be tied to the release of new value-relevant news related to the fundamental factors listed earlier. Though this finding may be surprising, it is consistent with similar work on the behavior of the overall stock market. Cutler, Poterba and Summers (1989) and Cornell (2013) report that a majority of the largest moves in the aggregate stock market could not be matched to the release of

fundamental valuation-related news. The overall event study results suggest that oil was trading, at least in part, like a financial asset during the period. As such, its price was affected by forces such as investor sentiment, momentum trading, and all the other factors that affect financial assets as well as the underlying supply and demand for the commodity.

One final day is worth noting even though it is not in the first group. On January 14, 2015 the WTI price jumped 5.45% on news that U.S. crude supplies *rose* and the outlook was for a continued increase. That day is in the final group because there was fundamental valuation-related news. However, the price movement was in the wrong direction, suggesting that the change in price was not a result of the news.

The second group, color-coded green, consists of days on which there was unambiguously important fundamental information released. By my analysis, there is only one day in this group - November 27, 2014. On that day, OPEC announced its decision to hold crude oil output steady at 30 million barrels per day despite plentiful global supplies. The response was an 11.13% decline in the price of WTI crude, the largest price movement in the sample and one of the largest dollar price drops in the history of the oil market.

The final group, color-coded blue, consists of 13 days on which there was mention of at least one of the fundamental factors listed at the outset as determinants of the price of oil. Interpretation of news on these days is complicated by the difficulty of determining what constitutes "new" news. It is only surprises regarding the factors that should move oil prices. Given the efficiency of the foreign exchange market, changes in exchange rates are clearly new news, but comments regarding the slowing economic

growth in Europe or Saudi intentions are much more difficult to interpret. Should the news article be taken to imply that investors learned something new about European economic growth on Saudi intentions on the day in question or were traders and journalists trotting out well known facts to explain price movements *ex post*? In some cases, the article directly identifies the disclosure as a "surprise" but this is not always the case. For instance, on January 30, 2015 the newswire reports that U.S. oil-rig count saw its worst week, falling by 94 rigs to 1,223 and hitting a 2-year low. Because the WTI price rose 7.99% on that day it seems reasonable to conclude that the news was a surprise, but with no data on the reduction in rig count that was expected (and some reduction would be expected in light of the lower price of crude) the conclusion is not unambiguous.

Bearing in mind the foregoing caveat, the large movements in the second group were associated with news regarding three recurrent factors and one possible fourth factor. The three main factors are:

- Appreciation of the dollar relative to other currencies;
- Surprises regarding the production of U.S. crude compared with expectations; and
- Surprises regarding oil production other than that of U.S. crude.

The fourth possible fourth factor is:

- Reduced demand for oil due to slowing economic growth.

I refer to the fourth factor as "possible" because falling demand for oil due to slowing economic growth is mentioned in two news reports, but there is scant evidence that there was any meaningful surprise regarding the rate of economic growth in the major

consuming countries during the sample period. As a result, it seems fair to conclude that innovations in economic growth rates had little to do with the collapse of oil prices.

Returning to the three main factors, there is little doubt news about appreciation of the dollar contributed to the decline in the dollar price of WTI crude. The role of the dollar was mentioned on five days when there were significant negative returns. However, the role of the dollar in explaining the overall price drop is limited. During the sample, the dollar only appreciated 10% against a trade weighted average of other major currencies compared to an approximately 60% (not continuously compounded) drop in the price of crude. Furthermore, as Zhang, Fan, Tsai and Wei (2008) show, the price of oil is unlikely to move one-to-one with the dollar exchange rate. On net, therefore, the appreciation of the dollar can explain only a small fraction of the collapse in the price of oil.

The second and third factors are different aspects of the same point – that the market was surprised by the fact that in response to falling prices there was not more reduction in effective supply. The biggest surprise, as noted earlier, was the response of OPEC. In addition to the major price drop on November 28, 2014, news regarding the intentions of OPEC producers, particularly Saudi Arabia was associated with significant price declines on October 14, December 8, December 10, 2014; and January 5 and January 6, 2015. Even more common were reports related to U.S. inventories and production which were associated with large price movements on eight days. The main surprise was first that U.S. shale production was greater than expected and second that it declined more slowly than expected when prices began falling. Finally, there were also reports of other producers failing to cut production as prices fell. For instance, the 5.20%

drop on January 5, 2015 was attributed in part to new supply from Russia and Iraq. Such a finding is consistent with the view that political forces related to the fiscal revenue requirements of non-OPEC producers prevented them from cutting production. At the end of the sample period, further information regarding the role of non-OPEC producers was released. Bloomberg (2015) reported the Kuwait oil minister Ali Al-Omair stated that prior to the November 27, 2014 announcement OPEC ministers had met with non-OPEC producers, including Russia, and those producers had been unwilling to cut production. As a result, Mr. Al-Omair claimed that OPEC decided to forego production cuts in order to maintain its market share.

Discussion and Interpretation

The empirical findings thus far can be summarized as follows. First, the news releases coincident with large WTI crude price movements point to positive supply surprises as the most important new information associated with the collapse of oil prices between August of 2014 and March of 2015. The findings suggest that as prices began to fall, the market was surprised by the failure of suppliers to react as expected and constrain production. The OPEC announcement on November 27, 2014 was the most direct news in that regard, but throughout the sample period investors learned that U.S. production was greater than expected and that non-OPEC producers were not cutting production.

Second, news regarding fundamental factors that affect the supply and demand for oil as a commodity was not the whole story during the sample period. On 10 of the 24 days on which there were large price movements there was no corresponding news related to fundamental factors. This tendency of prices to move sharply without the

arrival of new information is characteristic of asset markets and supports the view that a substantial fraction of oil price movements were related to factors such as investor sentiment and momentum trading unrelated to the fundamental demand and supply of the commodity.

Further insight into the reaction of oil prices to news can be gained by looking at the futures curve. The basic model for pricing futures contracts on a commodity is given by:

$$F = S*e^{(r+u-y)} \qquad (1)$$

where F is the futures price, S is the spot price, r is the interest rate on a risk-free security with maturity equal to the futures contract, u is the storage cost, and y is the convenience yield associated with owning the commodity.[4] At the end of the sample period, the ratio of the one-year futures price to the spot price exceeded 1.2. At that time, r was less than 1%. Assuming that the convenience yield is zero, equation (1) implies annual storage costs of approximately 20%! Including a convenience yield just serves to increase that amount. This 20% spread vastly exceeds the cost of storing oil in normal times. At the end of the sample period, however, storage facilities in the United States were close to capacity. In fact, Forbes (2015) reported that integrated oil companies including Shell and oil trading firms such as Vitol were was leasing tankers for up to 12 months to anchor offshore and store oil. In doing so, they were in effect acting as "negative" producers for at least up to of 12 months by removing oil from the market and storing it. Nonetheless, this arbitrage activity was insufficient to offset the combination of

[4] See Hull (2012). In equation (1), it is assumed that forward and futures prices are equivalent.

producers failing to store oil by leaving it in the ground and by the apparent impact of speculative trading.

Although there is nothing in the current study that can be used as the basis to predict the future direction of oil prices, the analysis does suggest that a sharp rebound is possible. If a combination of producers' failure to coordinate a cutback in production and speculative trading were the main factors leading to the price collapse, then a reversal of that combination could produce a bounce back. The one limiting factor is potential shale production. The market is now on notice that shale production appears to put a cap on prices, though there remains debate as to what that cap is.

REFERENCES

Areski, Rabah and Oliver Blanchard, 2014, Seven questions about the recent oil price slump, *IMFdirect – The IMF Blog*, December 22, 2014.

Areski, Rabah, Prakash Loungani, Rick van der Ploeg and Amthony J. Venables, 2014, Understanding international commodity price fluctuations, *Journal of International Money and Finance*, 42: 1-8.

Baumeister, Christiane and Lutz Kilian, 2015, Understanding the decline in the price of oil since June 2014, unpublished working paper, International Economic Analysis Department, Bank of Canada.

Bloomberg, 2015, Kuwait says OPEC has no choice but to keep oil production target, http://www.bloomberg.com/news/articles/2015-03-19/kuwait-says-opec-has-no-choice-but-to-keep-oil-production-target

Cashin, Paul., Kamia Mohaddes, Maziar Raissi and Mehdi Raissi, 2014, The differential effects of oil demand and supply shocks on the global economy, *Energy Economics*, 44: 113-134.

Cornell, Bradford, 2014, What moves stock prices – Another look, *Journal of Portfolio Management*, 39: 32-38.

Cutler, David M., James M. Poterba and Lawrence Summers, 1989, What moves stock prices, *Journal of Portfolio Management*, 15: 4-11.

Forbes, 2015, Storing oil at sea is about the futures price, http://www.cmegroup.com/trading/energy/crude-oil/light-sweet-crude.html

Hamilton, James, 2014, The changing face of world oil markets, *IAEE Energy Forum Newsletter*, Fourth Quarter.

Hull, John, C., 2012, *Options, Futures and other Derivatives*, 8th edition, Prentice Hall, New York.

Kilian, Lutz, 2014, Oil price shocks causes and consequences, *Annual Review of Resource Economics*, 61: 133-154.

Perman, Roger and Yue Ma, 2012, *Natural Resource and Environmental Economics*, 4th edition, Addison Wesley, New York.

World Bank Report, 2014, Understanding the plunge in oil prices: Sources and implications, World Bank, Washington, D.C.

Zhang, Y., Y. Fan, H. Tsai and Y. Wei, 20008, Spillover effect of US dollar exchange rate on oil prices, Journal of Policy Modeling, 30: 973-991.

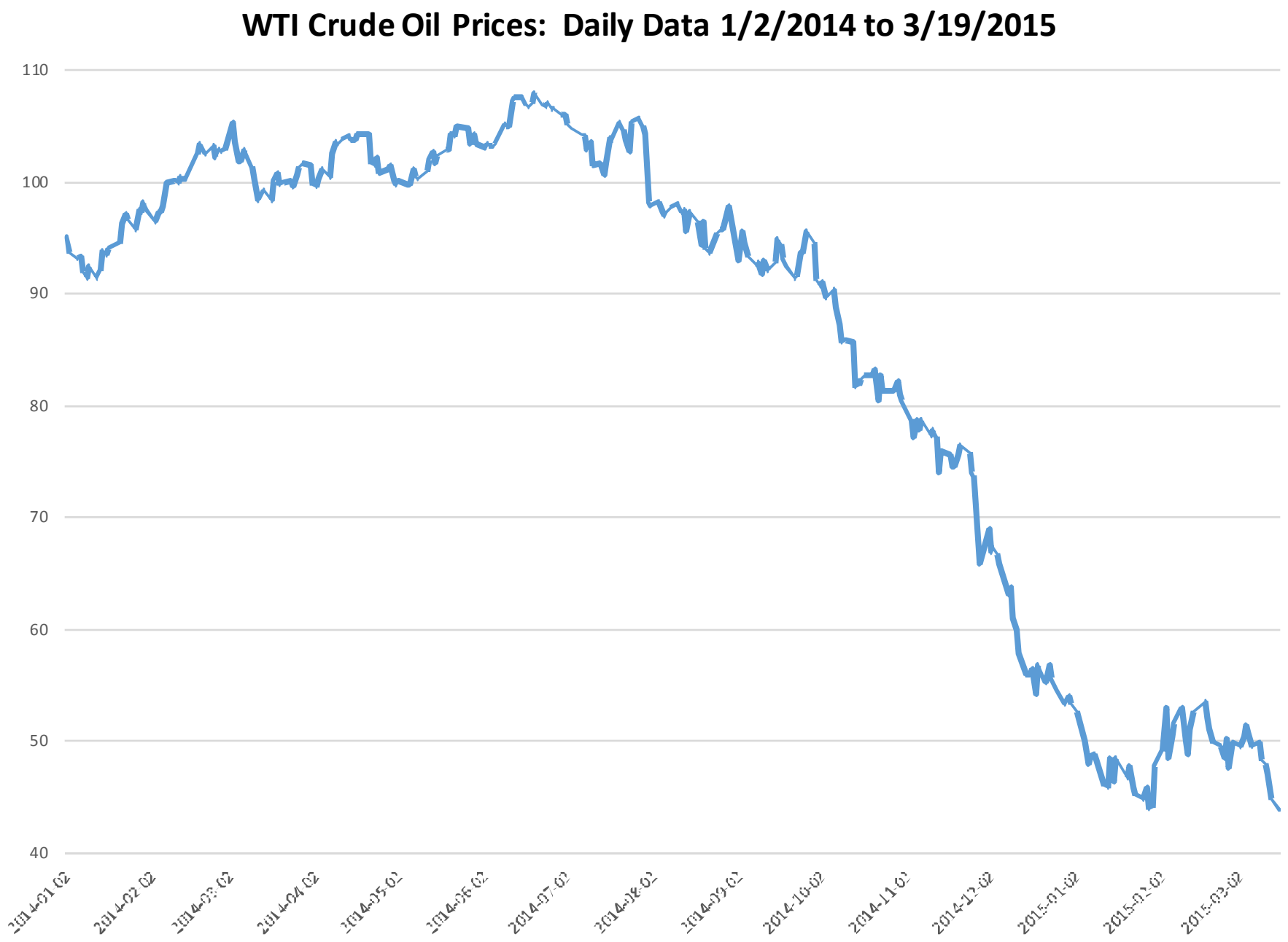
WTI Crude Oil Prices: Daily Data 1/2/2014 to 3/19/2015
110
100
90
80
70
60
50
40
2014-01-02
2014-02-02
2014-03-02
2014-04-02
2014-05-02
2014-06-02
2014-07-02
2014-08-02
2014-09-02
2014-10-02
2014-11-02
2014-12-02
2015-01-02
2015-02-02
2015-03-02

Table 1: News Releases Associated with Significant Moves in the Price of WTI Crude Oil

DATE		WTI Price	Log Return	Source	News
2014-07-31	1	98.23	-5.99%	Dow Jones Institutional News (8:45 AM EDT). Note released the next morning	"...[C]rude remains in the red on fundamentals unique to the commodity, including ample supplies and the prolonged closure of a Kansas refinery that will crimp demand at the key delivery point for the benchmark contract in Cushing, Okla. Nymex futures touched their lowest level since Feb. 5 in overnight trading and are currently at $97.73/barrel. The market hasn't closed below $98 since March 12."
2014-09-02	1	92.92	-5.18%	Dow Jones Institutional News (2:04 PM EDT)	"Oil's $2.93-a-barrel slide ranks as the third-biggest decline for 2014, according to FactSet. One factor conspiring against West Texas Intermediate crude was disappointing data from Chinese factories, suggesting a weakening of demand for oil. Also providing a drag was a resilient dollar, whose gains weigh on the value of commodities that use it as a measure. Brent crude was suffering a smaller decline, off $2.19. It had also fallen Monday, while U.S. markets were closed, so WTI had some catching up to do. Oil at $93.03 at 2 p.m."
2014-10-14	2	81.72	-4.79%	Dow Jones Institutional News (2:40 PM EDT)	"The prospect of unchecked global supply weighed on oil prices Tuesday after the International Energy Agency slashed its oil-demand growth forecast for this year. The Paris-based IEA issues a closely watched monthly oil-market report. Today, the agency cut its forecast for global demand growth by about one fifth. The new projections come at a time when oil prices have been in a free fall amid slowing growth in Asia and a sputtering European economy, not to mention a divide among OPEC members. Facing price pressure for the last several weeks, the organization has opted to cut prices and defend market share rather than cut production to bolster prices."

Table 1: **News Releases Associated with Significant Moves in the Price of WTI Crude Oil**

DATE		WTI Price	Log Return	Source	News
				Dow Jones Institutional News (4:14 PM EDT)	"U.S. crude oil production is surging for the first time in decades. It is now widely reported that the United States has surpassed Saudi Arabia and Russia to once again become the world's largest petroleum liquids producer. The latest 'Capital Markets Update,' just published on RatingsDirect, says that what is remarkable, though, is how much new production the U.S. has brought online in such a short time, and that its production far exceeds imports."
				Dow Jones Institutional News (4:52 PM EDT)	"Worried about oil supplies exceeding demand? 'The story is not over,' says Citigroup. Just as US production has displaced imports into the Gulf Coast and East Coast, sending oil producers looking for new buyers, railroads will bring more shale oil to the West Coast next year and push additional imports onto the global market, the bank says. 'There is an emerging surplus that should weigh heavily on prices through next year,' says Citi, which calls for US prices to fall from $81.84/barrel today to average $80 in 2015 and $75 in 2016 if US oil exports stay constrained. Even worse for oil bulls, 'a cut in Saudi output would do little to address the light sweet crude overhang.'"

Table 1: **News Releases Associated with Significant Moves in the Price of WTI Crude Oil**

DATE		WTI Price	Log Return	Source	News
	1	**Thanksgiving Holiday**		Dow Jones Institutional News, 2014-11-27 (Thanksgiving Holiday) (1:31 PM EST)	"Benchmark oil prices fell sharply on Thursday in European trading to the lowest levels in four years as the Organization of the Petroleum Exporting Countries refused to draw any line under the recent sharp price declines. The members of the oil-producing group met in Vienna on Thursday and maintained their existing production limit of 30 million barrels a day, although some OPEC members often exceed their production quotas. The 12 member countries on Thursday said they would comply with the limit, which might lead to a decline in production of about 300,000 barrels a day, according to OPEC's own data. ... Analysts have argued that OPEC, which accounts for around one-third of world production, must make outright production cuts to arrest the decline in oil prices, which have fallen more than 35% since June. Speaking after the meeting, however, OPEC officials didn't suggest any levels that would prompt the member nations to take action. Without that guidance, traders and analysts were left disoriented. OPEC is 'forfeiting its role as swing supplier' said Harry Tchilinguirian, senior oil analyst at BNP Paribas. Saudi Arabia, the largest producer within OPEC, is 'leaving it to the market to readjust balances though prices,' he said. The U.S. contract for January crashed through the key level of $70 per barrel, and was down $4.58, or 6.2%, at $69.13 a barrel on the New York Mercantile Exchange, its lowest level since May 2010, while the global Brent contract for January fell $4.93, or 6.3%, to $72.82 a barrel on the ICE Futures Europe exchange. U.S. markets were closed for the Thanksgiving holiday."

Table 1: **News Releases Associated with Significant Moves in the Price of WTI Crude Oil**

DATE	WTI Price	Log Return	Source	News
			Dow Jones Institutional News, 2014-11-27 (Thanksgiving Holiday)(1:31 PM EST) (cont'd.)	"Some are now expecting much faster declines ahead. Torbjørn Kjus, an oil analyst at DNB Bank, said that without any agreement to cut production in real terms, the price of Brent 'will probably fall down into the 60s [dollars per barrel] before Christmas.' Thursday's meeting turned out to be about as 'bearish' as it could have been, and OPEC is sending a 'strong signal that the market will be left to itself,' he said. Russia, the world's third largest oil producer and a major oil exporter that is not a member of OPEC, was quick to respond. The country's finance ministry said it would probably have to revise its budget assumptions--the budget for 2015 at an average oil price of $100 per barrel. 'In the past several days we have observed that an absence of determination to limit volumes of extraction by OPEC has led to a further negative pressure on oil prices,' said Maxim Oreshkin, head of strategic planning department at the finance ministry. 'The market remains in a condition of oversupply and the current [OPEC] decision means that the issue won't be solved quickly.'"
2014-11-28			Dow Jones Institutional News (4:04 AM EST)	"'OPEC yesterday delivered just about the most unfriendly possible response to ruble and oil prices,' Tom Levinson, a strategist at Sberbank said. Barclays economists said that in the short term, they now expect Brent crude to sink below $70 per barrel and the West Texas Intermediate benchmark to fall even further. 'Over the course of the coming months, oil markets will have to find a new equilibrium--a world where demand elasticities are tested, and non-OPEC supply sensitivities, and particularly the pain threshold for U.S. producers becomes better understood,' they wrote in a note."

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DATE		WTI Price	Log Return	Source	News
2014-11-28		65.94	-11.13%	Dow Jones Institutional News (2:06 PM EST)	"OPEC's decision to leave crude oil output steady at a time when global supplies are plentiful 'underscores how much of a game changer shale and fracking have been for oil,' says Nicolas Robin, commodities fund manager with Threadneedle Investments. Lower oil prices will weigh on shale producers' profitability, but the impact should also impact other high-cost producers, like deep-water drilling projects, Mr. Robin says."
2014-11-28		65.94	-11.13%	Dow Jones Institutional News (2:49 PM EST)	"US crude prices will have to stay at $65 to $70 a barrel for several quarters before the American oil industry significantly slows production, analysts at Wood Mackenzie say. Brent, the global benchmark crude, will have to stay below $75 to $80 a barrel. The analysts aren't too optimistic about a quick rebound in crude oil prices, saying OPEC's ongoing refusal to cut production undermines any potential price recovery in the near term."

Table 1: **News Releases Associated with Significant Moves in the Price of WTI Crude Oil**

DATE		WTI Price	Log Return	Source	News
2014-12-01	2	68.98	4.51%	Dow Jones Institutional News (3:21 PM EST)	"U.S. oil prices posted their biggest one-day gain in two years on Monday as traders locked in profits on bearish bets following last week's selloff. But many market watchers were skeptical that Monday's gains signaled that oil prices had reached their bottom, pointing to global supplies that continue to overwhelm demand." "On Monday, light, sweet oil for January delivery shot up 4.3% to $69.00 a barrel from Friday's close, recovering from a more-than five-year low below $64 a barrel hit in overnight trading. It was the biggest one-day percentage gain for the U.S. benchmark since August 2012. Brent futures, the international benchmark, gained 3.4% to end at $72.54 a barrel. Investors said much of Monday's activity was driven by traders closing out profitable bets on falling prices or opening positions that would protect them should the market rebound. Both the U.S. benchmark and Brent slumped Thursday and Friday to fresh multiyear lows, posting two-day losses of about 10%. 'Today's a little bit more of a rebound from Friday's plastering,' rather than a long-lasting change in direction, said Kyle Cooper, analyst at IAF Advisors in Houston. 'We got [to five-year lows] really quick, and it's not an entirely bad thing to take some profits.'"

Table 1: **News Releases Associated with Significant Moves in the Price of WTI Crude Oil**

DATE		WTI Price	Log Return	Source	News
2014-12-08	3	63.13	-4.28%	Dow Jones Institutional News (9:25 AM EST)	"Oil prices continued to fall to fresh lows Monday as the dollar surged on signs of an improving U.S. economy. Both contracts were on track to settle at more-than-five-year lows. The ICE Dollar Index, which measures the dollar against a basket of currencies, rose to a multiyear high Monday after monthly U.S. employment data released Friday showed better-than-expected job growth. Oil is traded in dollars, so a stronger dollar makes oil more expensive for buyers using foreign currencies."

Table 1: **News Releases Associated with Significant Moves in the Price of WTI Crude Oil**

DATE		WTI Price	Log Return	Source	News
				Dow Jones Institutional News (4:11 PM EST)	"Oil prices skidded to fresh five-year lows on Monday, as lackluster readings on Asian economies and a price cut by Iraq heightened concerns about a global supply glut. The decline extends a six-month selloff in crude prices driven by rising production in the U.S. and elsewhere. Traders couldn't pinpoint a specific catalyst for Monday's tumble, which began overnight but accelerated during the New York trading day." "A benchmark U.S. oil price below $65 a barrel poses challenges for oil companies drilling in shale-rock formations, the source of the U.S. oil boom, some analysts say. Some operations will be loss-making with oil below that market, they say. 'It's getting close to the marginal cost for shale production in North America,' said Michael Hiley, head of the energy over-the-counter trading desk at brokerage LPS Partners Inc. 'I think guys are very nervous.' Iraq on Monday cut the January price of its flagship crude-oil blend for Asian and American buyers, but raised them for European customers, in line with similar moves by Saudi Arabia, the world's largest oil exporter, earlier this month. Market watchers say that these price cuts indicate producers' desire to protect their market share during the downdraft, a stance that is likely to result in a steady flow of barrels."

Table 1: News Releases Associated with Significant Moves in the Price of WTI Crude Oil

DATE		WTI Price	Log Return	Source	News
2014-12-10	4	60.99	-4.41%	Dow Jones Institutional News (10:59 AM EST)	"Oil prices took another dive Wednesday and are on track to settle at more-than-five-year lows on a U.S. government report showing a surprise increase in the country's crude stockpiles. The weekly reading on U.S. oil supplies signals a potential deepening of a global glut that has sent crude-oil prices plunging more than 40% in nearly six months." "U.S. crude supplies rose by 1.5 million barrels in the week ended Dec. 5, according to the U.S. Energy Information Administration. Analysts surveyed by The Wall Street Journal had expected supplies to fall by 2.7 million barrels in the week. The Organization of the Petroleum Exporting Countries also cut its forecast for global demand for its oil next year. OPEC, which has cut its production in the past when prices drop, opted last month to maintain its production quota of 30 million barrels a day, prompting concerns that the market could stay oversupplied well into 2015. OPEC said demand for its oil will decline to 28.9 million barrels a day in 2015, down from 29.4 million barrels a day in 2014. OPEC's output exceeded its quota by 50,000 barrels a day in November, the group said. OPEC bases its output estimates on secondary sources, such as shipping trackers and energy consultancies."

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DATE		WTI Price	Log Return	Source	News
2014-12-19	3	56.91	4.92%	Dow Jones Institutional News (5:25 PM)	"Shares of oil-and-gas companies rallied alongside oil prices, which recouped some of their recent losses, partly on news that Nigeria was cutting back its exports. The African nation, a member of the Organization of the Petroleum Exporting Countries, has become a key supplier to the U.S. and other international markets in recent years. There was also likely a technical element to the bounce in oil prices, as traders bought back bearish positions. 'The energy space was certainly a major beneficiary of short covering,' said Quincy Krosby, market strategist at Prudential Financial."

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DATE		WTI Price	Log Return	Source	News
2015-01-05	5	50.05	-5.20%	Dow Jones Institutional News (12:44 PM EST)	"West Texas Intermediate crude prices briefly dipped below $50 a barrel for the first time since 2009 on Monday. U.S. oil prices tumbled as low as $49.95 on the New York Mercantile Exchange in earlier trading. Oversupply and tepid demand have taken oil prices lower for six consecutive weeks, according to the Wall Street Journal's Market Data Group. WTI crude has fallen more than 50%, from as high as $107 a barrel, since June. Prices fell 4.5% to $50.30 recently, according to FactSet." "Brent crude, the global benchmark, similarly dropped to more than five-year lows; Brent futures dropped 5.9% to $53.08 in recent trading. Traders pegged Monday's leg lower in part to a pair of bearish reports from Wall Street. Citigroup's commodity group led by Edward Morse warned of 'trouble ahead in 2015,' cutting its oil-price forecasts for 2015 and 2016 to below even its most bearish previous estimates. Morse now sees WTI averaging $55 a barrel in 2015, down from $72; Brent oil will average $63 a barrel this year, down from $80 a barrel, he says. 'Markets will confront considerably more downside risk in the months ahead and it will likely take well into the year before prices will bottom let alone achieve a new equilibrium.' Meanwhile, Morgan Stanley's Adam Longson writes that 'it's hard to see much improvement in oil fundamentals near term' given issues with oversupply."
				Dow Jones Institutional News (12:44 PM EST) (cont'd.)	"'New supply has entered the market, offsetting Libya woes. Additional exports are coming primarily from Russia and Iraq. ... Recent comments out of Saudi Arabia suggest a stronger stance that production will not be cut under almost any scenario.'"

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DATE		WTI Price	Log Return	Source	News
				Dow Jones Institutional News (1:10 PM EST)	"Saudi Arabia on Monday cut the price it charges for its oil in the U.S., prolonging a price war to regain market share lost to American shale producers. The move came after the U.S. West Texas Intermediate oil price benchmark earlier briefly fell below $50 a barrel--a level not seen since April 2009." "In a list of official selling prices sent to oil buyers, Saudi Arabia's state oil company Saudi Aramco cut its light oil prices to the U.S. by 60 cents a barrel for February delivery, the latest in a long series of monthly price cuts. But Aramco also raised its light oil prices in Asia by 60 cents a barrel for delivery next month, a trend that started with December shipments after a four-month decrease. Saudi Arabia, which is the world's largest oil exporter, convinced the rest of the Organization of the Petroleum Exporting Countries to keep its production ceiling unchanged in November, arguing the group should fight for market share rather than defending oil price--a move that led to a sharp drop in global oil prices."
2015-01-06	6	47.98	-4.22%	Dow Jones Institutional News (5:50 PM EST)	"World oil prices fell for the fourth straight day to more than five-year lows Tuesday after major oil exporter Saudi Arabia indicated it would continue to resist a production curb that might lift prices."

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DATE		WTI Price	Log Return	Source	News
2015-01-12	4	46.06	-4.85%	Dow Jones Institutional News (10:05 AM)	"There's no bottom in sight for oil prices. Analysts at Goldman Sachs say that oil prices need to hover at $40 for most of this year in order to drown out oversupply from U.S. shale producers. West Texas Intermediate crude prices fall 4.4% on Monday to $46.26 a barrel, a nearly six-year low." "Goldman's Jeffrey Currie says crude will fall as low as $39 a barrel in six months and trade at $65 in one year, down from estimates for $75 and $80, respectively. For 2015, Goldman's Currie sees U.S. crude averaging $47.15 a barrel, down 36% from $73.75. Currie notes a shift in how quickly capital now translates into increased shale production. That means crude needs to stay low for a long time to bring about price recovery. 'Capital investments are now a new margin of adjustment -- a direct result of the collapsed time lag shale has created between when capital is spent and when production rises, as well as producers' ability, through very high decline rates, to quickly throttle back production when spending slows. However, the short-cycle capital nature of shale requires that such pressure remain in place in the coming months, likely creating a more U-shaped type of recovery with more downside risks. To keep all capital sidelined and curtail investment in shale until the market has rebalanced, we believe prices need to stay lower for longer. We now believe WTI needs to trade near $40/bbl for most of 1H15 to keep capital sidelined.'"

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DATE		WTI Price	Log Return	Source	News
2015-01-14	7	48.49	5.45%	Dow Jones Institutional News (4:17 PM EST)	"Shares of oil and gas companies were firm as oil prices rose in the wake of inventory data. Equity traders remained pessimistic about the supply-and-demand dynamics. Oil futures were up more than 4% even after a report that U.S. crude-oil and petroleum-product supplies rose to 1.16 billion barrels in the week ended Jan. 9, a record high in weekly data going back to 1990. 'Oil production continues to be strong, and so does worldwide production,' said Tony Headrick, energy analyst at CHS Hedging. 'The outlook is for those crude-oil inventories to continue to rise.'"
2015-01-15	5	46.37	-4.47%	Dow Jones Institutional News (12:47 PM EST)	"Frenzied trading in the US oil benchmark hit a record Wednesday, with combined futures and options volume of 3.1M contracts--representing more than 3B barrels of oil--according to Nymex owner CME. The prior record was set on May 5, 2011 amidst the Libyan uprising and the Arab Spring. Oil caught a rare pop yesterday in the course of its 6-month collapse with futures rising 5.6%--the most in more than 2 years. But the bounce was largely a quirk due to options expiry, with traders buying underlying futures to cover options bets. Futures are back in the red today, down 2.1% at $47.47/barrel."
2015-01-16	6	48.49	4.47%	Dow Jones Institutional News (1:21 PM EST)	"The streak is now six. Baker Hughes' weekly survey shows 55 fewer active rigs targeting oil in the U.S. than a week earlier, putting the total at 1,366, which is also lower than the 1,408 rigs in operation a year earlier. Analysts aren't surprised. They say the streak of weekly declines could continue for months, heading toward 1,000 active rigs or less, as producers respond to lower oil prices by not drilling wells whose costs are too high. Meanwhile, US natural-gas rigs also started showing weakness, falling by 19 to 310; there were 365 in operation a year ago."

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DATE		WTI Price	Log Return	Source	News
		48.49	4.47%	Dow Jones Institutional News (3:58 PM EST)	"Oil prices rose about 3% in New York trading after one international forecaster cut its target for supplies in 2015. In a sign that the Organization of the Petroleum Exporting Countries' strategy to defend its market share may be working, the International Energy Agency reduced its forecast for the increase in non-OPEC oil supply this year by 350,000 barrels a day, saying the production cut is expected to bolster demand for OPEC's own output. 'A price recovery--barring any major disruption--may not be imminent, but signs are mounting that the tide will turn,' the IEA said in its monthly oil market report."
2015-01-22	7	45.93	-4.10%	Dow Jones Institutional News (2:31 PM EST)	"*Nymex Crude Settles Down $1.47, or 3.1%, at $46.31/Barrel"
2015-01-30	8	47.79	7.99%	Dow Jones Institutional News (2:41 PM EST)	"The US oil-rig count saw its worst week yet amid the current downturn, says Baker Hughes, falling 94 to 1,223, hitting a 2-year low. The early-afternoon report helped fuel a big bounce in US oil futures, which finished the day up 8.3% to notch its biggest-one day gain in 2 1/2 years amid hopes that oil's slump is finally set to slow domestic output. The oil-rig count is also down 199 from a year earlier. For all rigs, including natural gas, the week's drop was 90 to 1,543, which is 242 below year-ago levels and the least since June 2010."
2015-02-03	9	53.04	7.41%	Dow Jones Institutional News (11:54 AM EST)	"Oil prices are up for a 4th session amid a slew of bullish signals: a strike threatening some US refinery production, lower spending plans from major oil companies and a drop in US oil-drilling rigs. But some analysts remain skeptical prices have hit their low as the market is still oversupplied and cuts in spending or drilling could take months to translate into lower production. 'People are trying to catch a falling knife,' says BNP Paribas' Gareth Lewis-Davies. 'Investors are trying to buy ahead of the upturn in physical balances.'"
				Dow Jones Institutional News (4:10 PM EST)	"Adding to oil's rise is a weaker dollar…"

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DATE		WTI Price	Log Return	Source	News
2015-02-04	10	48.45	-9.05%	Dow Jones Institutional News (10:41 AM EST)	"Oil prices extend losses after the EIA reports a larger-than-expected build in US oil supplies and unexpected increases in refined-product supplies. US commercial crude supplies are again at their highest level since the 1930s, based on monthly EIA data (on weekly data, which goes back to 1982, this is an all-time high)."
2015-02-05	8	50.48	4.10%	Dow Jones Institutional News (3:22 PM EST)	"Saudi Arabia increased the oil prices it charges to buyers in the U.S. on Thursday but cut them in Asia as it shifts a battle over market share from America to the Far East. In an email to clients, Saudi Aramco said it was [*sic*] increased its U.S. prices for light oil delivery in March by 15 cents a barrel but was cutting them for Asia by 90 cents. Last fall, the world's largest oil exporter sharply reduced its prices in the U.S. as it sought to defend its share of the American market against a domestic production boom. The move contributed to global oil prices falling by more than half. But the kingdom is now also facing competition in Asia from many fellow producers in the Organization of the Petroleum Exporting Countries who lost some sales in the U.S."

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DATE		WTI Price	Log Return	Source	News
2015-02-10	11	50.06	-5.69%	Dow Jones Institutional News (3:15 PM EST)	"U.S. oil prices tumbled on Tuesday, snapping a three-day streak of gains, on concerns that swelling global oil inventories would keep prices subdued in the coming months." "The International Energy Agency said in a monthly report released Tuesday that commercial petroleum inventories held by the nations that are members of the Organization of Economic Cooperation and Development could test all-time highs by the middle of the year. 'The inventory growing to that extent--that definitely outlines the problem to the market,' said Andy Lebow, senior vice president for energy at Jefferies LLC. 'We're going to have to slog through all this inventory.' Until stored supplies start shrinking, 'It's really going to become increasingly difficult for this market to rally,' Mr. Lebow said. The IEA's concerns were echoed by the U.S. Energy Information Administration, in its own monthly report released Tuesday, and by Ian Taylor, chief executive of oil-trading firm Vitol SA. The increase in world-wide stockpiles will be "quite dramatic" in the coming months, keeping prices in check, Mr. Taylor said in London Tuesday. In the U.S., crude-oil supplies have climbed to their highest levels in about 80 years, and analysts expect stockpiles to keep growing. Analysts surveyed by The Wall Street Journal expect the EIA to report Wednesday that U.S. crude-oil supplies increased by 4 million barrels in the week ended Feb. 6. The weekly EIA storage data is due at 10:30 a.m. EST. The American Petroleum Institute, an industry group, is scheduled to release its inventory data for the same period later Tuesday."

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DATE		WTI Price	Log Return	Source	News
2015-02-12	9	51.17	4.74%	Dow Jones Institutional News (10:47 AM EST)	"Oil prices rose on Thursday on several bullish factors, including a weak dollar, a contract expiration and warnings from one of the world's biggest oil companies." "Traders are looking to book gains before the expiration of the Brent March contract on Thursday. Analysts also pointed to weakness in the U.S. dollar, which is supportive of dollar-denominated commodities such as oil. Royal Dutch Shell PLC Chief Executive Ben van Beurden also warned of a rapid recovery in oil prices in the years to come if production projects get canceled. In prepared remarks he is expected to deliver later Thursday he said oil demand will outpace supply growth this year. It isn't entirely clear which factors are pushing prices up so far Thursday, said Peter Donovan, broker for Liquidity Energy in New York. But so many traders have bet on oil prices falling, large numbers of them can jump at once to unwind those bets by buying futures to cover the position, feeding a rally. 'There are several generic reasons that are all leading to some short-covering,' Mr. Donovan said. 'No one wants to be sitting here holding the bag if this thing runs up.'"
2015-02-26	10	47.65	-5.31%		No news on Dow Jones News Wire other than reporting the decline
2015-02-27	12	49.84	4.49%	Dow Jones Institutional News (1:09 PM EST)	"Just-released data show the number of active oil rigs in the US fell under 1K for the first time since June 2011. Baker Hughes' weekly report puts the total at 986, down 33 from a week ago and marking a dozen-straight weeks of declines. The latest figure is 39% below October's high."

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DATE		WTI Price	Log Return	Source	News
2015-02-27		49.84	4.49%	Dow Jones Institutional News (1:56 PM EST)	"The EIA expects US gasoline consumption to rise 2% on-year in 1H, with 1% growth projected for distillates--which include heating oil and diesel--due to expanded industrial production. The agency adds planned refinery maintenance this winter and spring won't lead to any shortages in fuel supplies. Maintenance on the East and West coasts and Midwest is expected to be light, with moderate outages seen for the Rocky Mountain and Gulf Coast regions."
				Dow Jones Institutional News (2:52 PM EST)	"Oil futures rally into the settlement, ending the day up $1.59 or 3.3% at $49.76 a barrel, after shaking off a decline in U.S. drilling activity that was smaller than expected. The market did give back gains after oilfield services company Baker Hughes reported domestic rigs drilling for oil declined by 33 in the week, compared with the 50+ decline the market was expecting, but came back in the last half hour of trading. Phil Flynn at brokerage Price Futures Group said crude prices were likely following refined product markets higher, which jumped as the front-month contracts for gasoline and diesel expired with the close of trading today. 'Crude oil is basically being supported by those products,' he said."
2015-03-13	13	44.88	-4.87%	Dow Jones Institutional News (5:20 AM EDT)	"Oil prices are down on Friday after an international energy watchdog warned the oil price recovery remained fragile amid high U.S. production and soaring oil inventories. The International Energy Agency said that 'behind the facade of stability, the rebalancing triggered by the price collapse has yet to run its course, and it might be overly optimistic to expect it to proceed smoothly.' April Brent crude on London's ICE Futures exchange is down 0.4% to $56.86 a barrel. On the New York Mercantile Exchange, light, sweet crude futures for delivery in April trade at $46.90 a barrel, down 0.3% from Thursday's settlement."

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DATE		WTI Price	Log Return	Source	News
				Dow Jones Institutional News (11:42 AM EDT)	"In its closely watched monthly report, the International Energy Agency said U.S. oil production was up 115,000 barrels a day in February, some of it going into bulging storage inventories whose capacity may soon be tested. 'That would inevitably lead to renewed price weakness,' the report said." "The force behind any price fall would be stubborn flows of American oil, much of it produced by hydraulic fracturing of underground shale formations. Shale oil has contributed to a global oversupply of oil, and the IEA raised its predictions of American production for the first quarter of 2015. U.S. crude stocks stood at an all-time record, the IEA said, with American producers not pulling back as quickly as some thought they would when prices fell. The IEA suggested that it might take another round of falling prices to usher in the kind of supply cuts that 'so far remained elusive,' predicting that U.S. production growth would abate in the second half of this year. That has given hope to some analysts who foresee higher prices later in the year. 'We still see fundamental support for higher prices,' Oswald Clint of Sanford C. Bernstein Research said Friday, in response to the IEA report."
				Dow Jones Institutional News (3:48 PM EDT)	"The Department of Energy announces plans to buy 5M barrels of oil for its strategic petroleum reserve, which it says is required after selling the same amount last year to test the system's infrastructure. Still, it can't hurt that prices have fallen in half in the meantime. This may also be a move to help the domestic oil industry, which is struggling amid a glut of crude. The purchases could slow the growth in US commercial crude supplies, currently at their highest in about 80 years. But purchases won't start until May, the DOE says."

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DATE		WTI Price	Log Return	Source	News
				Dow Jones Institutional News (4:11 PM EDT)	"Money managers added to bearish positions on benchmark US oil prices faster than they added to bullish positions in the week ended Tuesday, CFTC data show. Hedge funds, pension funds and others added their long positions, or bets on rising prices, by 731, and added to their short positions, or bets on lower prices, by 4,763. This cut the net-long position to 160,278 from 164,310 the prior week. Light, sweet crude on the New York Mercantile Exchange fell 4.4% during the reporting period on expectations that US crude stockpiles hit another record high last week."