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Terrorism and the Returns to Oil

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Abstract: The effect of terrorism on global oil prices has been largely explained through demand-side effects. We develop a model to include important supply-side imperfections to re-examine the effect of terrorism on the price of global oil stocks. Our model finds that if two criteria are met, conflict can positively affect an oil company's stock price. First, oil firms must have some monopoly power. Second, the informational content of a terrorist or conflict event must be large enough to seriously affect investor perception of the market. We argue this is possible when capacity constraints are binding. If both of these prerequisites exist when a conflict occurs, then we predict that a positive stock price reaction can be expected for oil firms from such a shock. We exploit a rich new panel data set to investigate the predictions of our model, using conflict data from the top twenty oil producing and exporting countries in the world, and members of OPEC. We show that in the current era, as cartel behavior of OPEC member countries has diminished and as conflict has become more regular and thus the information surrounding it noisier, oil stock prices do not increase in response to conflict. However, using different time samples, we find that oil stocks can in fact increase in response to conflict. In some cases, the impact of conflict may cause the return of oil stocks to rise by as much as ten percentage points.

Keywords: Political Economy, Oil, Terrorism

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1 Introduction

Terrorism, war, revolutions, and other forms of conflict have become seemingly omnipresent aspects of today's world. Conflict is widely regarded as an aggravating or causal factor in energy supply shocks abroad. Particularly with globalization and highly interconnected economic activity, conflict has become increasingly important for the performance modern global markets. The oil and natural gas markets, for example, are inexorably linked to both domestic and foreign conflict as fluctuations in oil prices are often seen when major conflicts occur. "The combination of the Iranian revolution and the Iraq/Iran War resulted in crude oil prices more than doubling from $14 in 1978 to $35 per barrel in 1981."[1] Though many sectors are affected by conflict, energy prices can be more sensitive due to fluctuations in corporate and consumer confidence, as well as disruptions to foreign energy supplies. Energy companies with a great stake in important oil producing countries often encounter situations involving conflict. But exactly what is the relationship between conflict and the performance of energy companies in global equity markets? This research will attempt to answer this question, and could be valuable for financial analysts and policymakers in determining portfolios and policies that involve the companies that produce one of the world's most sought after resources.

Much attention has been given to the relationship between the real economy and oil markets, and in particular, the market effects of oil price shifts. For example, Kilian (2008c) and Barsky and Kilian (2004) both examined the effects of presumed exogenous oil price shocks on the U.S. macroeconomy. Kilian (2008c) determined that oil price shocks vary in their impact on the economy, and that price shifts may be created by changes in precautionary demand due to the uncertainty of future oil supplies. This altered the prevailing view that oil price shocks were primarily a result of supply shocks abroad. Kilian's findings provide important background information for our study. Because oil price shocks can be driven by precautionary demand, conflict could greatly affect oil prices due to its negative impact on consumer confidence. Price shocks, driven by precautionary demand, could have large consequences for the performance of energy companies' stock prices. Another study, by Keane and Prasad (1996), examined the impact of oil price changes on

[1] Williams, James L. Oil Price History and Analysis. Viewed June 2007. http://www.wtrg.com/prices.htm

sectoral unemployment and determined that there was not a significant relationship. Bernanke *et al.* (1997) investigated the effects of oil price changes in combination with federal monetary policy. He concluded that monetary policy, alone, greatly contributed to the recessions that many had thought were created primarily by exogenous oil supply shocks, such as in the 1975 oil embargo.

Other authors have examined the effects of conflict itself, rather than oil price shifts, on macroeconomies.[2] Abadie and Gardeazabal (2003) investigated the effects of conflict in the Basque region of Spain. This study determined that those companies with direct interests in the Basque region performed poorly in financial markets due to conflict when compared to a theoretically constructed control group outside of the Basque region. Venieris and Gupta (1986) explored the implications of sociopolitical instability for the long-term savings of a country, and discovered a negative relationship. However, these studies have not thoroughly examined the direct effects of conflict on the performance of energy stocks.

Still other studies have researched the more specific relationship of oil markets to financial markets. Oil prices are often considered an important factor for understanding fluctuations in financial markets. For example, some authors such as Chen, Roll and Ross (1986), Huang, Masulis, and Stoll (1996) have found that the relationship between oil price shocks and financial markets are greatly exaggerated. Others, however, such as Jones and Kaul (1996) do find that oil price shocks harm aggregate stock returns.

Much of the disagreement lies in the difficulty in disentangling the various macroeconomic shocks from oil shocks when estimating these relations. In a series of papers by Kilian (2008a,b,c), and Kilian and Park (2008), the authors attempt to estimate the impact of oil price shocks on asset prices by isolating the supply effect from the demand effect. This is not very straightforward given the difficulty in controlling for reverse causation (see Hamilton 2003, 2005). Still Kilian (2008c) uses a novel approach by appealing to a structural decomposition to show that the impact of oil shocks has been primarily driven by demand rather than supply.[3] This is seen in the recent increase

[2]Blomberg and Hess (2006) focus on trade, especially on comparing the costs of conflict to measures for trade promotion. Alternatively, Blomberg, Hess and Orphanides (2004) investigate the impact of various forms of conflict such as terrorism, internal wars and external wars on a country's economic growth. Enders, Sandler and Cauley (1990) have developed a model to assess the effectiveness of terrorist-thwarting policies on terrorism. They find little evidence for legislative activity in preventing terrorism. Enders, Sandler and Sachsida (2006) focus on foreign direct investment rather than portfolio investment.

[3]In a similar vein, Hess and Lee (1999) also found the relationship was conditional on the cause of the shock.

in oil and asset prices during the 2000s.

While the approach is novel, the results require some restrictive assumptions - namely being able to identify oil supply and demand shocks by assuming that (1) crude oil supply are slow in responding to demand; (2) the global economy is slow in responding to oil shocks; and (3) oil shocks that cannot be explained by oil supply aggregate demand for industrial commodities must be demand shocks that are specific to the oil market.

We build on this approach by introducing two important differences. First, we are more interested in the financial health of the oil market and will therefore be more interested in the impact on earnings, stock prices, etc. for oil firms rather than with oil production. Second and more importantly, rather than relying on the three restrictive assumptions outlined above, we present a novel strategy for identifying oil supply shocks through their relation to political variables. In doing so, we hope to better gauge the importance of oil supply shocks in explaining fluctuations in the price of oil stocks.

In this study, we investigate the relationship between conflict and the financial market performance of firms in the energy sector. Oil companies have a substantial amount of influence over the availability and price of the oil we pay for. Therefore, the relationship between the increasing levels of conflict in the world and oil firm performance could be an important one. We compare monthly data on all types of conflict, ranging from no casualty events to the September 11th attacks, and examine their effects on financial market performance, using data on terrorism from the Memorial Institute for the Prevention of Terrorism (MIPT). We included only data from those countries that are top oil producers, top oil exporters, or members of O.P.E.C. We then compiled monthly stock price data from the WRDS database at the University of Pennsylvania for those companies listed as part of the AMEX Oil Index (XOI) and others that are typically regarded as indicators of market performance. These two sets of data were then merged to analyze the predictions of our model.

In the next section, we describe our simple model of explaining how conflict is related to the profitability of the oil industry. Sections 3 and 4 summarize the data and our estimation strategy. Section 5 presents our empirical results. Section 6 concludes.

2 The Model

In this section, we present a very simple model to describe how oil firms respond to conflict. For simplicity, we do not distinguish between the various stages of production for oil firms.[4] The model is a standard one-shot game in which firms select optimal quantities in order to maximize profits. The main innovation is that we assume conflict imposes a binding capacity constraint. In this way, we allow conflict to increase profits by lowering supply, making the current stock of oil available more valuable.

We assume a simple linear demand curve that is exploited by firms with some degree of market power. We begin by assuming the firm is a monopoly. We then allow for an oligopolistic market structure.[5] The demand curve is

$$p = a - Q \tag{1}$$

where p is price Q is quantity demanded which may be impacted by state of nature in which there is a conflict. We also assume there exists a linear cost curve[6]

$$C = cQ \tag{2}$$

in which costs C depend on quantity produced.

We allow for conflict to restrict production without increasing costs. In this case, if there is a conflict, we assume that output is reduced by a capacity constraint k, due to delays in the ability to drill for oil which makes the current stock of oil more valuable. This is a central way in which conflict allows firms to exploit production in the manner of a "war profiteer." We argue that conflict has much larger informational content when there are capacity constraints as conflict is more apt to impact output when capacity constraints are binding.

[4]We do allow conflict to impact firms at the intermediate levels of production (e.g. refineries) and do not find the general qualitative results to be impacted by such specifications. Hence, we concentrate our results on the more general case.

[5]We could also relax the assumption that the demand curve is linear. This assumption is made simply for analytical convenience.

[6]The assumption is merely made for tractability.

The optimization problem for a monopolist facing a linear demand curve and constant marginal cost is

$$\max_{\{Q\}} \quad E\Pi = [TR - TC] \tag{3}$$

s.t.

$$(p-c)Q = (a-Q)Q - cQ$$

The first order condition for output is:

$$Q^* = (a-c)/2$$

so that in equilibrium

$$p^* = (a+c)/2$$

and

$$\Pi_m^* = \left(\frac{a-c}{2}\right)^2 \tag{4}$$

We could also investigate the equilibrium when there is a different market structure. The optimization problem for the duopolist firm 1 under Cournot competition with firm 2 is

$$\max_{\{q_1\}} \quad E\Pi_1 = [TR_1 - TC_1] \tag{5}$$

s.t.

$$(p-c)q_1 = (a-(q_1+q_2))q_1 - cq_1.$$

The first order condition for firm 1 is:

$$q_1^* = (a-c-q_2^*)/2$$

so that in equilibrium

$$q_2^* = (a-c-q_1^*)/2.$$

Substituting yields

$$q_1^* = q_2^* = (a - c)/3$$

so that aggregate output and market price will be

$$Q^* = q_1^* + q_2^* = 2(a - c)/3$$

and

$$p^* = (a + 2c)/3$$

and aggregate profits are:

$$\Pi^* = Q^*[p^* - c] = Q^*[a - Q^* - c] = \left(\frac{2(a-c)^2}{9}\right). \tag{6}$$

These results can be generalized for n firms, such that

$$Q^* = n \sum q_i^* = \frac{n(a-c)}{(n+1)} \tag{7}$$

and aggregate profits are:

$$\Pi_o^* = Q^*[p^* - c] = Q^*[a - c - Q^*] = n\left(\frac{(a-c)}{(n+1)}\right)^2. \tag{8}$$

Notice as $n \to \infty$, that is the number of firms increase, so that the market becomes perfectly competitive, there are zero economic profits $\Pi^* \to 0$.

Now consider how the equilibrium changes with capacity constraints, k, so that aggregate output falls due to delays in the ability to drill for oil which makes the current stock of oil more valuable. This is a central way in which conflict allows firms to exploit production in the manner of a "war profiteer." First, consider monopolist. Recall from equation (4)

$$\Pi_m^* = \left(\frac{a-c}{2}\right)^2.$$

Including the capacity constraint changes profits to

$$\Pi_m^* = \left(\frac{a-c}{2}\right)^2 - k^2. \tag{9}$$

Next, consider the oligopolist. Including the capacity constraint changes profits to

$$\Pi_o^* = \left[n\left(\frac{(a-c)}{(n+1)}\right)^2 + k\left(Q^* - q_i^* - k\right)\right] = \left[n\left(\frac{(a-c)}{(n+1)}\right)^2 + k\left(\frac{n-1}{n+1}(a-c) - k\right)\right]. \tag{10}$$

In the proposition below, we characterize how changes in the likelihood of conflict impacts the profitability of the firm.

Proposition 1 *If the market structure is oligopolistic, then a binding capacity constraint increases the profitability of the firm.*

This is seen by examining the expected profit function of the firm. Recall from (9) that

$$\Pi_m^* = \left(\frac{a-c}{2}\right)^2 - k^2.$$

For any capacity constraint $k > 0$, equilibrium profits are uniformly lower for monopolists. The intuition is that monopolists have already optimally reduced output so that marginal revenue and marginal cost are equated. Further reduction of output from Q^* will lead to lower profits.

Next, consider the oligopolist. Recall from (10)

$$\Pi_o^* = \left[n\left(\frac{(a-c)}{(n+1)}\right)^2 + k\left(Q^* - q_i - k\right)\right]$$

Therefore, equilibrium profits are uniformly higher provided that capacity constraints, $k > 0$, firms are not atomistic, $n \neq \infty$, and capacity constraints do not eclipse residual demand $(Q^* - q_i - k) > 0$.

Finally, notice the impact of capacity constraints on increasing profits begins when $n = 2$. This impact increases proportionally as n increases. However, profits decline proportionally as n falls. Hence, if terrorism constrains capacity, our model predicts that profits should rise provided that the oil industry isn't a monopoly. ■

Once again, the intuition on why monopolists can not be war profiteers is quite simple. Since a monopolist has already maximized profits by setting marginal cost to marginal revenue, any decrease in quantity due to capacity will necessarily decrease profitability. Moreover if there is free exit or entry, then any profitability due to capacity constraints will be decreased as more firms enter the market.

However, oligopolists may be able to increase profits if war causes a capacity constraint that allows firms to behave more like a monopolist would without capacity constraints. This is the only way to see war profiteering in our framework.

To review, we describe a very simple model in which firms have market power and are subject to demand and binding capacity constraints in the presence of conflict. If the main consideration associated with conflict is a capacity constraint, then the occurrence of conflict will raise firms profits only if firms are oligopolistic. In the next section we describe the data we employ to test the implication of the proposition in the section 4.

3 The Data

Several sources of data provide information on terrorist incidents around the world. We employ the Terrorist Knowledge Base (TKB) of the Memorial Institute for the Prevention of Terrorism (MIPT), which includes a computerized database of worldwide international terrorist incidents since 1968. The MIPT was established following the April 1995 bombing of the Murrah federal building in Oklahoma City. The U.S. Congress directed MIPT to conduct "research into the social and political causes and effects of terrorism" and to "serve as a national point of contact for antiterrorism information sharing among federal, state, and local preparedness agencies, as well as private and public organizations dealing with these issues." While the database coverage is quite extensive, it generally excludes violence carried out by terrorists within their own country against their own nationals and terrorism perpetrated by governments against their own citizens (even if located abroad). The TKB provides detailed information on terrorist incidents, groups, and trials by integrating data from the Rand Terrorism Chronology and Rand-MIPT Terrorism Incident databases, the Terrorism Indictment database, and DFI International's research on terrorist organizations.[7]

Other available data sets include ITERATE (International Terrorism: Attributes of Terrorist Events), the State Department data set, TWEED (Terrorism in Western Europe), and IPIC (the International Policy Institute for Counter-Terrorism). ITERATE, a data set developed by Mickolus and others, covers 179 countries over thirty-seven years, providing an unbalanced panel data set of more than 4,000 observations. The State Department issues an annual report titled Patterns of Global Terrorism, which contains information on the number and location of international terrorist events. The TWEED data set catalogs all terrorist events, including domestic and international events, in Western Europe since 1950. IPIC began to systematize the data in 1987. In each of these cases, the data are given at the country level and so are difficult to employ in our city analysis. Given the coverage is greatest with the MIPT, we choose to employ it for our terrorism data.[8]

The monthly stock price data are taken from the WRDS database at the University of Pennsylvania for those companies listed as part of the AMEX Oil Index (XOI) and others that are typically regarded as indicators of market performance. These companies include: CHEVRON, ROYAL DUTCH , HESS ,BP , HALLIBURTON , SCHLUMBERGER , EXXON , PHILLIPS , SUN , and OCCIDENTAL. These two sets of data were then merged and regression analysis was completed to examine the relationship between them, and the potential significance of that relationship.

We now turn our attention to examining oil stock prices directly and compare their movements during periods of terrorist activity. Figure 1 plots returns for Schlumberger oil and Hess oil from 1968 to 1973 along with measures of terrorism, and compares this to the 2001 to 2005 time sample.[9] The stock price appears to be highly correlated with the terrorist events in the first part of the sample. Notice in almost each period where there is a terrorist shock, returns are significantly higher than average. Figure 1 also shows that while stock prices are correlated with terrorist attacks, they are not perfectly correlated. This is especially striking when you consider

[7]The terrorist events included in our analysis come from the following countries: Saudi Arabia, Russia, United States, Iran, China, Mexico, Venezuela, United Arab Emirates, Canada, Norway, Kuwait, Nigeria, Brazil, Angola, Qatar, Iraq, Algeria, Libya, Kazakhstan, and Indonesia.

[8]The results are qualitatively different when using ITERATE. We also initially included other forms of conflict in our data. Due to the frequency of attacks, we were unable to uncover any statistical significance associated with other forms of internal conflict such as genocides, ethnic wars and revolutions.

[9]For illustrative purposes only, these firms are chosen as a representative sample of oil firms.

the end of the sample period 2001-2005. In this case, terrorist shocks occur more frequently and are, therefore, just as likely to occur when returns are greater than average than when returns are smaller than average. In summary, Figure 1 provides some evidence that terrorist surprises would have the largest impact in the first part of the sample than the latter parts. Hence, if the theory is correct, we would expect returns to be most sensitive to conflict during the first part of the time sample.[10]

[Place Figure 1 about here]

We motivate why returns should be highest in the early sample by examining the empirical regularities of capacity constraints. Figure 2 plots world demand and capacity from 1965 to 2004 as calculated by IEA and Goldman Sachs. Notice that worldwide capacity and demand were identical until the first OPEC shock. After that, there was a significant increase in capacity by firms in an effort to meet future global demand. This peaked by 1981. Shortly afterward, there has been a trend upward in demand. Still the gap between capacity and demand is still larger throughout the sample as when compared to 1965-1973. We believe that capacity constraints due to terrorism will have larger impacts when global capacity is tight (i.e. when global demand is close to global supply). This means that any shock to capacity (say by conflict) should have the largest impact on profits in early part of the sample. Since, then, conflict shocks would not allow firms to exploit production in the same way, reducing the available profits.

To examine these issues more carefully, we examine the mean returns to these oil stocks during various terrorist attacks. Table 1 reports the mean return to stock prices since 1968 under alternative regimes in annualized terms. The second column reports the mean value over the entire sample. The third and fourth columns report the mean value during periods of terrorist attacks. Finally, column five reports the means when there is peace. Table 1 also reports the standard errors in parentheses. The mean returns are consistently higher when the there have been terrorist attacks. This conforms with what our theory predicts. The increased returns in response to terrorist attacks are greatest during the first part of the sample until 1973. In each subsequent time period, the

[10]We choose these breakpoints based on theoretical and statistical considerations described in our empirical results section.

difference between returns during peace and conflict shrinks until there is no significant difference in the last part of the time sample.

[Place Table 1 about here]

In this section, we did a very preliminary data investigation. We found that returns to stocks were higher during terrorist attacks than during peaceful periods. The correlation was the strongest during the first part of the sample when capacity constraints were most likely to bind. During the later periods of the sample, there was little correlation. While these results are supportive of the theory, a more detailed investigation is completed in section 5.

4 The Empirical Model

When the fundamentals follow a random walk, the standard asset pricing model in the presence of risk neutral agents implies:[11]

$$p_{t+1} - p_t = r_t = \alpha + \varepsilon_{t+1}.$$

that stock market prices p follows a random walk, possibly with a drift term, α.[12] ε_{t+1} represents the revision in the economic fundamentals (i.e. innovations) which determine stock prices and r denotes the simple return to an oil stock. The most interesting aspect of this model is that despite numerous attempts, no other reduced-form stock pricing model has been found to outperform it systematically.

In this paper, we argue that this model suffers from lack of information regarding the level of uncertainty associated with conflict. To incorporate this into the model, we include various measures of terrorism on the right hand side of the equation

$$r_t = \alpha_0 + \sum_{-3}^{3} \beta_j \text{terror}_{t+j} + \varepsilon_{it}. \tag{11}$$

[11] For a survey of these models see Frenkel and Mussa (1985).

[12] Hereafter we refer to a random walk with drift model as a random walk model.

If we estimate this for a panel of oil firms i , then the equation becomes:

$$r_{it} = \alpha_0 + \sum_{-3}^{3} \beta_j \text{terror}_{t+j} + \varepsilon_{it}. \tag{12}$$

Equation (12) shows returns should be unpredictable except to the extent terrorism provides information on the profitability of oil firms. Hence, if we have a good measure of terrorism, we could test the validity of this theory. The purpose of the next section is to describe such a test.

5 Empirical Results

In this section we carry out several formal empirical exercises to determine to what extent our measures of terrorism can explain monthly oil stock price dynamics.

First, we examine a simple specification with various measures of terrorism and test the hypothesis that terrorism provides important information on the profitability of oil firms over various time periods. Second, we examine the profitability of individual firms over the various time periods.

Our results suggest several important facts. First, we find that the measures of terrorism have greater predictive power over the first part of our time sample, 1968-73, when market supply equaled market demand and terrorist events were more frequent. During this time sample, the impact of a terrorist event raised returns to oil firms by 6 to 10 percentage points. However, as we widen the time sample to include more recent periods, the returns from conflict fall until they approach zero or even negative values in the most recent period. Second, we find that while all companies are impacted by conflict, Hess, Occidental, and BP tend to reap the largest benefits from conflict. All of the above results support our theory.

We begin by estimating a simple model with three lags and leads of terrorism included as covariates. We choose the lag length in the model based on the Schwarz (SIC) and Akaike Information Criterion (AIC). The SIC and AIC suggest slightly different lag lengths. Three lags were better than shorter lags for the AIC and better than longer lags for the SIC. We opted for three lags in our specifications because it is economically meaningful as it provides a quarter's worth of information. The qualitative results are not sensitive to changes in lag length. We begin by estimating the model using OLS and then control for endogeniety concerns by employing an IV estimator.

We then chose to break the sample into various periods to investigate whether or not terrorism had a larger or smaller impact across time. We choose three possible break points, 1973, 1979, and 1986 which coincide with OPEC shocks and the stock market crash of 1987. We provide formal endogenous break point tests using the Zivot-Andrews test statistic for one break point and a variant of Lumsdaine-Papell for two break points. These results are provided in Table 2. The results find break points near these three dates confirming our priors.[13]

[Place Table 2 about here]

We estimate this specification over the first portion of the sample period, January 1968 to December 1973. Table 3 reports the results of the hypothesis test that terrorism influences returns. The first column denotes the dependent variables and the other columns denote regressions with different terrorism variables and estimation procedures. The terror classifications are: Terrorism (dummy=1 if there was a terrorist incident in month, 0 otherwise) and Fatalities (number of fatalities scaled by 100). Columns (1,2,3,5,6,7) are estimated as OLS with robust standard errors. Columns (4,8) are estimated employing an IV estimator. We also include Column (9) which only includes attacks specifically on intermediate phases of production as in oil refineries.[14]

[Place Table 3 about here]

Table 3 shows that the measures of terrorism affect returns in the simple in the first time sample. It appears that the impact is largest in lags rather than leads. The impact of terrorism is statistically significantly positive shortly after terrorist attacks occur. Table 3 reports the p-value from the χ^2 test that the coefficients are equal to zero. The magnitude of the coefficient associated with terrorism is positive and statistically significant at the .10 level for both Terrorism

[13] The general results are not sensitive to changing the break points by a year or so.

[14] It turns out that such a restriction does not change the general qualitative results.

and Fatalities. We estimate that a terrorist incident raises stock returns by 6 to 10 percent and that for each 100 deaths returns increase by 500 percent.[15]

To see if the results hold up during the latter periods, we conduct similar exercises as in Table 3 but examine the results up to other possible breakpoints (e.g. 1979, 1987 and 2005). The results from this exercise are reported in Table 4-6.

Notice that in each case the general results from Table 3 hold. The measures of terrorism have the assumed theoretical sign and are statistically significant in most cases. However, as the time window is increased, both the statistical significance and magnitude of the impacts decline. In fact, once we include the entire sample period, 1968-2005, we find no significant positive difference between returns during attacks and during peace. If anything, the strongest statistical relationship appears to be *negative*. We interpret this as being consistent with our theory, as both the informational content from a terrorist attack (i.e. binding capacity constraints) and monopoly power of firms has likely fallen in the most recent period due to slackness in World oil markets.

[Place Tables 4-6 about here]

As a final robustness check, we estimate each firm's profitability during the later sample periods to see if firms systematically lose profitability from terrorism. The results from these exercises are reported in Tables 7-10. In each case, the results confirm the earlier findings. We find that the impacts continue to be positive with returns during terrorist attacks being higher than during peaceful periods. However, the magnitudes are significantly smaller. Once we investigate the entire time sample, we see there is no significant difference during times of attacks than times of peace.

[Place Tables 7-10 about here]

In summary, we have shown that the impact of terrorist measures on oil returns are significantly large and robust during the first part of the time sample and then begin to decline after

[15] We also found that our instruments were statistically strong in the first stage with Shea's partial R^2=.89 across all the variables. In addition, we fail to reject the null of the validity of our overidentifying restrictions in both cases, with $p - value = .16$ in column (4) for example.

1973. This is true across all firms but is strongest in Hess, Occidental and BP.

6 Conclusion

In the paper, we develop a model to include important supply-side imperfections to re-examine the effect of terrorism on the price of global oil stocks. Our model finds that two things are needed for conflict to positively affect an oil company's stock price. First, oil firms must have some sort of monopoly power, as was seen during the first two OPEC shocks in the 1970's. Second, the informational content of a terrorist or conflict event must be large enough to seriously affect investor perception of the market. If both of these prerequisites exist when a conflict occurs, then we predict that positive stock price reactions can be expected.

Our model further predicts that if firms are purely monopolistic, and the informational content of conflict is noisy and terrorist events as frequent as they are today, then conflict may not increase the price of an oil stock, and may even decrease it due to demand considerations. We exploit a rich new panel data set to investigate the predictions of our model, using conflict data from only the top twenty oil producing and exporting countries in the world, as well as members of OPEC.

We show that in the current era, as cartel behavior of OPEC member countries has diminished and as conflict has become more regular and thus the information surrounding it noisier, oil prices do not increase in response to conflict. However, using different time samples and different measures of conflict (that may have more informational content than previous studies), we find that stock prices can in fact increase in response to conflict. In some cases, the impact of conflict may even cause the return of oil stocks to rise by as much as ten percentage points.

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Table 1

Sample Means and Standard Errors

Time Period	*Return*	*WHEN TERRORISM*	*WITH FATALITIES*	*NO TERRORISM*
1968-2005	.0072	.0090	.0096	.0056
	(.1011)	(.0947)	(.0941)	(.1071)
n	6371	3153	2485	3218
1968-1973	.0037	.01756	.0226	.0012
	(.1045)	(.0753)	(.0761)	(.1089)
n	852	132	24	720
1974-1979	.0097	.0051	.0209	.0139
	(.1004)	(.0990)	(.1077)	(.1016)
n	864	408	204	456
1980-1986	-.0016	.0029	.0011	-.0035
	(.1143)	(.0996)	(.1011)	(.1199)
n	1098	325	234	773
1987-2005	.0102	.0100	.0093	.0106
	(.0959)	(.0942)	(.0919)	(.0989)
n	3557	2288	2023	1269

Notes: Return is the growth rate in the stock price for oil firms in the sample. WHEN TERRORISM refers to periods with terrorist events and WITH FATALITIES refers to periods in which multiple fatalities occurred. NO TERRORISM refers to periods with no terrorist events. Standard Errors are reported in parentheses.

Table 2: Endogenous Break Point Tests 1968-2005

	1	2	3	4	5	6	7	8	9	10
	CHEVRON	ROYAL DUTCH	HESS	BP	HALLIBURTON	SCHLUMBERGER	EXXON	PHILLIPS	SUN	OCCIDENTAL
Observations	454	453	454	454	454	454	454	454	454	454
Zivot-Andrews	-11.27	-19.24	-9.13	-9.41	-16.92	-21.79	-22.27	-10.74	-23.24	-18.09
Date	1974.92	1974.75	1975	1975	1980.92	1980.75	1982.58	1986.58	1987.25	1987.67
L-P1	-23.37	-22.42	-21.44	-23	-21.96	-22.99	-24.15	-24.83	-23.95	-24.5
L-P2	13.94	83.65	5.94	25.52	20.91	15.01	23.51	17.45	9.97	12.11
Date1	1981.25	2005.75	1971.25	1975.08	1976.17	1972.83	1987.83	1985.58	1980.5	1974.83
Date2	1981.08	1974.67	1970.25	1974.92	1976.25	1972.67	1987.58	1985.42	1980.33	1974.67

See Notes: Zivot-Andrews test statistic searches for one break point (see Zivot and Andrews, 1992). The selected date from the Zivot-Andrews test is given by Date. The L-P1,2 tests (see Lumsdaine and Papell, 1997) test for the unit root null hypothesis against stationarity about piecewise linear trend with two break points. The selected dates from the L-P1,2 tests are given by Date1,Date2.

Table 3: Oil Stock Returns and Terrorism: 1968-1973

$$r_{it} = \alpha_0 + \sum_{-3}^{3} \beta_j \text{terror}_{t+j} + \varepsilon_{it}$$

	1	2	3	4	5	6	7	8	9
	Pre	Post	Both	IV	Pre Fatalities	Post Fatalities	Both Fatalities	IV Fatalities	Refineries
terror_{t-3}	0.027**		0.027**	0.024*	1.834**		1.875**	0.954	0.051**
	[0.010]		[0.010]	[0.012]	[0.722]		[0.722]	[1.138]	[0.022]
terror_{t-2}	0.021*		0.020*	0.022*	1.825**		1.977**	2.324**	0.019
	[0.010]		[0.010]	[0.012]	[0.677]		[0.656]	[0.762]	[0.019]
terror_{t-1}	0.014		0.012	0.013	0.35		0.158	0.821	-0.013
	[0.009]		[0.009]	[0.009]	[0.659]		[0.649]	[0.803]	[0.026]
terror_{t}		0.016*	0.016*	0.011		1.242**	1.351**	0.566	0.061***
		[0.008]	[0.008]	[0.013]		[0.532]	[0.516]	[0.989]	[0.018]
terror_{t+1}		0.007	0.007	0.04		0.728	0.95	6.218	-0.008
		[0.009]	[0.009]	[0.046]		[0.567]	[0.580]	[4.597]	[0.018]
terror_{t+2}		0.010*	0.010*	0.037		0.605	0.52	4.799	0.067***
		[0.005]	[0.005]	[0.036]		[0.437]	[0.462]	[3.138]	[0.018]
terror_{t+3}		0.014	0.013	0.032		0.639	0.12	2.71	-0.035*
		[0.015]	[0.015]	[0.020]		[1.348]	[1.360]	[2.179]	[0.017]
Observations	852	852	852	852	852	852	852	852	852
R-squared	0.02	0.01	0.03		0.02	0.01	0.02		0.02
χ^2 test: $\beta_{t-3}==\beta_{t-1}=0$									
p-value	0		0.01	0.01	0		0.01	0.01	0.05
χ^2 test: $\beta_{t+1}==\beta_{t+3}=0$									
p-value		0.01	0.01	0.12		0.02	0.01	0.02	0.00
$\sum_{j=-3}^{0} \beta_j$	0.06		0.06	0.06	4.01		4.01	4.1	0.06
$\sum_{j=1}^{3} \beta_j$		0.05	0.05	0.12		3.21	2.94	14.29	0.08
$\sum_{j=-3}^{3} \beta_j$	0.06	0.05	0.10	0.18	4.01	3.21	6.95	18.39	0.14

See Notes: ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. The estimated standard errors are presented in parentheses. Each column represents the panel regression of oil firms returns as a function of terrorism. Note that in the estimation procedure, the data are weighted by cell-size and the standard errors are clustered at the firm level. The terror classifications are: Terrorism (dummy=1 if there was a terrorist incident in month, 0 otherwise) and Fatalities (number of fatalities scaled by 100) and Terrorism on Refineries [column 9](dummy=1 if there was a terrorist incident at an intermediate input such as oil refinery in month, 0 otherwise). Columns (1,2,3,5,6,7,9) are estimated as OLS with robust standard errors. Columns (4,8) are estimated employing an IV estimator with lags of both measures of terrorism included as instruments.

Table 4: Oil Stock Returns and Terrorism: 1968-1979

$$r_{it} = \alpha_0 + \sum_{-3}^{3} \beta_j \text{terror}_{t+j} + \varepsilon_{it}$$

	1	2	3	4	5	6	7	8	9
	Pre	Post	Both	IV	Pre Fatalities	Post Fatalities	Both Fatalities	IV Fatalities	Refineries
terror_{t-3}	0.011		0.01	0.022**	0.039		0.036	-0.017	0.042***
	[0.006]		[0.006]	[0.008]	[0.041]		[0.041]	[0.045]	[0.011]
terror_{t-2}	0.008		0.007	0.016*	-0.047		-0.041	-0.013	-0.009
	[0.008]		[0.008]	[0.008]	[0.043]		[0.042]	[0.041]	[0.008]
terror_{t-1}	0.012**		0.012**	0.013	0.014		0.014	0.017	0.027**
	[0.005]		[0.005]	[0.007]	[0.014]		[0.014]	[0.016]	[0.009]
terror_{t}		-0.002	-0.006	-0.003		0.048***	0.048***	0.048***	0.008
		[0.005]	[0.006]	[0.008]		[0.013]	[0.013]	[0.013]	[0.009]
terror_{t+1}		0.011***	0.009*	-0.077***		-0.02	-0.019	0.169	0.010
		[0.003]	[0.004]	[0.019]		[0.011]	[0.011]	[0.097]	[0.010]
terror_{t+2}		0.008**	0.004	-0.018		0.011	0.011	-0.226*	0.008
		[0.004]	[0.004]	[0.020]		[0.008]	[0.008]	[0.116]	[0.009]
terror_{t+3}		0.001	-0.001	0.065**		0.041***	0.041***	0.330***	0.005
		[0.007]	[0.007]	[0.027]		[0.012]	[0.012]	[0.102]	[0.012]
Observations	1716	1716	1716	1716	1716	1716	1716	1716	1716
R-squared	0.01	0	0.01		0	0.01	0.01		0.01
χ^2 test: β_{t-3}==β_{t-1}=0									
p-value	0		0	0.04	0.15		0.16	0.6	0.00
χ^2 test: β_{t+1}==β_{t+3}=0									
p-value		0	0.05	0.01		0	0	0.02	0.51
$\sum_{j=-3}^{0} \beta_j$	0.03		0.03	0.05	0.01		0.01	-0.01	0.06
$\sum_{j=1}^{3} \beta_j$		0.02	0.01	-0.03		0.08	0.08	0.32	0.03
$\sum_{j=-3}^{3} \beta_j$	0.03	0.02	0.03	0.02	0.01	0.08	0.09	0.31	0.09

See Notes: ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. The estimated standard errors are presented in parentheses. Each column represents the panel regression of oil firms returns as a function of terrorism. Note that in the estimation procedure, the data are weighted by cell-size and the standard errors are clustered at the firm level. The terror classifications are: Terrorism (dummy=1 if there was a terrorist incident in month, 0 otherwise) and Fatalities (number of fatalities scaled by 100) and Terrorism on Refineries [column 9](dummy=1 if there was a terrorist incident at an intermediate input such as oil refinery in month, 0 otherwise). Columns (1,2,3,5,6,7,9) are estimated as OLS with robust standard errors. Columns (4,8) are estimated employing an IV estimator with lags of both measures of terrorism included as instruments.

Table 5: Oil Stock Returns and Terrorism: 1968-1986

$r_{it} = \alpha_0 + \sum_{-3}^{3} \beta_j \text{terror}_{t+j} + \varepsilon_{it}$

	1	2	3	4	5	6	7	8	9
	Pre	Post	Both	IV	Pre Fatalities	Post Fatalities	Both Fatalities	IV Fatalities	Refineries
terror_{t-3}	0.009		0.009	0.01	-0.002		-0.002	-0.001	0.008
	[0.005]		[0.005]	[0.006]	[0.004]		[0.004]	[0.004]	[0.008]
terror_{t-2}	0.008*		0.008*	0.001	0.006		0.007	0.008	
	[0.004]		[0.004]	[0.007]	[0.005]		[0.005]	[0.005]	[0.008]
terror_{t-1}	0.003		0.003	0.003	-0.009		-0.009	-0.007	0.042**
	[0.002]		[0.002]	[0.004]	[0.013]		[0.014]	[0.014]	[0.009]
terror_{t}		0.003	0	-0.005		0.001	0.002	0.001	-0.008
		[0.004]	[0.004]	[0.008]		[0.009]	[0.009]	[0.010]	[0.008]
terror_{t+1}		0.001	0	0.021		-0.006	-0.006	0.057	-0.031***
		[0.005]	[0.005]	[0.032]		[0.004]	[0.004]	[0.062]	[0.006]
terror_{t+2}		0.003	0.002	-0.025		0.013**	0.013***	0.037	-0.021**
		[0.002]	[0.002]	[0.025]		[0.004]	[0.004]	[0.041]	[0.008]
terror_{t+3}		0.003	0.002	0.041		0.012	0.012	0.078*	-.019*
		[0.005]	[0.004]	[0.024]		[0.009]	[0.009]	[0.043]	[0.010]
Observations	2814	2814	2814	2814	2814	2814	2814	2814	2814
R-squared	0	0	0		0	0	0	0.01	
χ^2 test: β_{t-3}==β_{t-1}=0									
p-value	0		0	0.46	0.5		0.49	0.45	0.00
χ^2 test: β_{t+1}==β_{t+3}=0									
p-value		0.24	0.84	0.33		0	0	0.21	.0.00
$\sum_{j=-3}^{0} \beta_j$	0.02		0.02	0.01	-0.01		0	0	0.06
$\sum_{j=1}^{3} \beta_j$		0.01	0	0.03		0.02	0.02	0.17	-0.08
$\sum_{j=-3}^{3} \beta_j$	0.02	0.01	0.02	0.05	-0.01	0.02	0.02	0.17	-0.02

See Notes: ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. The estimated standard errors are presented in parentheses. Each column represents the panel regression of oil firms returns as a function of terrorism. Note that in the estimation procedure, the data are weighted by cell-size and the standard errors are clustered at the firm level. The terror classifications are: Terrorism (dummy=1 if there was a terrorist incident in month, 0 otherwise) and Fatalities (number of fatalities scaled by 100) and Terrorism on Refineries [column 9](dummy=1 if there was a terrorist incident at an intermediate input such as oil refinery in month, 0 otherwise). Columns (1,2,3,5,6,7,9) are estimated as OLS with robust standard errors. Columns (4,8) are estimated employing an IV estimator with lags of both measures of terrorism included as instruments.

Table 6: Oil Stock Returns and Terrorism: 1968-2005

$$r_{it} = \alpha_0 + \sum_{-3}^{3} \beta_j \text{terror}_{t+j} + \varepsilon_{it}$$

	1	2	3	4	5	6	7	8	9
	Pre	Post	Both	IV	Pre Fatalities	Post Fatalities	Both Fatalities	IV Fatalities * Refineries	
terror_{t-3}	0.008**		0.008**	0.006	0.001		0.002**	0.001	-0.002
	[0.003]		[0.003]	[0.005]	[0.001]		[0.001]	[0.001]	[0.004]
terror_{t-2}	0.001		0.002	-0.006	0		0	-0.001**	0.012***
	[0.003]		[0.003]	[0.004]	[0.000]		[0.000]	[0.000]	[0.003]
terror_{t-1}	0.001		0.002	-0.007	0.002***		0.003***	0.002**	0.022***
	[0.002]		[0.002]	[0.007]	[0.001]		[0.001]	[0.001]	[0.003]
terror_{t}		0.002	0	-0.008		-0.001**	-0.002***	-0.004***	0.020***
		[0.002]	[0.002]	[0.007]		[0.000]	[0.000]	[0.001]	[0.003]
terror_{t+1}		-0.006**	-0.008**	0.072**		0	0	0.007	-0.028***
		[0.003]	[0.003]	[0.031]		[0.001]	[0.001]	[0.005]	[0.003]
terror_{t+2}		0	-0.002	-0.056**		-0.001	-0.001	-0.004	-0.019***
		[0.001]	[0.002]	[0.019]		[0.001]	[0.001]	[0.005]	[0.003]
terror_{t+3}		0.010***	0.009***	0.019*		-0.001**	-0.002**	0.009*	-0.002
		[0.003]	[0.002]	[0.010]		[0.001]	[0.001]	[0.005]	[0.005]
Observations	6372	6372	6372	6372	6372	6372	6372	6372	6372
R-squared	0	0	0		0	0	0.01		0.02
χ^2 test: β_{t-3}==β_{t-1}=0									
p-value	0.01		0.02	0.08	0.01		0.01	0.04	0.00
χ^2 test: β_{t+1}==β_{t+3}=0									
p-value		0	0.02	0.09		0.01	0	0.01	0
$\sum_{j=-3}^{0} \beta_j$	0.01		0.01	-0.01	0		0	0	0.03
$\sum_{j=1}^{3} \beta_j$		0.01	0	0.03		0	0	0.01	-0.03
$\sum_{j=-3}^{3} \beta_j$	0.01	0.01	0.01	0.02	0	0	0	0.01	0

See Notes: ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. The estimated standard errors are presented in parentheses. Each column represents the panel regression of oil firms returns as a function of terrorism. Note that in the estimation procedure, the data are weighted by cell-size and the standard errors are clustered at the firm level. The terror classifications are: Terrorism (dummy=1 if there was a terrorist incident in month, 0 otherwise) and Fatalities (number of fatalities scaled by 100) and Terrorism on Refineries [column 9](dummy=1 if there was a terrorist incident at an intermediate input such as oil refinery in month, 0 otherwise). Columns (1,2,3,5,6,7,9) are estimated as OLS with robust standard errors. Columns (4,8) are estimated employing an IV estimator with lags of both measures of terrorism included as instruments.

Table 7: Oil Stock Returns and Terrorism By Company: 1968-1973

$$r_t = \alpha_0 + \sum_{-3}^{3} \beta_j \text{terror}_{t+j} + \varepsilon_{it}$$

	1	2	3	4	5	6	7	8	9	10
	CHEVRON	ROYAL DUTCH	HESS	BP	HALLIBURTON	SCHLUMBERGER	EXXON	PHILLIPS	SUN	OCCIDENTAL
terror_{t-3}	0.007	0.006	0.056	0.02	-0.029	0.041	0.024	0.058*	0.029	0.094**
	[0.027]	[0.020]	[0.051]	[0.023]	[0.058]	[0.027]	[0.015]	[0.031]	[0.022]	[0.041]
terror_{t-2}	0.033	0.012	0.004	0.011	-0.018	-0.015	0.002	0.011	0.016	0.077*
	[0.020]	[0.023]	[0.043]	[0.021]	[0.022]	[0.025]	[0.017]	[0.023]	[0.029]	[0.041]
terror_{t-1}	-0.01	-0.008	0.008	0.001	0.054**	0.076**	-0.004	0.01	-0.021	-0.015
	[0.025]	[0.020]	[0.037]	[0.032]	[0.022]	[0.033]	[0.019]	[0.025]	[0.016]	[0.035]
terror_{t}	0.019	0.048**	0.064**	0.019	0.02	0.036*	0.018	-0.014	0.029	-0.014
	[0.025]	[0.019]	[0.025]	[0.023]	[0.022]	[0.021]	[0.016]	[0.021]	[0.022]	[0.030]
terror_{t+1}	0.016	-0.009	-0.03	-0.055*	0.032	0.021	0.006	0.054*	-0.019	0.036
	[0.023]	[0.018]	[0.033]	[0.029]	[0.026]	[0.019]	[0.016]	[0.032]	[0.024]	[0.027]
terror_{t+2}	0.003	0.013	0.049	-0.004	0.018	0.032	-0.006	-0.004	0.014	-0.018
	[0.023]	[0.020]	[0.037]	[0.031]	[0.024]	[0.034]	[0.018]	[0.029]	[0.023]	[0.031]
terror_{t+3}	0.032	0.040**	0.008	0.106*	-0.038	-0.097	0.050**	0.039	0.016	0.015
	[0.022]	[0.018]	[0.035]	[0.057]	[0.027]	[0.065]	[0.019]	[0.028]	[0.018]	[0.033]
Observations	71	71	71	71	71	71	71	71	71	71
R-squared	0.06	0.14	0.09	0.16	0.1	0.18	0.16	0.09	0.09	0.13
χ^2 test: β_{t-3}==β_{t-1}=0	1.14	0.19	0.56	0.32	3.31	3.37	0.96	1.39	0.98	1.95
p-value	0.34	0.91	0.41	0.05	0.03	0.02	0.42	0.25	0.41	0.13
χ^2 test: β_{t+1}==β_{t+3}=0	0.91	1.95	0.98	2.79	1.41	0.85	2.5	1.41	0.64	1
p-value	0.44	0.13	0.64	0.81	0.25	0.47	0.07	0.25	0.59	0.4
$\sum_{j=-3}^{0} \beta_j$	0.05	0.06	0.13	0.05	0.03	0.14	0.04	0.07	0.05	0.14
$\sum_{j=1}^{3} \beta_j$	0.05	0.04	0.03	0.05	0.01	-0.04	0.05	0.09	0.01	0.03
$\sum_{j=-3}^{3} \beta_j$	0.12	0.15	0.22	0.12	0.06	0.13	0.11	0.14	0.09	0.16

See Notes: See Table 1. ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. The estimated standard errors are presented in parentheses. Each column represents the regression of oil firms returns as a function of terrorism. Note that in the estimation procedure, the data are weighted by cell-size and the standard errors are clustered at the firm level. The terror classifications is Terrorism (dummy if there was a terrorist incident in month).

Table 8: Oil Stock Returns and Terrorism By Company: 1968-1979

$$r_t = \alpha_0 + \sum_{-3}^{3} \beta_j \text{terror}_{t+j} + \varepsilon_{it}$$

	1	2	3	4	5	6	7	8	9	10
	CHEVRON	ROYAL DUTCH	HESS	BP	HALLIBURTON	SCHLUMBERGER	EXXON	PHILLIPS	SUN	OCCIDENTAL
terror_{t-3}	0.013	0.017	0.033	0.018	-0.023	-0.012	0.004	0.019	0.025*	0.045**
	[0.013]	[0.011]	[0.022]	[0.020]	[0.024]	[0.018]	[0.012]	[0.017]	[0.015]	[0.021]
terror_{t-2}	0.013	-0.003	0.007	0.018	-0.001	-0.022	-0.009	-0.015	0.007	0.041*
	[0.013]	[0.014]	[0.021]	[0.023]	[0.017]	[0.018]	[0.013]	[0.018]	[0.014]	[0.022]
terror_{t-1}	-0.003	0	0.001	-0.003	0.043***	0.025	0.014	0.02	0.001	-0.007
	[0.013]	[0.013]	[0.020]	[0.022]	[0.016]	[0.017]	[0.017]	[0.017]	[0.013]	[0.020]
terror_{t}	-0.005	0.011	0.017	-0.008	-0.013	0.032*	-0.017	-0.039**	-0.001	-0.017
	[0.014]	[0.011]	[0.018]	[0.019]	[0.021]	[0.017]	[0.012]	[0.018]	[0.015]	[0.022]
terror_{t+1}	0.015	0.014	-0.015	0.004	0.012	0.014	0.016	0.038*	-0.01	0
	[0.013]	[0.012]	[0.017]	[0.021]	[0.025]	[0.021]	[0.012]	[0.022]	[0.014]	[0.021]
terror_{t+2}	0.012	0.008	0.012	0.025	0.014	0.014	-0.011	-0.018	0.006	-0.013
	[0.014]	[0.013]	[0.020]	[0.024]	[0.018]	[0.019]	[0.014]	[0.019]	[0.014]	[0.020]
terror_{t+3}	0.007	-0.004	0.012	0.019	-0.045**	-0.058**	0.004	0.016	0.009	0.028
	[0.013]	[0.011]	[0.018]	[0.027]	[0.021]	[0.025]	[0.013]	[0.018]	[0.014]	[0.024]
Observations	143	143	143	143	143	143	143	143	143	143
R-squared	0.05	0.06	0.04	0.04	0.08	0.08	0.03	0.05	0.04	0.07
χ^2 test: β_{t-3}==β_{t-1}=0	0.77	0.96	0.77	0.83	3.12	1.24	0.51	1.54	1.13	1.97
p-value	0.51	0.66	0.59	0.28	0.08	0.3	0.42	0.21	0.83	0.12
χ^2 test: β_{t+1}==β_{t+3}=0	1.02	0.53	0.65	1.3	2.31	1.77	0.94	1.41	0.29	0.5
p-value	0.39	0.41	0.51	0.48	0.03	0.16	0.68	0.24	0.34	0.68
$\sum_{j=-3}^{0}\beta_j$	0.02	0.03	0.06	0.02	0.01	0.02	-0.01	-0.02	0.03	0.06
$\sum_{j=1}^{3}\beta_j$	0.03	0.02	0.01	0.05	-0.02	-0.03	0.01	0.04	0	0.01
$\sum_{j=-3}^{3}\beta_j$	0.05	0.05	0.08	0.06	-0.03	0.03	-0.01	-0.02	0.03	0.06

See Notes: See Table 1. ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. The estimated standard errors are presented in parentheses. Each column represents the regression of oil firms returns as a function of terrorism. Note that in the estimation procedure, the data are weighted by cell-size and the standard errors are clustered at the firm level. The terror classifications is Terrorism (dummy if there was a terrorist incident in month).

Table 9: Oil Stock Returns and Terrorism By Company: 1968-1986

$$r_t = \alpha_0 + \sum_{-3}^{3} \beta_j \text{terror}_{t+j} + \varepsilon_{it}$$

	1	2	3	4	5	6	7	8	9	10
	CHEVRON	ROYAL DUTCH	HESS	BP	HALLIBURTON	SCHLUMBERGER	EXXON	PHILLIPS	SUN	OCCIDENTAL
terror_{t-3}	0.015	0.018*	0.027	0.019	-0.018	-0.01	0.004	0.022	0.019	0.033**
	[0.012]	[0.010]	[0.017]	[0.015]	[0.019]	[0.014]	[0.009]	[0.015]	[0.013]	[0.015]
terror_{t-2}	0.012	-0.002	0.008	0.009	0.008	-0.006	0	-0.012	0.015	0.032**
	[0.013]	[0.011]	[0.018]	[0.017]	[0.016]	[0.015]	[0.010]	[0.017]	[0.014]	[0.016]
terror_{t-1}	0.001	0	-0.008	0.002	0.013	0.003	0.006	0.008	0	-0.006
	[0.011]	[0.010]	[0.018]	[0.016]	[0.014]	[0.014]	[0.012]	[0.016]	[0.013]	[0.014]
terror_{t}	-0.007	0.014	0.033**	0.002	-0.002	0.016	-0.001	-0.031*	0.004	-0.014
	[0.011]	[0.009]	[0.016]	[0.015]	[0.016]	[0.014]	[0.009]	[0.017]	[0.013]	[0.015]
terror_{t+1}	0.009	0.013	-0.02	-0.006	0.007	0.011	-0.006	0.026	-0.024*	0.001
	[0.011]	[0.010]	[0.017]	[0.016]	[0.018]	[0.015]	[0.013]	[0.017]	[0.013]	[0.014]
terror_{t+2}	-0.001	0.001	0.014	0.015	0.004	0.007	0.001	-0.008	0.002	0
	[0.011]	[0.011]	[0.016]	[0.017]	[0.014]	[0.014]	[0.010]	[0.015]	[0.012]	[0.014]
terror_{t+3}	0.003	-0.002	0.001	0.014	-0.028*	-0.029	0.002	0.001	0.006	0.018
	[0.011]	[0.010]	[0.016]	[0.018]	[0.017]	[0.018]	[0.010]	[0.015]	[0.015]	[0.016]
Observations	227	227	227	227	227	227	227	227	227	227
R-squared	0.02	0.03	0.04	0.02	0.02	0.02	0	0.03	0.03	0.05
χ^2 test: $\beta_{t-3}{=}{=}\beta_{t-1}{=}0$	1.04	1.26	0.92	0.9	0.55	0.28	0.27	1.75	1.3	2.35
p-value	0.37	0.59	0.58	0.44	0.65	0.84	0.97	0.16	0.32	0.07
χ^2 test: $\beta_{t+1}{=}{=}\beta_{t+3}{=}0$	0.25	0.64	0.65	0.97	1.21	0.94	0.07	0.87	1.17	0.46
p-value	0.86	0.29	0.43	0.41	0.31	0.42	0.85	0.46	0.27	0.71
$\sum_{j=-3}^{0} \beta_j$	0.02	0.03	0.06	0.03	0	0	0.01	-0.01	0.04	0.04
$\sum_{j=1}^{3} \beta_j$	0.01	0.01	-0.01	0.02	-0.02	-0.01	0	0.02	-0.02	0.02
$\sum_{j=-3}^{3} \beta_j$	0.02	0.05	0.09	0.06	-0.02	0.01	0.01	-0.02	0.03	0.05

See Notes: See Table 1. ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. The estimated standard errors are presented in parentheses. Each column represents the regression of oil firms returns as a function of terrorism. Note that in the estimation procedure, the data are weighted by cell-size and the standard errors are clustered at the firm level. The terror classifications is Terrorism (dummy if there was a terrorist incident in month).

Table 10: Oil Stock Returns and Terrorism By Company: 1968-2005

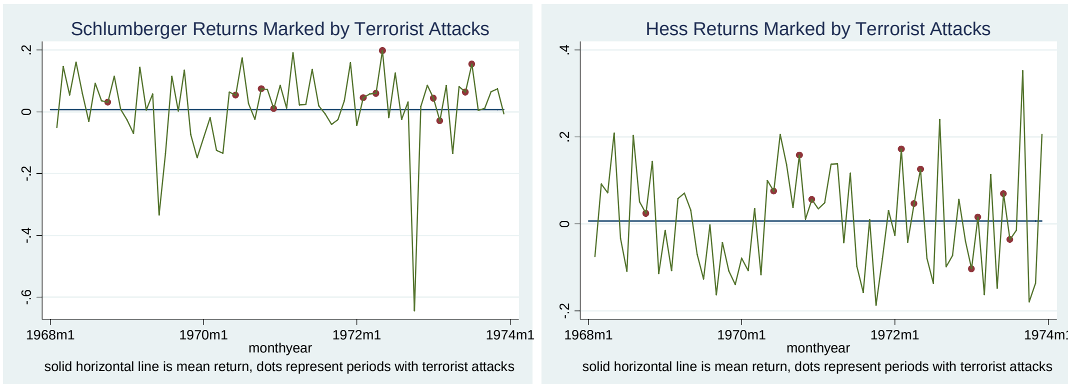
$$r_t = \alpha_0 + \sum_{-3}^{3} \beta_j \text{terror}_{t+j} + \varepsilon_{it}$$

	1	2	3	4	5	6	7	8	9	10
	CHEVRON	ROYAL DUTCH	HESS	BP	HALLIBURTON	SCHLUMBERGER	EXXON	PHILLIPS	SUN	OCCIDENTAL
terror_{t-3}	0.006	0.008	0.016	0.006	-0.013	-0.008	0.008	0.014	0.019*	0.019**
	[0.008]	[0.008]	[0.011]	[0.010]	[0.014]	[0.010]	[0.008]	[0.011]	[0.010]	[0.009]
terror_{t-2}	0.001	-0.011	0.001	-0.001	0.01	-0.005	0	-0.009	0.005	0.022**
	[0.008]	[0.009]	[0.012]	[0.011]	[0.012]	[0.011]	[0.008]	[0.011]	[0.010]	[0.010]
terror_{t-1}	0.002	0.006	-0.007	0.002	0.01	0.004	-0.002	0.001	0.002	-0.012
	[0.008]	[0.009]	[0.012]	[0.011]	[0.012]	[0.010]	[0.010]	[0.011]	[0.010]	[0.010]
terror_{t}	-0.005	0	0.019*	-0.004	0	0.013	-0.007	-0.018	0.005	-0.004
	[0.008]	[0.008]	[0.011]	[0.011]	[0.013]	[0.010]	[0.008]	[0.011]	[0.009]	[0.010]
terror_{t+1}	0	0.007	-0.016	-0.008	-0.008	-0.003	-0.001	0.01	-0.019**	-0.002
	[0.007]	[0.009]	[0.011]	[0.011]	[0.013]	[0.011]	[0.010]	[0.012]	[0.009]	[0.010]
terror_{t+2}	-0.005	-0.004	-0.006	-0.002	0.009	0.007	-0.001	-0.005	0	-0.01
	[0.008]	[0.009]	[0.011]	[0.011]	[0.012]	[0.010]	[0.007]	[0.011]	[0.009]	[0.010]
terror_{t+3}	0	0.008	0.005	0.017	-0.003	-0.009	0.01	0.011	0.008	0.017
	[0.007]	[0.009]	[0.010]	[0.012]	[0.012]	[0.012]	[0.008]	[0.011]	[0.010]	[0.011]
Observations	455	453	455	455	455	455	455	455	455	455
R-squared	0	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.03
χ^2 test: β_{t-3}==β_{t-1}=0	0.29	0.96	0.78	0.16	0.63	0.39	0.45	0.82	1.44	2.63
p-value	0.83	0.76	0.5	0.92	0.59	0.76	0.64	0.46	0.18	0.43
χ^2 test: β_{t+1}==β_{t+3}=0	0.14	0.39	1.05	0.85	0.24	0.36	0.56	0.87	1.65	0.93
p-value	0.94	0.41	0.37	0.46	0.87	0.78	0.72	0.48	0.23	0.05
$\sum_{j=-3}^{0} \beta_j$	0	0	0.03	0	0.01	0	0	-0.01	0.03	0.03
$\sum_{j=1}^{3} \beta_j$	0	0.01	-0.02	0.01	0	-0.01	0.01	0.02	-0.01	0
$\sum_{j=-3}^{3} \beta_j$	-0.01	0.01	0.03	0.01	0.01	0.01	0	-0.01	0.03	0.03

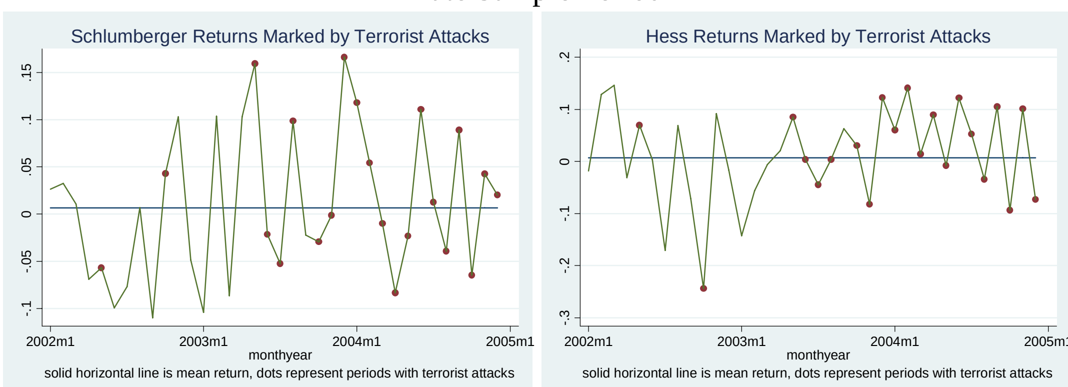
See Notes: See Table 1. ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. The estimated standard errors are presented in parentheses. Each column represents the regression of oil firms returns as a function of terrorism. Note that in the estimation procedure, the data are weighted by cell-size and the standard errors are clustered at the firm level. The terror classifications is Terrorism (dummy if there was a terrorist incident in month).

Figure 1: Stock Market Returns and Terrorist Attacks

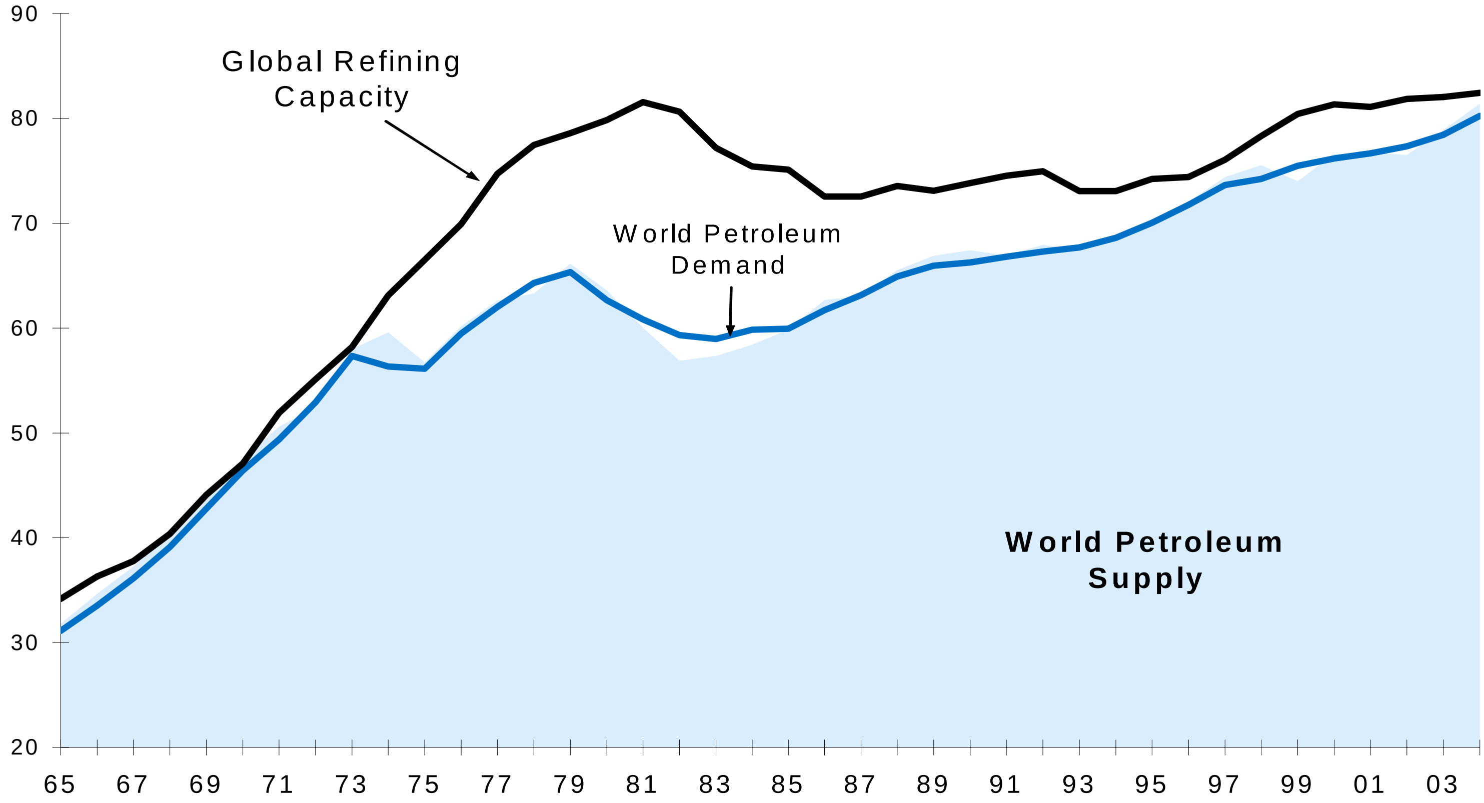
Early Sample Period



Late Sample Period



Oil Refining Capacity Peaked in 1981



Source: IEA and Goldman Sachs Commodity Research.