

The Behavior of Oil Futures Returns around OPEC Conferences

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INTRODUCTION

There has been rapid growth during the last decade in the trading of oil futures contracts. The two most successful contracts, both traded on the New York Mercantile Exchange (NYMEX), are the Crude Oil contract using West Texas Intermediate as the par grade and the Heating Oil No. 2 contract. The former recorded volume of over two million (1000-barrel) contracts in June 1990, while the latter saw 400,000 (42,000-gallon) contracts traded.¹ A central reason for the trading interest has been the high levels of price volatility which have made hedging by end users and producers increasingly important. Despite the cessation of conflict in the Persian Gulf uncertainty should remain high for the foreseeable future.

An issue of concern for all market users is to what extent the pricing of these contracts conforms to the efficient markets hypothesis.² One strategy in testing semistrong form efficiency is to use the event study methodology. Popularized by Fama, Fisher, Jensen, and Roll (1969), the standard procedure is to examine the typical path of excess security returns—that is, deviations of returns from their “normal” counterparts—around economically significant events.³ This approach is especially suitable for equities due to the recurrent nature of firm-specific events such as dividend and earnings announcements, and the conventional acceptance

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¹Trading concludes on the last business day of the month, and on the third business day prior to the 25th calendar day of the month, preceding the delivery month, for Heating Oil and Crude Oil, respectively. Delivery must be initiated after the fifth/first calendar day and completed before the last calendar day of the deliverable month for Crude Oil/Heating Oil (NYMEX Energy Complex).

²It has been shown that hedging efficacy is enhanced if markets are efficient. See, for example, Merrick (1988), who explores this issue in the context of stock index futures.

³Event studies test for semistrong form efficiency, since information over and above merely past returns is conditioned on. Deaves and Krinsky (1992) conduct a number of weak-form and semistrong-form efficiency tests using monthly observations for NYMEX Crude Oil futures. Their results broadly support efficiency. Ma (1989) and Bopp and Sitzer (1987) investigate the related issue of the forecasting power of energy futures prices.

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of generating normal returns using pricing models based on market returns. Event studies are utilized less often for futures contracts, because of the scarcity of such periodic events and the methodological difficulties inherent in estimating excess returns.

For the oil market, the obvious periodic event to which market participants pay great attention is a meeting of the Organization of Oil Exporting Countries (OPEC). OPEC has been a major player in the world oil market, at least since the first oil shock of 1973. Representatives of its 13 member countries confer and meet frequently, but those meetings which attract the most attention are the OPEC conferences where the oil ministers negotiate such crucial issues for world prices as official prices and output quotas. Every year two "ordinary" conferences are held, one scheduled usually during the early summer and the other toward the end of the year. When pressing matters arise, "extraordinary" conferences are scheduled with less advance notice.

The purpose of this article is to explore the behavior of oil futures returns around OPEC conferences with a view to investigating conformity to market efficiency.⁴ Nearby NYMEX Crude Oil and Heating Oil No. 2 contracts, both of which trade for delivery in all 12 months of the year, are used for a sample beginning on October 2, 1979 for Heating Oil, and on May 3, 1983 for Crude Oil, and ending on April 20, 1990.⁵ During the sample period, OPEC held 32 such meetings (conferences 55–86), of which 20 were ordinary and 12 extraordinary. Of the total, 13 occurred before May 1983 and were thus exclusive to the Heating Oil sample period. These conferences ranged from a single day to over a month.⁶

A crucial methodological issue in an event study is the generation of normal returns. The next section explores this. Given the lack of success in extending CAPM to futures as a potentially more fruitful avenue of exploration in modeling the risk-adjusted returns, the class of models based on the ARCH methodology of Engle (1982) is investigated. Using this approach, some evidence, albeit weak, is found for the existence of positive mean returns, or, equivalently, positive risk premiums. A byproduct of the analysis here is that some preliminary investigation of the time series properties of energy futures prices is undertaken. Following this analysis, the methodology and results of the event study are detailed and interpreted. Suggestive evidence is found that traders systematically underreact to OPEC conferences that convey bullish news.⁷

⁴Draper (1984), shortly after the inception of oil futures trading, looks at mean risk-adjusted returns for the Heating Oil No. 2 contract before and after OPEC meetings. Due to his tiny sample—five regularly scheduled meetings—he simply averages weekly returns over an eight-week period preceding and another following the meetings. Interpretation of his results is difficult, since he makes no effort to condition returns on the news content of the meetings.

⁵Heating Oil futures actually began to trade in November 1978 but open interest for all contracts remained below 1000 until late in the summer of 1979. The one contract per month trading cycle only became a permanent fixture with the November 1979 contract. The Crude Oil contract began trading at the end of March 1983, but May constitutes the first month for which a nearby contract existed for the entire month.

⁶Two conferences in the tumultuous year 1986 (when prices plummeted) lasted over one month, though in both cases there were recesses. Conferences usually last from a couple of days to a week. Conference dates were obtained from various OPEC publications [namely, *OPEC Official Resolutions and Press Releases 1960–83*, *OPEC Official Resolutions and Press Releases 1984–88* (Supplement), *OPEC Annual Reports*, and various issues of the (almost) monthly *OPEC Bulletin*].

⁷Bullish here is from the standpoint of those long in oil or its upside derivatives.

OIL FUTURES NORMAL RETURNS

A number of researchers [e.g., Dusak (1973); Bodie and Rosansky (1980); and Carter, Rausser, and Schmitz (1983)] have addressed the applicability of the standard CAPM in the context of futures markets. For samples of commodities, which do not include energy futures, the results are very much mixed. At the very least it is necessary that beta and mean returns have the same sign, a condition questioned by Bodie and Rosansky (1980).

The first two columns of Table I provide sample means of single-day nearby futures returns,⁸ and market model estimates of beta vs. the S&P 500, for both the Crude Oil and Heating Oil contracts.⁹ The sample is split when Crude Oil futures appear in the spring of 1983, and arbitrarily at the midpoint of the remaining observations. Note that returns, which are calculated as log-differences of nearby futures settlement prices, should really be viewed as ex post risk premiums. This is because only a goodwill deposit, which can be in the form of interest-bearing securities, need be initially advanced.

All estimated betas and mean returns (or, synonymously, mean ex post risk premiums) are insignificantly different from zero.¹⁰ Thus, on the basis of these estimates, there is no reason to believe that the risk inherent in naked positions of oil futures is priced.

It is possible that such statistical tests may be invalid. Standard interpretation of means and *t*-statistics is based on the assumption that the residuals are independently and identically distributed. The rest of Table I provides evidence on the time series properties of oil futures returns. Consistent with weak-form market efficiency, it cannot be rejected, for the most part, that returns are white noise. The *Q*-statistics for Crude Oil and Heating Oil are significant in only two of the ten cases.¹¹

Researchers have observed that volatility clustering is sometimes present in time series of macroeconomic magnitudes and asset prices. Casual observation of day-to-day energy price changes following the Iraqi invasion of Kuwait suggests that oil and its derivatives may fit this mould.¹² Engle (1982) developed the ARCH (autoregressive conditional heteroskedasticity) methodology to correct for this phenomenon of a time-variant variance. To formally test for such an ARCH effect, consider the following specification:

$$R_t = \mu + e_t \quad (1a)$$

⁸The reason it is best to concentrate exclusively on the nearby contract is that only the nearby contract is exempt from price limits. For Crude Oil, there is a \$1 per barrel price limit (amounting to \$1000 per contract) for all other contracts, while Heating Oil has a comparable two-cent per gallon (\$840 per contract) price limit. Thus, any returns calculated using more distant contracts will be biased downward sometimes in absolute value.

⁹Daily settlement prices for the two commodities are obtained from Technical Tools, Los Altos, CA.

¹⁰Carter, Rausser, and Schmitz (1983) suggest that the appropriate market portfolio in the case of commodity futures should include a positive weight for commodities themselves. Betas calculated using various weighted averages of the S&P 500 and the Dow Jones Commodity Index for the market portfolio were tested. These were found to be not significantly different from zero.

¹¹For ten lags, in two of the five cases, the *Q*-statistic is significantly different from zero at 5%. This need not be overly troubling when one recognizes that by the fifth lag, the day-of-the-week effects are just emerging as factors of significance.

¹²The sample, of course, ends prior to the Iraqi invasion. Nevertheless, this episode drives home the point forcefully, and causes one to suspect that some degree of volatility clustering prior to this should not be overly surprising.

Table I
SAMPLE STATISTICS FOR OIL FUTURES RETURNS

Sample Period	Mean $\times 100$	Beta	Q(1)	Q(4)	ARCH-Stat.
Heating Oil					
Oct./79–May/83	–0.015 (0.355)	0.075 (1.856)	1.090 (0.035)	9.180	55.54
May/83–Nov./86	0.013 (0.168)	–0.046 (0.488)	0.126 (0.012)	22.642	137.86
Nov./86–Apr./90	0.121 (1.878)	0.036 (0.772)	4.647 (0.073)	5.696	39.00
Crude Oil					
May/83–Nov./86	–0.040 (0.505)	–0.159 (1.606)	0.188 (0.015)	7.564	105.88
Nov./86–Apr./90	0.097 (1.505)	0.025 (0.540)	0.082 (–0.010)	1.494	4.89

The number of observations in the three subperiods are 899, 875, and 875, respectively. Absolute t -statistics are in brackets below means and betas. $Q(k)$ is distributed as $\chi^2(k)$. Five percent critical values for $\chi^2(1)$ and $\chi^2(4)$ are 3.84 and 9.49, respectively. First-order serial correlation coefficients are in brackets below $Q(1)$ statistics. ARCH-stat is distributed as $\chi^2(1)$.

$$\sigma_t^2(e_t) = \delta_0 + \sum_{i=1}^q \delta_i e_{t-i}^2 + u_t \quad (1b)$$

If there is no ARCH effect, all $\delta_i = 0$. On the other hand, if it is the case that high absolute innovations occurring in the recent past tend to be followed by the same in the future, then the return variance is conditional on past innovations. An LM test is performed by taking the OLS squared residuals from eq. (1a) and regressing them on lagged own values. The test-statistics are distributed as $\chi^2(q)$. The fifth column of Table I (ARCH-stat.) provides test-statistics for $q = 1$. It is clear that in no case can an ARCH effect of the first order be rejected.¹³

In Table II the impact of this ARCH effect on the estimates of mean returns is explored for both Crude Oil and Heating Oil futures.¹⁴ ARCH models are estimated for both commodities for the three same subperiods as previously. The estimated coefficients are presented for those ARCH models whose log-likelihood functions are maximized, subject to their being superior to models with one less lag at a 5%

¹³Tests of higher ARCH orders are conducted also and these tests also reject the null.

¹⁴Betas estimated taking the ARCH effect into consideration continue to be uniformly insignificant. ARCH-M (ARCH-in-mean) models [as developed by Engle, Lilien, and Robins (1987)] which provide for an increase in ex ante return with recent volatility are experimented with also. [See Melvin and Sultan (1990) for a recent application in the context of commodity futures.] The following model for ex ante premiums or returns is hypothesized:

$$R_t = \gamma_0 + \gamma_1 f(\sigma_t^2(e_t)) + e_t$$

$$\sigma_t^2(e_t) = \delta_0 + \sum_{i=1}^q \delta_i e_{t-i}^2 + u_t$$

The intuition is that speculators require a reward for high volatility, and so the ex ante premium is assumed to be linearly related to some (monotonically increasing) function of the variance. No evidence of such an effect for these futures is found. This is not surprising since there is little reason to believe that volatility in any given commodity market should have a non-insignificant impact on systematic risk.

Table II
ARCH MODELS FOR OIL FUTURES RETURNS

Coefficients	Estimates/Asymptotic Absolute <i>T</i> -Statistics				
	Heating Oil			Crude Oil	
	1979–1983	1983–1986	1986–1990	1983–1986	1986–1990
$\mu \times 100$	-0.014 (0.546)	0.013 (0.303)	0.098 (1.732)	0.019 (0.858)	0.130 (2.515)
$\delta_0 \times 100$	0.003 (8.180)	0.006 (6.767)	0.021 (11.149)	0.001 (4.461)	0.014 (9.449)
δ_1	0.483 (6.719)	0.197 (4.084)	0.055 (1.630)	0.299 (5.009)	0.249 (4.620)
δ_2	0.232 (4.437)	0.187 (3.893)	0.225 (4.405)	0.123 (2.871)	0.214 (4.285)
δ_3	0.130 (3.114)	0.138 (3.134)	0.126 (3.000)	0.176 (3.691)	0.232 (4.400)
δ_4	0.236 (4.638)	0.138 (3.157)	—	0.180 (3.695)	—
δ_5	—	0.219 (4.337)	—	0.177 (3.658)	—
δ_6	—	—	—	0.139 (3.065)	—
δ_7	—	—	—	0.105 (2.602)	—

degree of significance. In particular, one can show that $-2 \ln(L)$ is asymptotically distributed as an $\chi^2(1)$, where L is the ratio of the value of the restricted likelihood function to that of the unrestricted (i.e., with one more lag included).¹⁵

Notice that there is now weak evidence of positive mean ex post premiums. Mean returns are positive in four of five cases, though only significantly so for Crude Oil during 1986–1990. Annualization of the estimate in this case does imply large returns on the order of over 30% per year.¹⁶

Given these weak results, the event study is conducted in terms of unadjusted returns (which are excess returns if normal futures returns are zero). Then, if any persistent profit opportunities are uncovered, one can consider if these could conceivably be eliminated by a reasonable risk adjustment.¹⁷

OIL FUTURES RETURNS AROUND OPEC CONFERENCES

Methodology

The event study strategy is to examine the pattern of typical excess returns around a recurrent relevant event, conditional on the information content of the event. For

¹⁵See Berndt, Hall, Hall, and Hausman (1974) for details.

¹⁶These continuously compounded returns are generally five per week (or less in the case of holidays). One multiplies by about 250 to annualize the returns.

¹⁷No evidence of ARCH-M effects (see footnote 14) or significant betas are found. However, evidence (albeit weak) of constant positive premiums is found. Nevertheless, trivial risk adjustments can be allowed for, since they are time-invariant, after the fact.

this purpose, cumulative average residuals (CARs) are calculated as follows:

$$CAR_t = \sum_{s=-x}^t \sum_{i=1}^{n(s)} e_{is}/n(s) \quad (2)$$

where e_{is} the excess return of the security in question at s in event time in the vicinity of event i ; $n(s)$ is the number of events for which observations exist at s ; and x is the number of days prior to the event over which the CARs are accumulated. To cite one well-known event study, Ball and Brown (1968) decomposed company earnings announcements into those that are favorable and those that are unfavorable, and investigated abnormal (i.e., risk-adjusted) common stock returns before, coincident with, and subsequent to these events. An approach along these lines is pursued here. In the present context, the events are OPEC conferences, and $t = 0$ is designated as the day on which these conferences conclude and a press release issued.¹⁸

The partitioning of OPEC conferences into favorable and unfavorable, or those that generate "good news" and "bad news" for market participants long in oil or its upside derivatives, is not a straightforward task. One alternative is to make use of contemporaneous reports and commentary to arrive at objective criteria. A little investigation along these lines suggests this to be an imperfect approach. Sources in the business press make little attempt to analyze whether an event is more or less favorable than what was anticipated by market participants. Of course only deviations from the latter constitute true "news," or items of information that markets should rationally react to.¹⁹

To see the potential pitfall, consider the methodology of Loderer (1985), whose purpose was to investigate whether OPEC was able to act as an effective cartel. If so, he argued, favorable (unfavorable) news emanating from an OPEC meeting should lead to positive (negative) abnormal returns. Since he was using cash market as well as futures prices, his sample spanned 1974–1983.²⁰ Of the nine meetings that he designated as either unequivocally good news or bad news meetings, surprisingly, there were three cases when Heating Oil futures prices actually moved in the wrong direction over a narrow (three-business day) interval centered on the meeting wind-up data.²¹ Clearly, only the market can truly differentiate between a favorable result that was anticipated from a true surprise.

¹⁸Note that returns at t are defined as log differences of prices from $t - 1$ to t . Therefore, by $t = 0$, any market reaction should have been completed.

¹⁹It is not difficult to cite examples where reportage seems to be at variance with price changes around OPEC conference wind-up dates. For example, *The Economist*, on February 2, 1985 (p. 57), headlined its report on Conference 75 "OPEC's final split comes another meeting closer." Yet, from $t = -2$ to $t = 2$, the cumulative return exceeded 5% for the Crude contract.

²⁰Note that prior to the inception of Heating Oil futures trading, Loderer uses spot (Rotterdam) gas-oil prices. In all cases, he uses one-week returns and his sample ends with Conference 69. Somewhat inexplicably, Loderer includes several lesser (nonconference) meetings, such as two of those of the Market Monitoring Committee.

²¹For meetings up to and including Conference 59, in the words of Loderer (pp. 1001–1002), "good news meetings were, somewhat arbitrarily, defined as meetings where there was a consensus to increase prices, and bad news meetings were meetings where OPEC members failed to agree on a common policy." For those meetings including and following Conference 59: "the good news category includes the meeting that established output quotas for the first time, the meetings that led to an agreement after two preceding failures, and the two announcements by the Market Monitoring Committee." Meetings were deemed bad when "no consensus could be reached." Meetings were considered neutral if they did not fulfill any of these requirements. Note that Conference 59 is doubly counted, and in fact (curiously), is good using one criterion but neutral using the other. The (three out of nine) statement made in the text is based on conferences only.

The decision rule for this study is to focus on the sign of the cumulative residual one day after the end of the conference. A positive value is deemed to represent a meeting which confers “good news,” while a negative one is viewed as symptomatic of “bad news.” A few issues should be highlighted. First, the reason that one day after is chosen is to err on the side of conservatism. The end of a meeting is not constrained by market closing hours, and some time to digest both the official OPEC press release (and any associated nuances) may not be unreasonable.²² Second, since CAR values are sensitive to the choice of x , several such values were experimented with. For example, when x is set to equal -1 , the results are virtually unchanged.

CAR Paths

Figures 1–3 illustrate visually the paths of the cumulative average residuals for Heating Oil during 1979–1983 and for Heating and Crude Oil during 1983–1990. Twenty business days prior to and subsequent to the end of the OPEC conferences are chosen as the event period (i.e., x) for presentation purposes, although results are quite robust to variations in x .²³

Figure 1 refers to the subperiod exclusive to Heating Oil, during which there are six and seven good and bad news meetings, respectively. For the 1983–1990 subperiod,

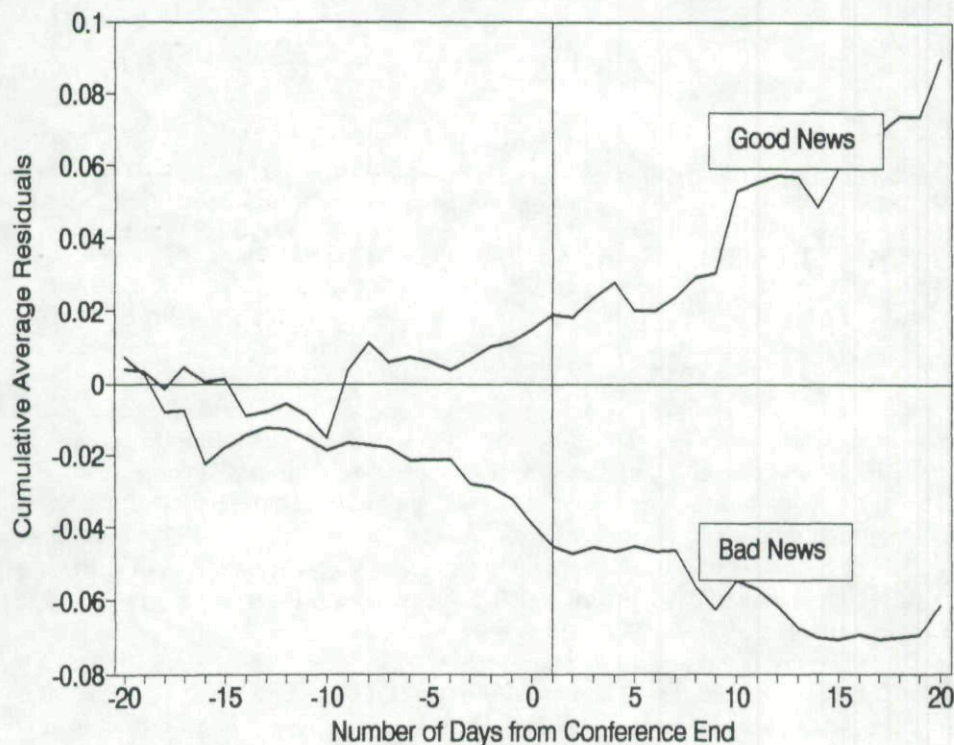


Figure 1

Car paths for heating oil futures returns around OPEC conferences for 1979–1983.

²²The latter problem is attenuated by the fact that there is a six-hour time difference between Vienna and Geneva (where most of the meetings were held) and New York.

²³In some cases, due to the proximity of conferences, it is not possible to use $2x + 1$ observations per conference [which is why $n(s)$ is not constant]. This is to allow at least one week between consecutive event periods.

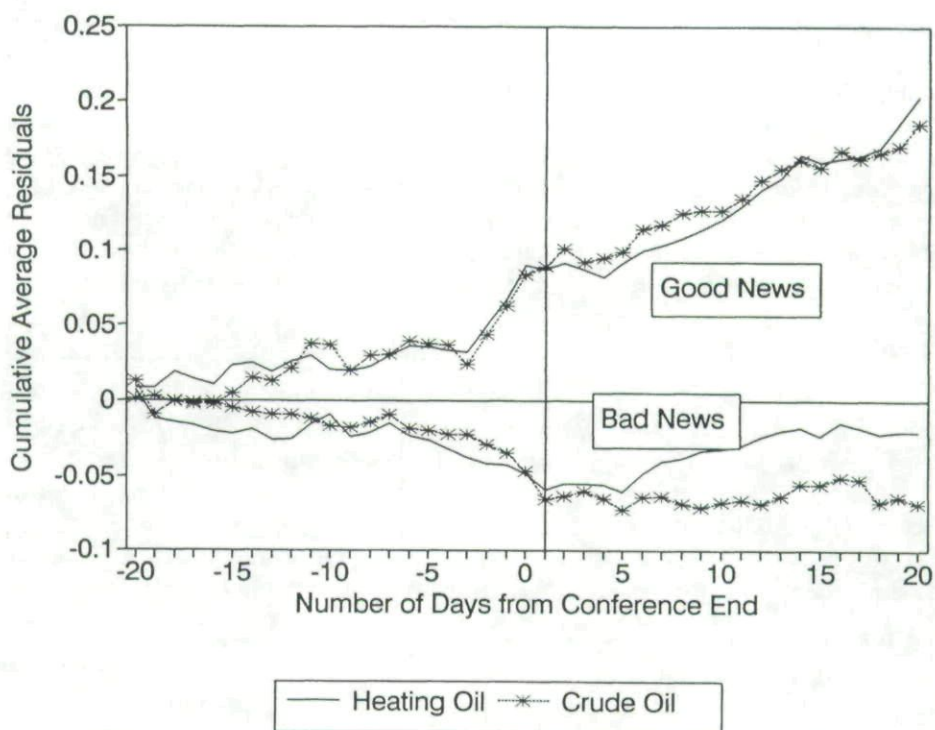


Figure 2

Car paths for heating oil and crude oil futures returns around OPEC conference for 1983–1990 (all observations).

two cases are presented. All meetings are assigned to either the good or bad news categories, with the split between good and bad news meetings being 11/8 for Crude Oil and 8/11 for Heating Oil. Figure 2 illustrates the CAR paths for this case.

Next, a more conservative cross signal screen is employed. To be assigned to a particular category, the CAR₁s in both markets must have the same sign. Thus, for Figure 3, five of 19 meetings, for which the two commodities provided cross signals, are omitted. These are cases where absolute CAR₁s are fairly small. For the remaining 14 meetings, the good and bad news meetings are evenly split at seven each.²⁴

The three commodity-period combinations are remarkably similar. First, it is apparent that much of the information content of the final release is largely anticipated, as evidenced by the gradually increasing (decreasing) CARs prior to $t = 0$.²⁵ This should not be surprising. It is often possible for observers to gauge the likely outcome of an OPEC conference while it is in progress (or in the period just preceding its inception).

More interesting from the standpoint of market efficiency are the CAR paths after $t = 1$, namely, after the market's reaction should have been completed. A visual

²⁴One advantage to the cross signal screen is it allows the last meeting (Conference 86) to be dropped. This (good news) meeting occurred in the vicinity of a December cold snap in North America which caused Heating Oil prices to shoot up (with little effect on Crude). This price movement obviously is unrelated to OPEC, so its inclusion would artificially bias upward return persistence.

²⁵This point should not be overstated, since, for the CAR at $t = 1$ to be positive, it is necessary that past residuals are on average, positive. Still, the positive second derivative of the CAR path (for "good news") is revealing.

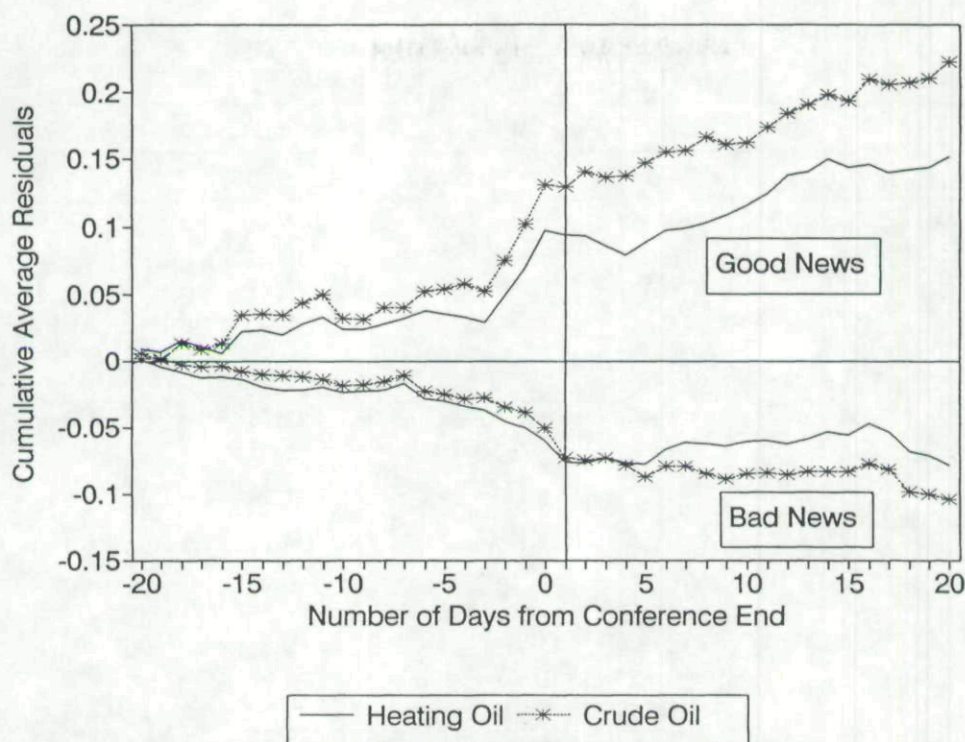


Figure 3

Car paths for heating oil and crude oil futures returns around OPEC conferences for 1983–1990 (cross signal screen).

inspection indicates that, in virtually all cases, there exists a degree of persistence or an incomplete initial reaction. This is especially so after “good news” conferences.

Whether this is statistically and economically significant is explored further in Table III, where differences between cumulative average residuals at $t = 1$ and $t = s$ (i.e., $CAR_s - CAR_1$) are presented, as well the significance of these CAR differences.²⁶ For 1983–1990 these values refer to the more conservative cross signal case. In the case of “good news,” the extent of the positive returns after the market has ample time to digest the information content is substantial, ranging from 5.67%

²⁶Under the null of market efficiency, one obtains for $t \geq 2$:

$$E[CAR_t - CAR_1] = E \left[\sum_{s=2}^t \sum_{i=1}^{n(s)} e_{is} / n(s) \right]$$

Since these error terms are mutually independent, on the assumption of constant return variance (σ^2), one obtains:

$$\text{var}[CAR_t - CAR_1] = \sum_{s=2}^t (1/(n(s))) \sigma^2$$

Given the number of independent observations (under the null), the distributions are essentially standard normal for 10, 15, and 20 days. It may occur to some that, given the demonstrated ARCH effects, t -statistics should be calculated with this in mind. As subsequent discussion indicates, however, this would serve to introduce bias, since variances for days leading up to the conferences exceed those at other times (including those subsequent to the conferences).

Table III
CAR DIFFERENCES (%) AND ABSOLUTE
t-STATISTICS (CROSS SIGNAL SCREEN)

Event Day of CAR Increment Relative to CAR ₁	Heating Oil		Heating Oil	Crude Oil
	1979-1983	1979-1990	1983-1990	
"Good news"				
5	0.07 (0.07)	-0.23 (0.23)	-0.68 (0.31)	1.81 (1.13)
10	3.35 (2.09)	2.67 (1.74)	2.00 (0.93)	3.34 (1.39)
15	4.00 (1.87)	4.53 (2.30)	4.88 (1.74)	6.38 (2.13)
20	7.07 (2.52)	5.97 (2.51)	5.67 (1.72)	9.30 (2.65)
"Bad News"				
5	-0.01 (0.01)	-0.06 (0.06)	-0.11 (0.07)	-1.48 (0.93)
10	-0.95 (0.66)	0.27 (0.18)	1.55 (0.65)	-1.21 (0.49)
15	-2.56 (1.41)	-0.37 (0.20)	2.05 (0.67)	-1.08 (0.34)
20	-1.64 (0.78)	-0.74 (0.33)	-0.20 (0.05)	-3.12 (0.83)

for Heating Oil during 1983-1990 to 9.30% for Crude Oil during the same period.²⁷ In all but the case of Heating Oil for 1983-1990, the difference between CAR₂₀ and CAR₁ is highly significant.²⁸ Since these returns are (approximately) one-month returns, on an annual basis, these represent returns of well over 50%. Thus, there is no question that such profit opportunities are economically significant.

As for the "bad news" meetings, in all cases, the difference between CAR₂₀ and CAR₁ is negative, but insignificantly so. Thus, given the size of the sample and the fact that persistence is only significant on one side, these results, though striking, should be interpreted carefully. Nevertheless, they are certainly very much reminiscent of such equity event studies such as Rendleman, Jones, and Latane (1982), where both good and bad news earnings announcements resulted in a noninstantaneous adjustment and associated profit opportunities for market participants.

²⁷Based on $x = -1$, in the case of Heating Oil for the full 1979-1990 sample, the 5-, 10-, 15-, and 20-day CAR increments for good news meetings are 0.64, 3.66, 4.75, and 6.32, respectively. Only one meeting (Conference 75) is dropped because of a cross signal, and there are a total of 14 such meetings.

²⁸The CAR differences (and associated *t*-statistics) for good news Heating Oil meetings during 1983-1990 are, if all meetings are utilized (i.e., a simple own-commodity decision rule is used), 0.44% (0.31), 3.39% (1.55), 7.27% (2.67), and 11.64% (3.66) for 5-day, 10-day, 15-day, and 20-day out CAR differences, respectively. For Crude the comparable numbers are 1.02% (0.80), 3.85% (2.01), 6.73% (2.81), and 9.64% (3.42).

Transaction Costs or Risk?

Clearly, transaction costs can play no role in explaining this anomaly. For such liquid contracts, futures market commissions and market impact costs are usually very low relative to the dollar value of a contract. This goes a long way in explaining the popularity of financial futures which are often viewed as attractive substitutes to cash market transactions for portfolio managers who wish to temporarily adjust market or interest rate exposure. Even a round-trip commission as high as \$50 on a Crude contract, coupled with a 5¢ (per barrel) spread, based on a contract selling for as little as \$10 per barrel, still only represents 1%.

Can risk adjustments explain these findings? Since the appropriate pricing model for commodity futures is subject to debate, no one can say with any certainty. Nevertheless, the extent of the anomaly appears inconsistent with any reasonable adjustment for risk. Although some evidence of positive risk premiums is found using the ARCH methodology, their size appears to be inadequate. If the largest of them is used—Crude Oil for 1986–1990—and deducted (multiplied by 19) from the CAR increment from the first day after the conference wind-up to the twentieth, one still obtains an excess return of 6.83% over the 19-day period. This figure remains significant in the neighborhood of 5%.

Another possibility is that *ex ante* returns are greater around the meetings due to the pricing of greater return variability. Kalay and Loewenstein (1985) find that this is a partial explanation for the regular occurrence of higher unconditional stock returns around dividend announcements. We explored this issue, but conclude that this too cannot account for the anomalous findings.²⁹ Although return variability is indeed greater leading up to the ends of the conferences, it is no different afterward. For example, the return standard deviations for the entire set of returns of Crude Oil futures, for those from 25 days prior to the meeting to $t = 0$, and from $t = 1$ to $t = 25$, are 2.12%, 2.55%, and 1.97%, respectively.

CONCLUSIONS

During the 1980s, after OPEC conferences that were associated with “good news,” substantial excess returns were available to market participants who went long in oil futures contracts on the day following the end of the conferences. These excess returns are large, especially when contrasted with those usually found in equity market event studies.³⁰ They are economically and statistically significant. This is true for both of the two subperiods examined. Transaction costs and risk adjustments, though perhaps able to erode these profits somewhat, appear unable to explain them. Since this type of event is so central to oil markets, it is indeed surprising to find such evidence contrary to market efficiency. Nevertheless, one must be cautious, given the unsettled nature of the debate on the appropriate reward for risk-bearing in futures markets.

²⁹Consistent with Kalay and Loewenstein (1985), *unconditional* mean returns are found to be positive for both Crude and Heating Oil at $t = 0$.

³⁰For example, Kalay and Loewenstein (1985) are seeking to explain a total excess return of less than 0.5%. The excess returns here range from 5.67–9.30%.

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