McCullough Research

Robert F. McCullough, Jr.
Managing Partner

Date: September 16, 2008

To: McCullough Research Clients

From: Robert McCullough

Subject: Seeking the Causes of the July 3, 2008 Spike in World Oil Prices (Updated)

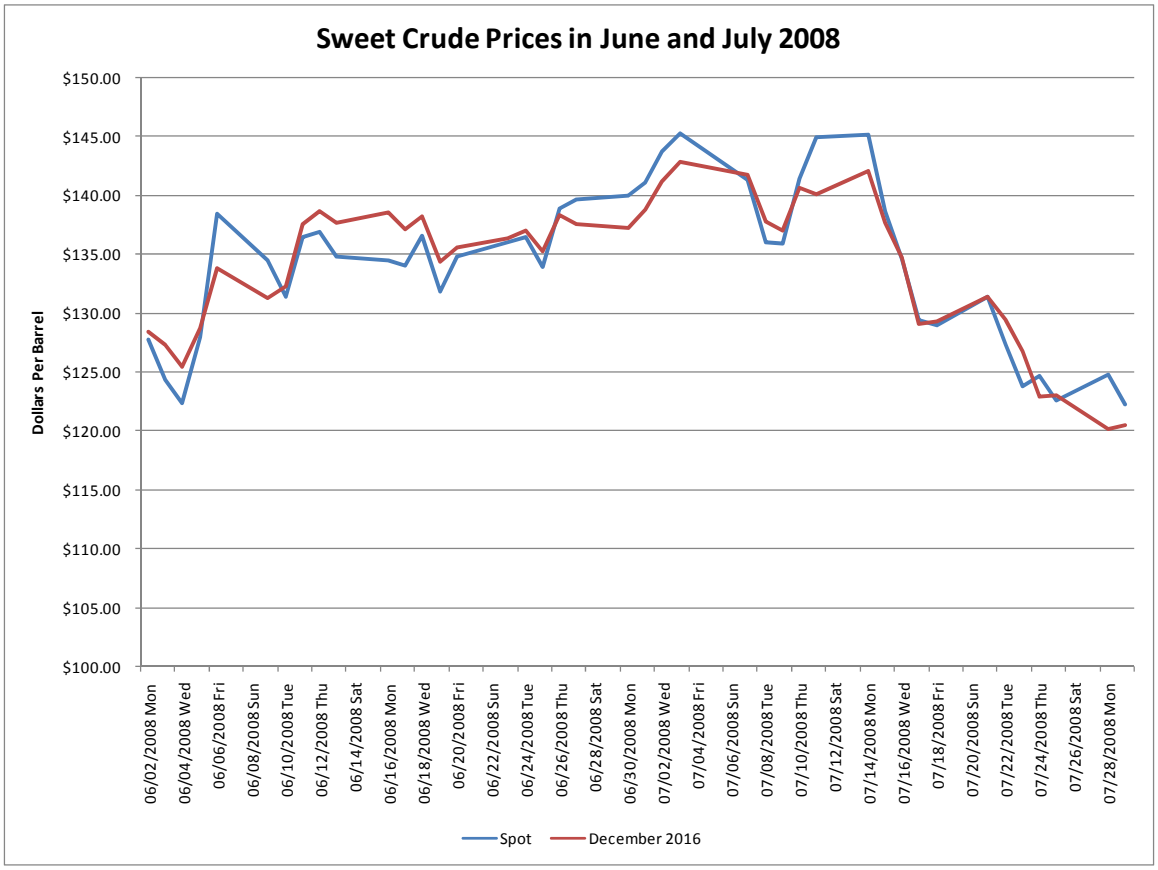
Over the past two years the price of oil has roughly doubled. The increase has surprised both the markets and official forecasters such as the Energy Information Administration. This is a situation where the savviest traders and the most sophisticated modelers have equally failed to predict the rapid increase.[1]

Although an intense public debate has emerged concerning the causes of the price increase, to date little substantive work has been undertaken. There are three reasons: first, a steady climb in oil prices does not provide a good basis for most econometric modeling; second, data is scarce and difficult to interpret; and third, three different federal agencies share inconsistent mandates concerning oil prices. More bluntly, we have the wrong tools; we lack even the most elementary data; and no one agency is clearly in charge.

While medical symptoms may be uncomfortable to the patient, they are useful tools for the internist. The price spike of July 3, 2008 was so sharp that it provides an opportunity to seek causes. A central advantage in reviewing June and July of this year is that the traditional explanations for oil price increases, such as exchange rates, storms, or major geopolitical events, were absent. Relatively little happened in June and July of 2008 in any of these areas. Even more significantly, the forward price curves followed the spike in spot prices in lockstep. On June 2, 2008 the price of oil on the NYMEX was $128.43 a barrel for December 2016. By July 3, the price for December 2016 had increased to $142.18 a barrel. By the end of July it had fallen to $117.67 a barrel. By September 14, the price had slipped just below $100 a barrel.

[1]July 2008 NYMEX oil futures settled on June 1, 2006 traded for $70.95 a barrel. The contemporaneous EIA forecast predicted a lower price $67.00 per barrel at the end of their forecast period.

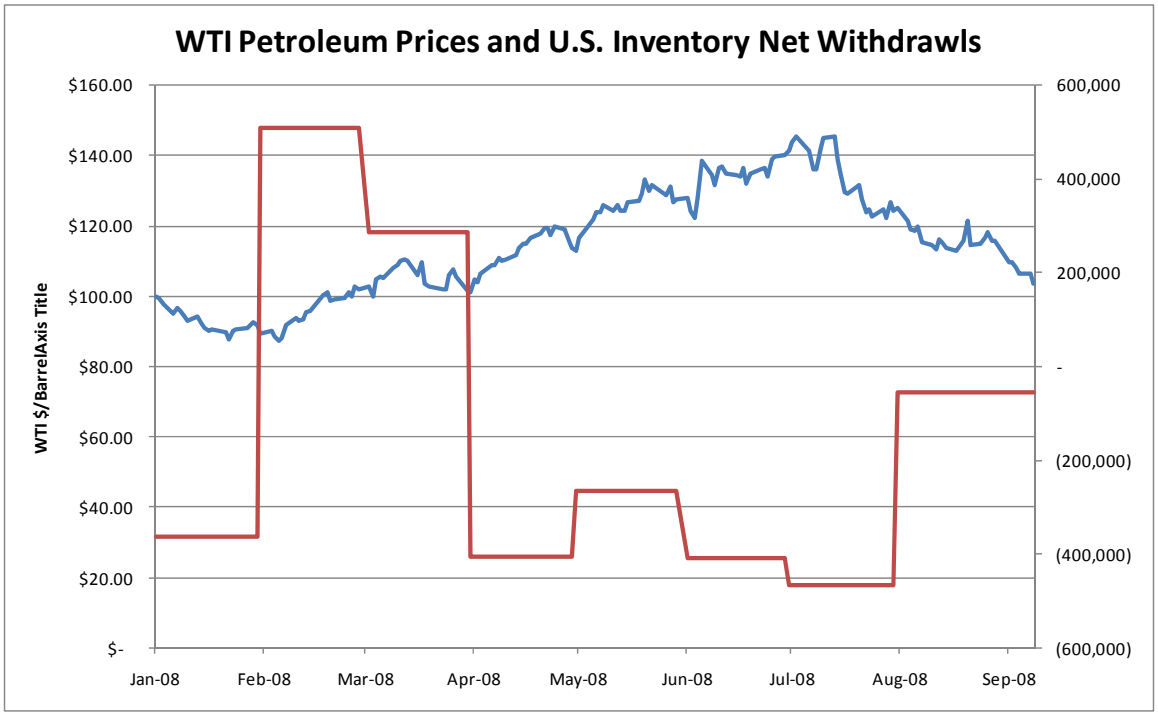
What happened in June 2008 that raised the forward prices of oil so significantly? What happened later in July that caused the forward price of oil for deliveries years in the future to fall even more precipitously?



Pundits are quick to point to increases in demand in India and China or blame price increases on the arrival of "peak oil." While they have the ability to extrapolate from minimal data, economists tend to check the facts. Monthly data on national and international production and consumption is published by the Energy Information Administration as part of its short term forecast.[2] Despite the pundits' opinions, the supply demand balance in the U.S. appears to have had little relationship to the price of oil this summer.

The following chart shows the relationship – or rather, absence of relationship – between the reduction in U.S. crude inventory and spot prices.

[2]See http://www.eia.doe.gov/emeu/steo/pub/contents.html for detailed monthly data on oil and other energy sources.



The U.S. continued to draw down its inventory of oil to meet current needs until the end of August, even though prices began to drop in early July. More puzzling, prices dropped throughout July even though the drawdown of inventories in the U.S. was at the greatest level in July – the exact opposite of what economic theory would lead us to predict.

All available evidence indicates that the price spike of July 3 was a form of market failure most likely due to the significant concentration in the energy sector in recent years. There is no evidence that a significant long term change in oil consumption or production took place in June and then faded away in July. The events this summer are eerily similar to Enron spot forward gambits in natural gas and electricity, specifically the timing of profit-taking which appears to show considerable prescience.

Oil

The U.S. is both the single largest consumer and a major domestic and international producer. Traditionally, the "seven sisters" (Exxon, Mobile, Gulf, Socal, Texaco, Shell, and BP) long dominated the industry. Five of the seven were U.S. companies. Industry consolidation has reduced the number of sisters to five. Exxon, Mobile,

Gulf, Socal, and Texaco have all merged or been acquired over the past decade. Today, we are down to five sisters, three of them U.S. based.[3]

Oil is a storable commodity. In economic theory this means that market participants can choose to sell oil today or wait for a better market tomorrow. The Organization of Petroleum Exporting Countries (OPEC) exploits this facet of the oil market by setting production targets, spacing out the production of oil over time.

A purely theoretical analysis of oil can be likened to the consumption of a prime, irreplaceable vintage of wine. The consumer calculates the benefit of opening the bottle after considering a desire to hold a reserve against a future need. In a perfect world, forward prices would reflect long term expectations of supply, technology, and demand. The relationship between spot and forward prices would reflect the time value of money.

In practice, the theoretical model asks too much of real consumers, producers, and traders. Technology changes the rules frequently. Reserves are difficult to evaluate and consumers change their preferences continuously. Substitutes for oil were not even considered possible until the past few years. Today, ethanol comprises an increasingly large proportion of retail gasoline for most drivers in the U.S.

In practice, oil's fundamentals are well known. New markets for gasoline like those in the Far East have appeared. The emergence of China and India as major consumers is no longer news. While price shocks such as changes in OPEC policy, civil unrest in Nigeria, or major storms that disrupt production in the Gulf of Mexico cannot be easily predicted, longer term impact are well understood. Thus, we are unsurprised to find that spot prices are more volatile than prices in longer term markets.

Because oil is so important, forward markets for oil are critical to the operation of the economy. The two most significant forward markets are the New York Mercantile Exchange (NYMEX) and the Intercontinental Exchange (ICE). Due to the two so-called "Enron loopholes", only NYMEX is fully regulated by the Commodity Futures Trading Commission (CFTC). Forward trades also take place in the over the counter markets that are also unregulated by the CFTC.[4]

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[3] The Energy Information Administration has produced an excellent history of industry consolidation in the oil business. This has been reproduced as Appendix A to this report.

[4]For a detailed discussion of the Enron loopholes see my testimony entitled "Regulation and Forward Markets Lessons from Enron and the Western Market Crisis of 2000-2001", May 8, 2006, http://www.mresearch.com/pdfs/191.pdf

Concerns about the efficiency of the market include the increasingly important role of speculators. In theory, speculators add liquidity to forward markets by taking risks that producers and consumers may not wish to accept. In practice, it is possible that a sufficiently large speculative position will change forward prices and even affect spot prices. In 2006, the hedge fund, Amaranth, had accumulated a massive position in March and April natural gas futures. From evidence collected by later investigations, Amaranth was attempting to support a significant differential in forward prices by repeated intervention in the market. Amaranth failed, but its impact on the relatively large North American natural gas markets has created fears that larger and better-funded entities could effectively set forward prices.

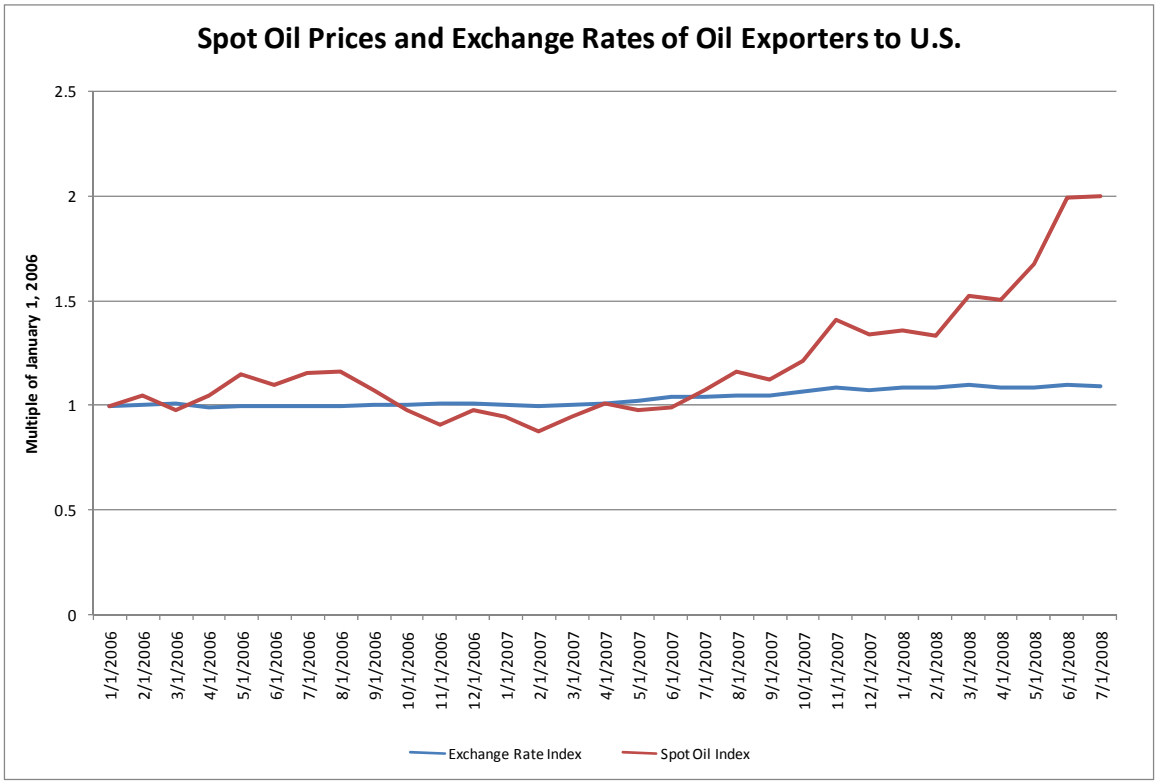
The U.S. government has regulated commodity trading since the 1930s. Responsibility for oil is split haphazardly among the Federal Energy Regulatory Commission (FERC), which has authority over pipelines, the Federal Trade Commission (FTC) which operates the Oil and Gas Industry Initiatives, and the CFTC which views oil as one small part of a large portfolio of commodities. The responsibility for forecasting and understanding the oil markets lies with the Energy Information Administration. As noted above, no one agency has a clear mandate to accumulate data, oversee markets, and evaluate factors that affect consumers.

The CFTC regulates part of the forward market in oil. FERC has traditionally focused on electricity and natural gas. The FTC's Oil and Gas Industry Initiatives focuses more on mergers and relies upon OPIS, a market data firm, and the EIA for data.[5] The EIA accumulates some data and issues periodic forecasts. This disorganized approach makes it difficult to obtain consistent data and even harder to determine the cause of price increases.

The Current Debate

An intense debate currently rages over the causes of recent price increases. An amazing degree of misinformation fuels the debate. For example, one often reads that the increase in the price of oil is due to the decline of the dollar relative to the euro. While exchange rates are a small factor, the U.S. does not buy oil from the European Union, so the exchange rates relative to Europe are not a significant factor. The market basket of currencies used by the ten major nations that provide oil to the U.S. has not changed markedly over time.

[5]See http://www.ftc.gov/ftc/oilgas/gas_price.htm for a description of collection efforts.

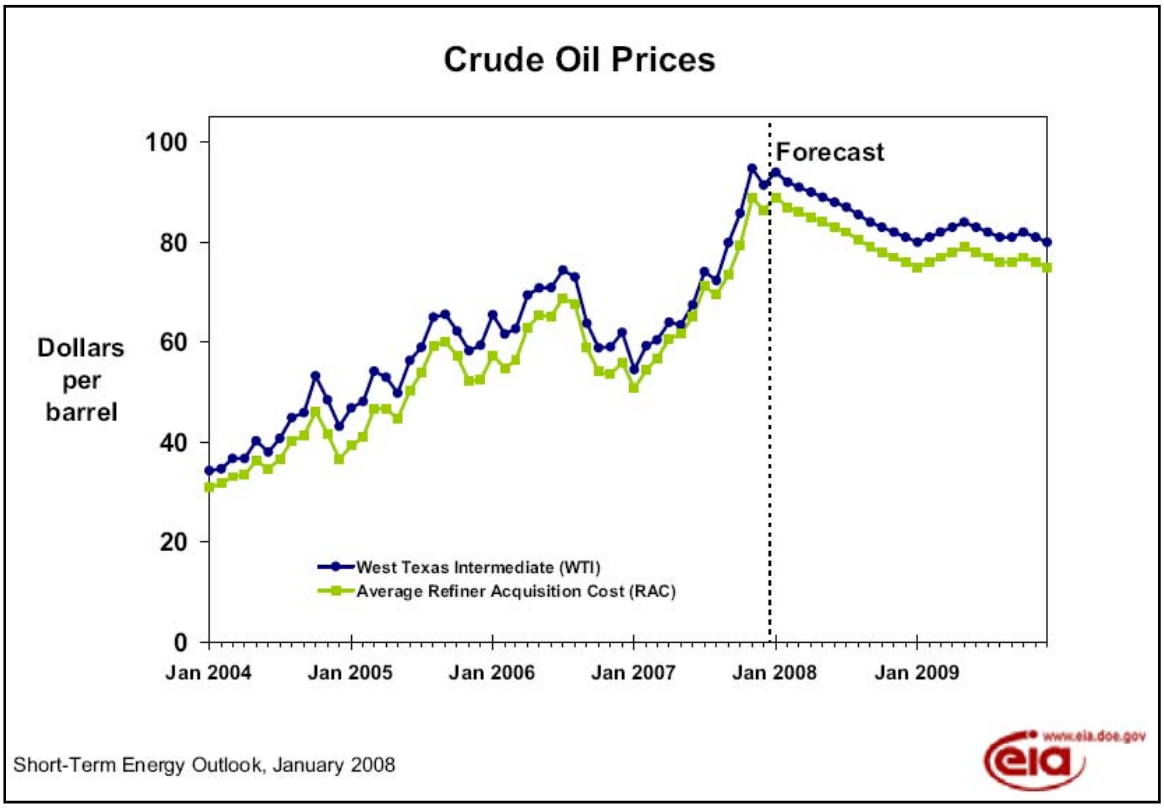


Overall, the U.S. dollar has only declined 10% relative to the currencies of its primary oil suppliers.

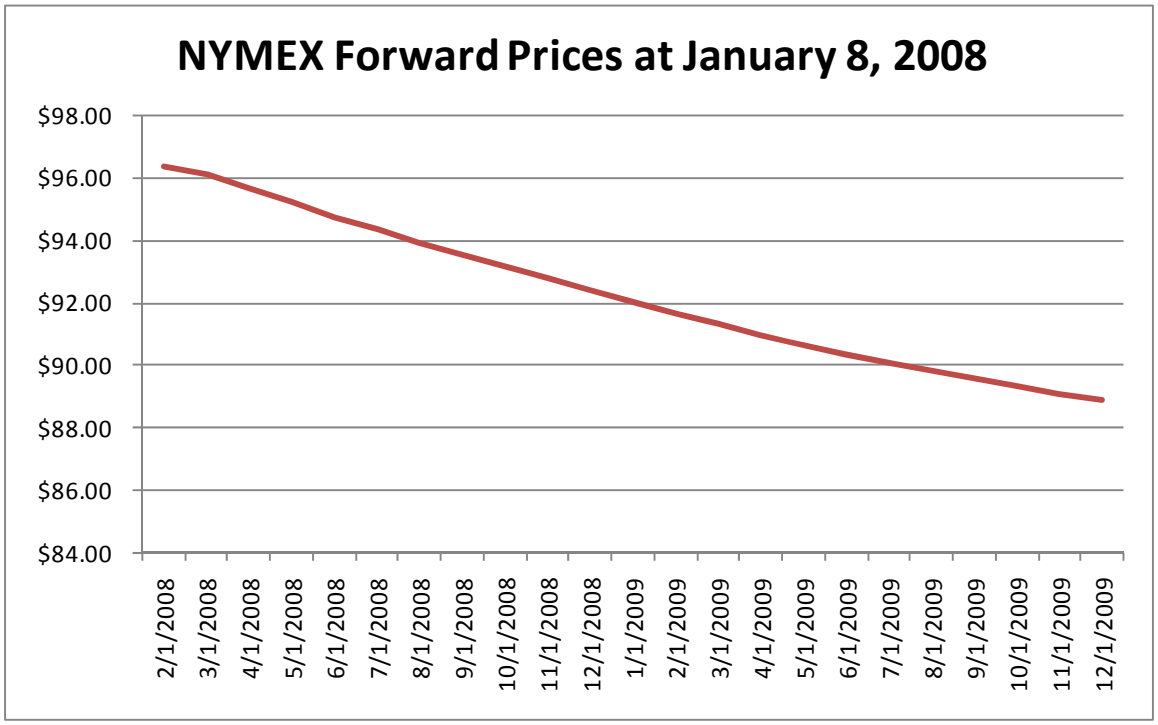
However, shifts in world consumption are a significant factor. A wealthier world consumes more oil. An analysis of the impacts of international demand is a central part of every recent EIA forecast, but regardless of the attention paid to China and other growing markets for oil each EIA forecast has significantly under-run actual oil prices.

The January 2008 EIA forecast, for example, predicted a steady fall in oil prices in 2008, even after a detailed consideration of international demand.[6]

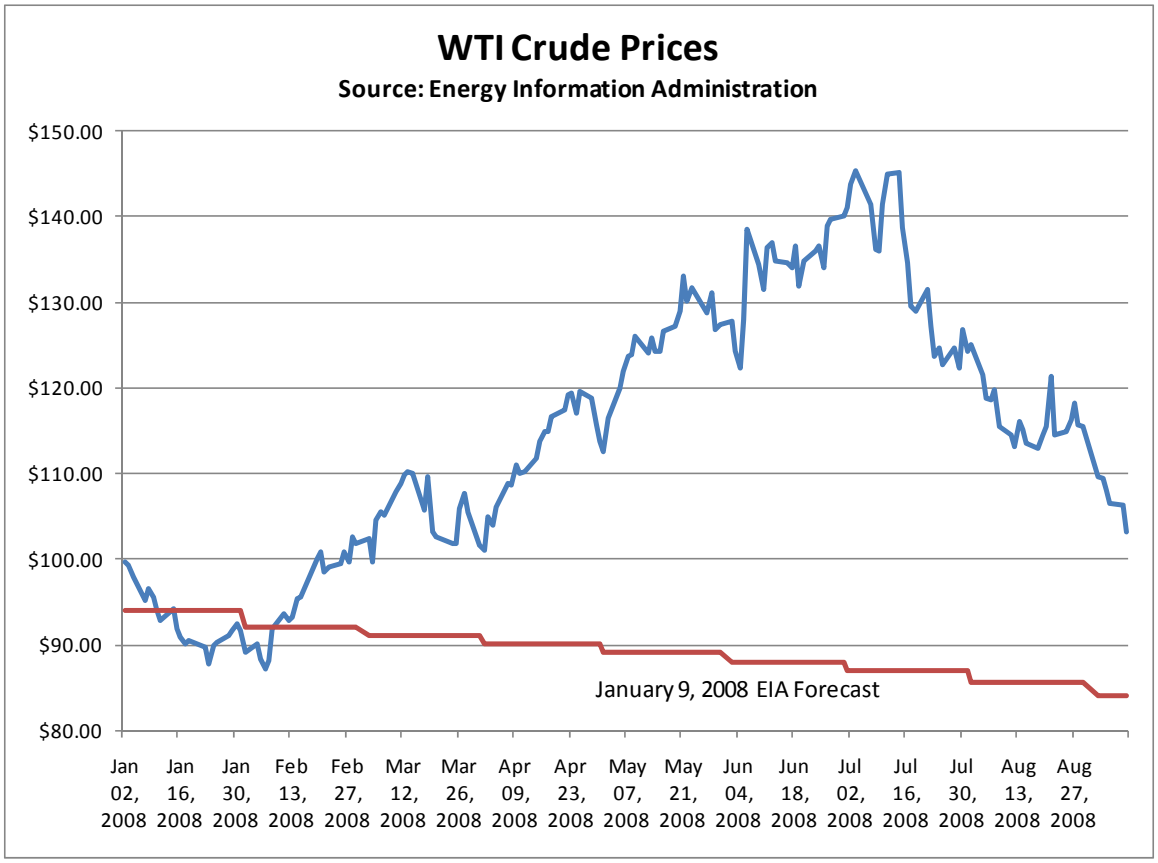
[6]Short Term Energy Outlook, January 8, 2008, page 9.



As noted above, the forward markets have done little better. The NYMEX prices for January 8, 2008 also did not predict a sharp increase in the price of oil.



While the EIA's forecast looked extremely poor by July, in September it began to look quite a bit better. Of course, the difference was the gradual reduction in the July 3, 2008 price spike.



The detailed components of the EIA's forecast including oil production and consumption have been relatively accurate. The EIA overestimated consumption, relative to actual August data, by 1.6%. An offsetting forecast error underestimated production in August by .8%. While these are relatively good forecasts of the world oil market, they would not normally appear to explain a forecasting error of 26.72% in crude oil prices.

Another side of the debate blames the price increases on excess speculation. As yet, there is relatively little data accumulated on the significance of excess speculation in the market for petroleum. As noted above, forward oil markets are subject to partial market surveillance. The one document that offers some insight into the forward market for oil at the NYMEX is an outdated and not easily interpreted report known as the "Commitments of Traders Report."[7] If speculators have taken a commanding

[7] http://www.cftc.gov/marketreports/commitmentsoftraders/index.htm

position by purchasing large forward positions in oil, it is virtually impossible to detect given the CFTC's current powers and procedures.

Still others debate that banks and hedge funds have gambled on the forward oil market, bidding up the price of forward contracts. Their impact on spot prices is not easy to understand unless speculators have either colluded with producers or their activities are obvious enough that the producers are restricting spot sales in order to sell the oil later at higher prices. This argument does not fit with the facts of the July 3 price spike which took place soon after Saudi Arabia announced a significant increase in oil production.[8] (The logical impact of the production increase would have been a reduction in the forward curve for oil.)

A better model for the July 3 price spike would appear to be the Enron market manipulation of the Henry Hub forward market on July 19, 2001.[9] In this case Enron purchased a large quantity of spot gas and took advantage of the price increase to sell at an artificial price in the forward markets. Enron's positions dramatically exceeded the levels that would provide legitimate economic hedges.

There is a strong possibility that the high level of concentration in the spot and forward oil markets have made the market strategies of the principal market participants more significant than fundamentals at least in the short term. This is consistent both with the inability of forecasters and traders to foresee major market movements and also explains the very tight correlation between spot and forward prices.

What Did Happen in June and July 2008?

As noted above, the most significant change in fundamentals, the decision by Saudi Arabia to increase oil production in July, took place immediately before the price spike. The most important events over this two-month period were:

3-Jun	Senator Cantwell chairs a Senate Commerce Committee hearing on oil market manipulation and federal authorities. Experts, including George Soros, testify that the CFTC has been slow to react to the energy crisis and that speculation could be adding as much as 20%-50% to the price of oil per barrel.
13-Jun	Fourth fall in US reserves pushes up oil prices
17-Jun	US Air Transport Association asks Congress to impose new restrictions on "rampant oil

[8]Saudis offer to boost oil production, *USA Today,* June 23, 2008.
[9]U.S. CFTC v. Enron Corporation and Hunter Shively, Complaint for Injunctive and Other Equitable Relief and Civil Monetary Penalties Under the Commodity Exchange Act, March 11, 2003.

	speculation"
17-Jun	Iranian President Mahmoud Ahmadinejad tells OPEC meeting in Isfahan the rise in oil consumption is lower than the growth in production; certain powers are controlling the prices in a fake way for political and economic gains; blames weakening of the US dollar
18-Jun	Bush calls for end to US offshore drilling ban
19-Jun	Movement for the Emancipation of the Niger Delta blows up Chevron pipeline; Chevron declares *force majeure,* halts output by 120,000 bpd; attacks Shell's offshore Bonga oilfield
20-Jun	China raises raise petrol and diesel prices by more than 16% to reduce the gap with soaring international oil prices; Organization of Islamic Conference meeting in Kampala says, "If we (the Islamic world) produce the bulk of the oil, why can't we be party to deciding what is a fair and equitable price? Unless OPEC returns to arrest the situation, mankind will cross the border of self destruction."
23-Jun	Saudi Arabia hosts summit attended by 36 nations in Jeddah; announces plans to increase output by more than 200,000 bpd to 9.7 million starting in July
23-Jun	Movement for the Emancipation of the Niger Delta announces ceasefire
23-Jun	Congressman Stupak holds eight-hour hearing on energy market speculation; experts testify that the explosion of speculation in the oil futures market could be driving up prices from $20 to $60 per barrel
26-Jun	EIA sees $70/b average crude price by 2015
26-Jun	By 402 to 19, the House by-passes legislation to direct the CFTC to use its emergency powers to take immediate action to curb speculation in energy market
27-Jun	Senate Republicans object to Unanimous Consent to pass the House-passed emergency powers legislation
30-Jun	Russian oil exports fell 5.3% to 757mln bbl in Jan.-May; world oil prices drop on unexpected US stockpile rise
9-Jul	House Agriculture Committee holds three hearings on increasing CFTC authority
9-Jul	Iran test-fires nine missiles, including ones capable of hitting Israel
15-Jul	OPEC revises 2008 world oil demand forecast to 1.20 percent from 1.28 percent, citing an economic slowdown and high fuel prices
15-Jul	Majority Leader Reid introduces the Stop Excessive Energy Speculation Act of 2008
15-Jul	Federal Reserve Chairman Ben Bernanke tells Senate Banking Committee that the US economic downturn would prove more persistent, and potentially more severe, than initially thought
22-Jul	Iran's Oil Minister Gholam Hossein Nozari says that it is unnecessary for OPEC to change the current output
22-Jul	US Senate invokes cloture on the motion to proceed to debate on Reid's Stop Excessive Energy Speculation Act of 2008
24-Jul	CFTC Charges Optiver Holding BV, Two Subsidiaries, and High-Ranking Employees with Manipulation of NYMEX Crude Oil, Heating Oil, and Gasoline Futures Contracts

24-Jul	House Agriculture Committee reports the Commodity Markets Transparency and Accountability Act of 2008
25-Jul	US Senate fails to invoke cloture on the Commodity Markets Transparency and Accountability Act of 2008
30-Jul	House fails to pass the Commodity Markets Transparency and Accountability Act of 2008 on a required 2/3 vote on suspension of the rules
30-Jul	White House announces its opposition to legislating new position limits to be developed by the CFTC

While many of these events might affect the price of oil, some of them are more likely to affect long term markets rather than spot transactions. Congressional hearings, for example, presage changes in national policy that will most likely take place at a later date. Civil unrest in Nigeria and production decisions by Saudi Arabia are more likely to have short term impacts. Arguably, the most significant event during this period was the Saudis' June decision to unilaterally increase production in July. However, immediately following this announcement, prices increased. As one trader remarked when the price fell sharply after July 3, "No news is good news, or in this case, no news is bearish news."[10]

To test the statistical significance of these events on the price of oil, we have developed two different models:

Spot:	A regression using EIA weekly data and events with short term impacts to explain spot prices
Forward:	A regression using spot prices and longer term events to explain forward prices.

Time series data, especially from complex markets with unobserved variables, can be difficult to interpret and analyze. A central assumption of classical linear regression is that the error terms are independent and identically distributed. This is seldom the case in economic time series.

Fortunately, time series analytical methods provide reasonable tools that can show useful results for a variety of economic time series that possess a particular kind of non-standard error distribution. Among the most useful of these methods employs the Generalized Autoregressive Conditional Heteroskedastic time series model (GARCH).

[10]Oil Drops Sharply, Associated Press, July 8, 2008.

We considered a model for spot oil prices that used refinery utilization and U.S. petroleum stockpiles as fundamentals. It also included proxy variables for three short term events: the unrest in Nigeria until the ceasefire announcement, the Saudi production increase announcement, and the change in Chinese retail petroleum pricing.

The statistical results for the model are excellent overall with significance far better than the .01 level. Unfortunately, the proxy variables for the three short term events are not significant at any acceptable level. In the careful language of the statistician, we cannot reject the hypothesis that these announcements had no impact on spot oil prices. The results are reproduced in Appendix B.

The forward model used spot prices as a fundamental and the Saudi announcement, the Russian production report, and the period between introduction and the failure to pass the Commodity Markets Transparency and Accountability Act of 2008. The high degree of correlation between NYMEX forward contracts makes results for different delivery periods largely unnecessary. In this study we used forward contracts for delivery in December 2016.

The results for the second regression were also highly significant. As before, the proxy variables for the Saudi production increase and Russian production news were insignificant. The proxy for the short-lived Commodity Markets Transparency and Accountability Act of 2008 was highly significant. Interestingly, this was the only variable that would have affected excess speculation as opposed to supply and demand fundamentals.[11]

One conclusion to be drawn from these statistics is that the news stories cited by pundits to explain the dramatic spike in oil prices have little or no explanatory power. While we can construct a sufficiently complex explanation to explain any result, we have very little evidence that explains the massive spike that occurred on July 3. A second conclusion is that the best forecast for future prices in 2016 is the daily spot price today. This is likely to occur only if the daily spot price has more information than any set of fundamentals.

[11]No alternative specifications of these models were analyzed. This decision was not made lightly. Statistical tests are based on the submission of a specific hypothesis for testing. Repeated testing of alternative hypotheses is a practice almost certain to eventually stumble on an apparently significant result.

Pivotal Suppliers

Paul Samuelson taught generations of undergraduates, "It takes more than the existence of a competitor to create perfect competition." As a general rule, a competitive market will require more excess capacity than the market share of the largest market participant. Stated more directly, a market where supply and demand are in close balance, with no quickly available substitutes, is in danger of seeing non-economic pricing if one supplier can withhold enough to create a temporary shortage. As we also learned in college, the student with the car gets to choose the movie.

The economic term for markets where the decisions of one supplier can set prices is called monopoly or oligopoly. The supplier with the ability to set prices is called the pivotal supplier.

We should, but we do not, have data to help determine whether we currently have one or more pivotal suppliers in the oil markets. We do know that if pivotal suppliers exist, the market decisions of the pivotal supplier will be more important than changes in fundamentals. Like the grocery consumer in a small town with few choices, the best forecast of the pivotal suppliers' strategy is the current price. If the pivotal suppliers are aggressively setting high prices, a wise trader would forecast this state of affairs to continue to dominate the market for the immediate future.

A trader who based its forward price quotes on fundamentals would quickly go bankrupt in the face of a pivotal supplier. A sudden 14% price increase unmatched by market fundamentals means that the market strategy has changed. An intelligent trader would factor the market strategy into long term prices. This is exactly the behavior that occurred during the July 3 price spike.

If data on spot market transactions was routinely collected and reported, as it is in other energy markets, we would be able to check whether there is evidence of increasing market concentration. If well head price data was routinely collected and reported, we could check whether the increased prices were being paid directly to oil producers or to pivotal suppliers in the U.S. market.

We can glean some information about market concentration and markups relative to well head prices from CFTC and industry sources. The information is not sufficient to conclusively answer the question, but it is interesting enough to propose the need for additional investigation by the FTC, the CFTC, or the EIA.

As mentioned above, the CFTC provides a weekly Commitments of Traders Report CoT). A recent report (July 29, 2008) is reproduced below.

CRUDE OIL, LIGHT SWEET - NEW YORK MERCANTILE EXCHANGE — Code-067651
Commitments of Traders - Futures Only, July 29, 2008

	Total	Reportable Positions							Nonreportable Positions	
	Open Interest	Non-Commercial Long	Non-Commercial Short	Non-Commercial Spreading	Commercial Long	Commercial Short	Total Long	Total Short	Long	Short
		(CONTRACTS OF 1,000 BARRELS)								
All	1,220,537	201,622	202,282	328,020	629,322	616,483	1,158,964	1,146,785	61,573	73,752
Old	1,220,537	201,622	202,282	328,020	629,322	616,483	1,158,964	1,146,785	61,573	73,752
Other	0	0	0	0	0	0	0	0	0	0
		Changes in Commitments from: July 22, 2008								
	3,162	3,603	623	5,381	-11,943	-10,045	-2,959	-4,041	6,121	7,203
		Percent of Open Interest Represented by Each Category of Trader								
All	100.0	16.5	16.6	26.9	51.6	50.5	95.0	94.0	5.0	6.0
Old	100.0	16.5	16.6	26.9	51.6	50.5	95.0	94.0	5.0	6.0
Other	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	# Traders	Number of Traders in Each Category								
All	307	88	111	126	82	99	248	264		
Old	307	88	111	126	82	99	248	264		
Other	0	0	0	0	0	0	0	0		

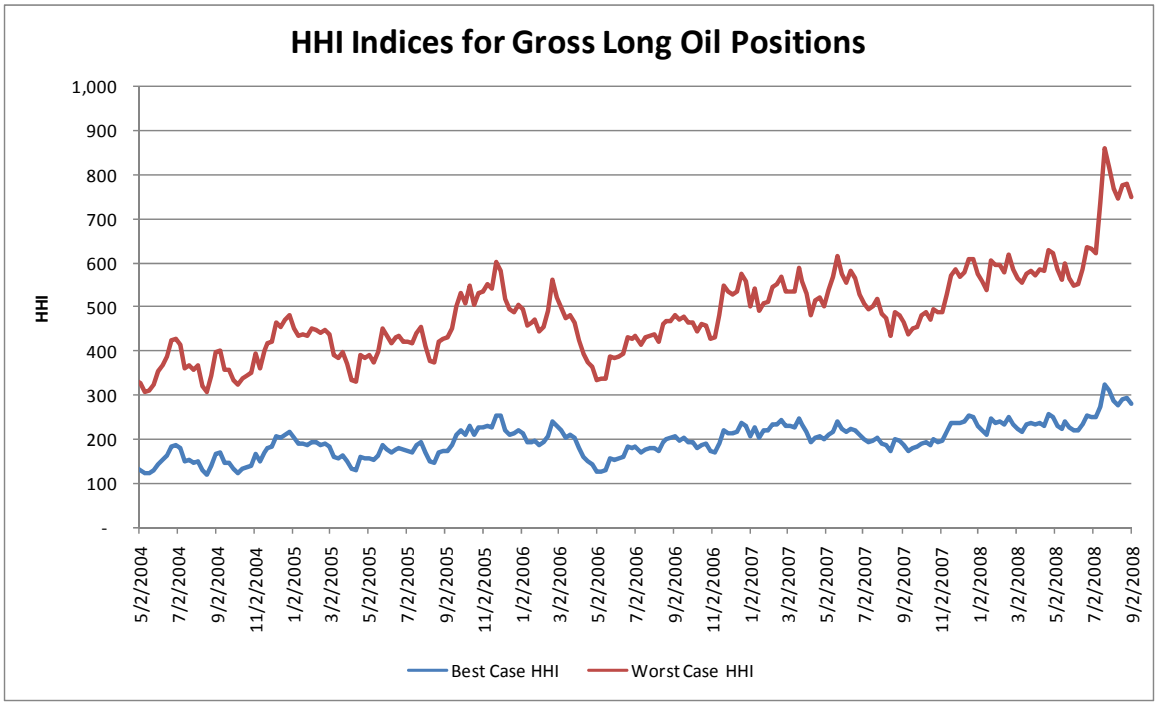
	Percent of Open Interest Held by the Indicated Number of the Largest Traders							
	By Gross Position				By Net Position			
	4 or Less Traders		8 or Less Traders		4 or Less Traders		8 or Less Traders	
	Long:	Short	Long	Short:	Long	Short	Long	Short
All	32.8	22.8	43.4	33.0	15.8	8.2	20.5	11.9
Old	32.8	22.8	43.4	33.0	15.8	8.2	20.5	11.9
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

The report is neither user-friendly nor substantially detailed. The last block of data in the report shows the degree to which the four largest traders dominate the "long" or supply positions. In the July 29, 2008 report the top four traders held 32.8% of the long positions.

One of the problems with this report is that the measure of concentration used by the CFTC differs from the standard measure in use by the FTC, the U.S. Department of Justice and the FERC. While one is not necessarily superior, the more widely used Herfindahl-Hirschman Index (HHI) has the virtue of being more readily comprehended.[12]

While it is possible to translate the Commitments of Traders data into the HHI, it is not possible to get a specific value. The best that can be accomplished from the CFTC data is a range where, mathematically, the actual HHI will be found. The following chart shows the HHI range for NYMEX crude since 2005.

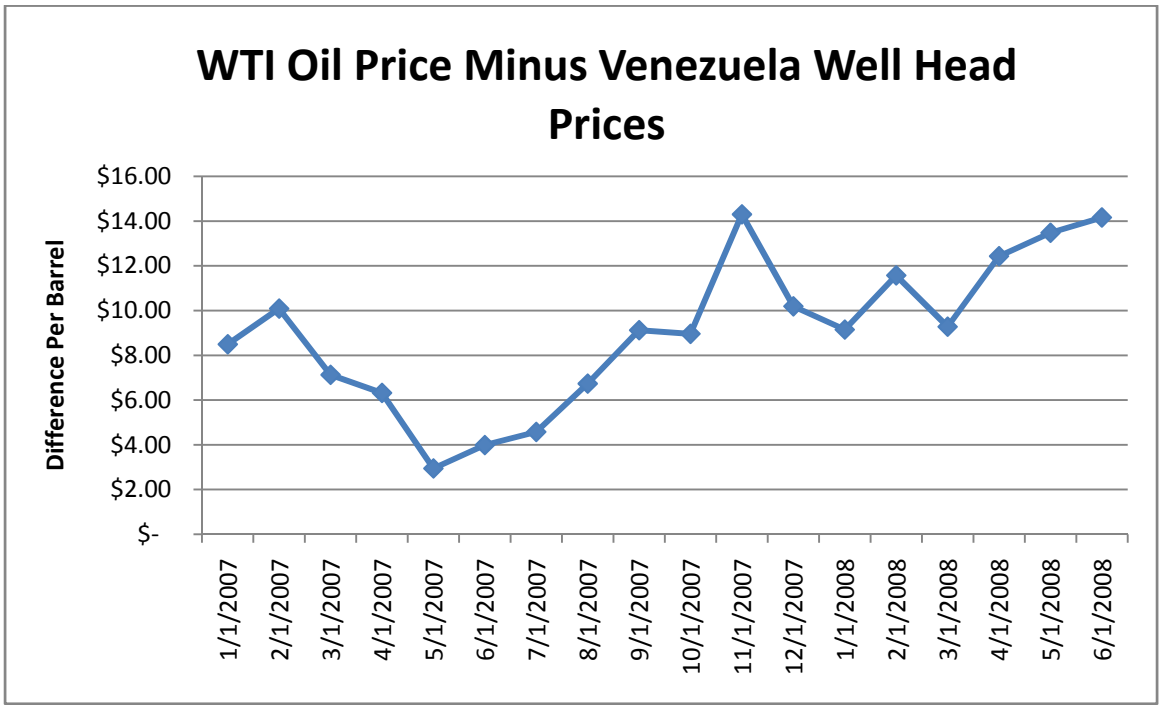
[12]A simple explanation of the HHI can be found at http://www.usdoj.gov/atr/public/testimony/hhi.htm



Neither the low nor the high HHI bounds are close to the U.S. Department of Justice guidelines for a concentrated industry. In fact, given the lack of reporting outside of the NYMEX, a substantial degree of market concentration could occur that would never show up in the Commitment of Traders Report. It is significant, however, that the HHI appears to be increasing over time, with a significant increase in July 2008. In the worst case, it is mathematically possible that one trader could hold as much as one quarter of the open long positions on the NYMEX from the data reported at the CFTC. If so, this trader would have a commanding position and could well be a pivotal supplier.

A pivotal supplier would also have the ability to increase oil prices above the well head prices paid to suppliers. Recent statements by OPEC representatives clearly appear to indicate that they have some concerns in this direction.[13] Supplier production and pricing is not transparent. Saudi Arabia, the world's largest producer, provides relatively little data and the Venezuelan government's estimates of crude oil well head receipts differ markedly from the EIA's estimates for Venezuela.

[13]See for example the comments of OPEC Secretary General Abdullah al-Badri on June 24, 2008 reported in OPEC president sees no easing of oil prices, Xinhua News Agency, June 28, 2008.



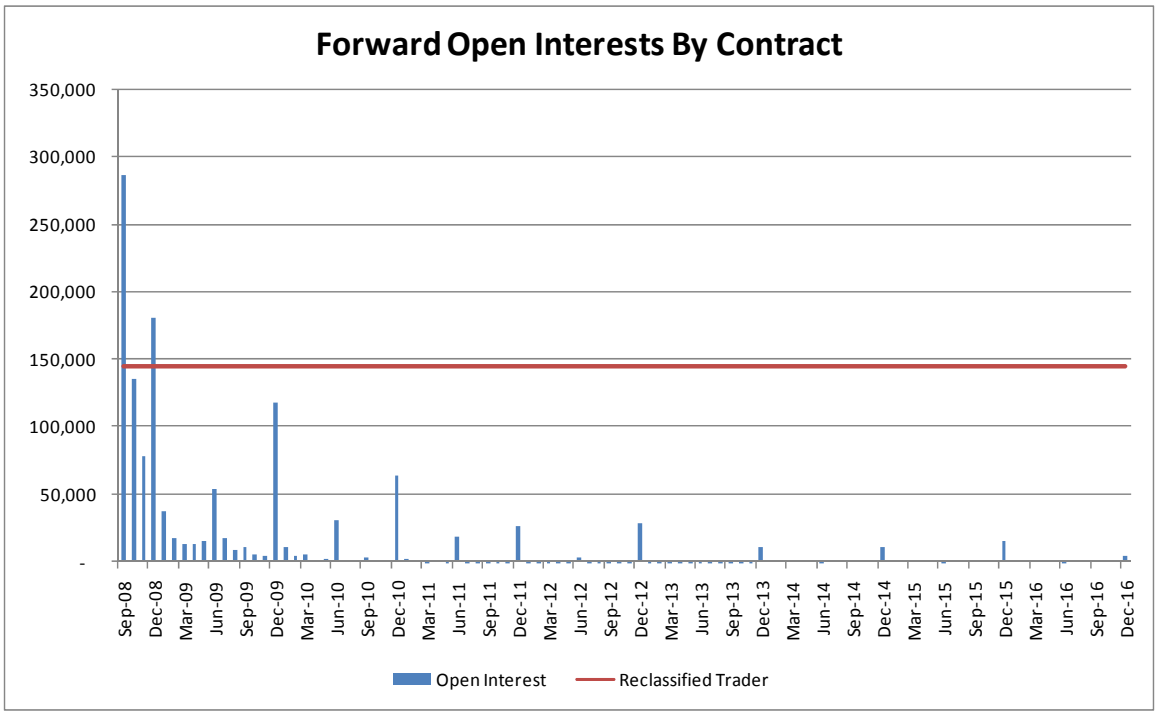
Though the data indicates an increasing differential, Venezuelan crude is a very different product from U.S. crude, so a number of alternative explanations could be made for the differential.

Vitol

On July 18, 2008, the CFTC reassigned Vitol from commercial to non-commercial status. An unusual opportunity to analyze the impact of a single trader on the CoT Report took place recently when the CFTC reclassified a single firm from Commercial to Non-Commercial. The reclassified report indicates that the trader held 144,856 open interests. These positions are classified as "spread positions" since they represent long positions in one contract and corresponding short positions in another contract. Since the total open positions in the NYMEX crude market is only 1,249,914, it indicates that this trader has more than 10% of the NYMEX market. More significantly, Vitol had 25% of the long positions owned by non-commercial interests (the CFTC's term for speculators).

There is no evidence that Vitol was involved in any suspicious activities. The evidence only shows that the levels of concentration are significantly higher than those suggested by the CoT report. It is also worth noting that Vitol's physical deliveries of

oil are 1.4 billion barrels of oil, a vast amount, considering that U.S. oil imports in 2007 were 4.9 billion barrels. Although CFTC reports do not indicate which contracts were held by Vitol, the scale of its positions was larger than all but two of the NYMEX contracts in sweet crude:



This corroborates the HHI calculations above that a substantial degree of concentration may be present in the NYMEX forward markets.

The Market Risk Premium

The enormous increase of speculation over the last few years has coincided with an increase in the price of commodities. A metaphor might be real estate: if speculators buy up attractive shorefront property in order to profit from a projected price increase, they will hoard a scarce commodity and increase the price of the property. This is not a bad metaphor, but it is not entirely correct. The key difference is that a forward contract for oil does not actually tie up physical oil before delivery. A contract for future supply is simply a promise to provide 1,000 barrels at a set price on a given date. Most market participants plan to sell or "offset" the contract before delivery. In theory, a perfectly workable forward market might be very large compared to the spot market and still not raise prices, as long as the market is characterized by

the rules of perfect competition (many suppliers, many consumers, transparency, and freedom of entry and exit). To make the real estate metaphor more precise, imagine that the speculator proposes selling a promise to supply beach property at a given price at a future date. This promise would not tie up beach property or cause a shortage in the short run.

Of course, the central question is "what price?" When you buy insurance, the insurance company figures the risk it is insuring against and then adds a profit to cover its risks. This is the risk premium. The offering price for a forward contract is equal to the forecasted price plus a risk premium.

Many students (and some traders, in my experience) are surprised to learn that risk premiums can be positive or negative. This appears counterintuitive until they realize that since they view themselves as customers of the insurance company, they almost always see a positive risk premium.

An example of how such premiums can vary involves a farm and a bakery. The farmer is always "long" on wheat. While the farmer is unlikely to run out of wheat, he faces an uncertain future in terms of price. He would be happy to offer to exchange his wheat for a fixed price even if he has to take a small loss against his best guess of future prices. In selling his forward contract, he is willing to accept a negative risk premium. The bakery has the opposite problem since it must know the cost of the bread it plans to bake. The baker is happy to pay a positive premium over the expected price to be able to plan ahead. When the farmer and the baker meet to set the price of their forward contract, the final risk premium will be set by haggling. A savvy farmer might well receive a positive risk premium simply because he is a better negotiator or, vice versa, the baker might enjoy the upper hand.

What happens if the two cannot agree? They can call their brokers at the Chicago Board of Trade and place orders for their forward contracts in the wheat market. Their orders, and thousands of others, will show up in the trading pit where a price will be hammered out by the willingness of speculators – non-commercial traders in the parlance of the CFTC – to take risks in the future price of wheat.

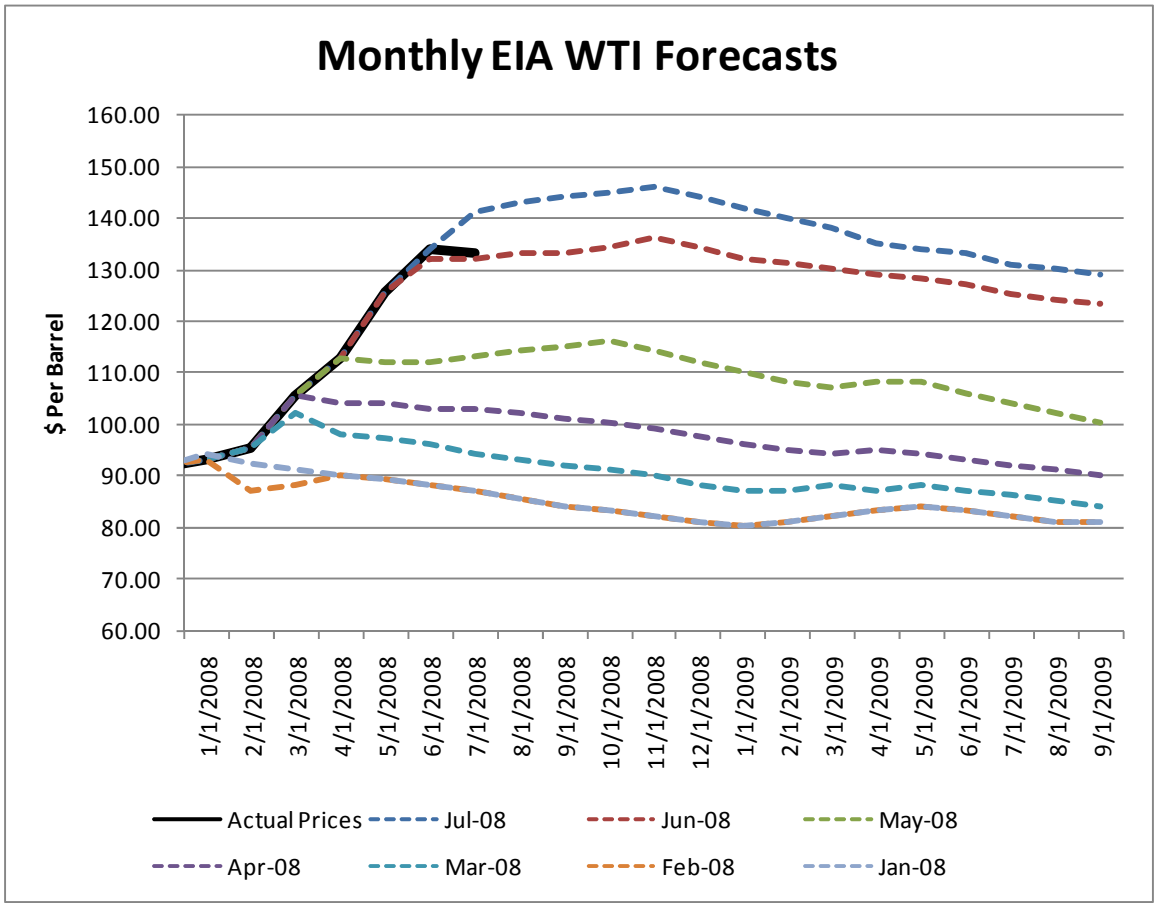
Speculators carry a portfolio of risks. When possible, they will be hedged against a similar commodity. Since not all risks can be hedged, the speculator will end up with a Value At Risk (VAR) that it must be willing to accept in exchange for a profit. If the VAR is large, the speculator will require a larger profit. If demand for a specific contract is high, the speculator will end up with a large unhedged position, its VAR

will expand enormously, and it will either demand a much larger risk premium or withdraw from further trading in that commodity.

In the Western Market Crisis of 2000-2001 the VAR became so large that all of the speculators abandoned the NYMEX forward markets on the West Coast. Halfway through the crisis, open interests on both NYMEX exchanges went to zero. Interestingly, Enron and others offered a negative risk premium at the height of the crisis – they sold forward contracts at less than the expected price. We now know that this was because their own forecasts recognized that the crisis would not last long and they needed to sell their forward contracts before the rest of the market discovered that prices had been manipulated.

A simple rule of thumb for estimating risk premiums is to compare the forward contract prices with the actual spot prices in the month of delivery. Since forecast errors tend to cancel out over time, the residual, positive or negative, is the risk premium. Unfortunately, this simple technique works poorly where spot and forward prices are increasing over a long period. Given the past two years in the WTI crude market, this rule of thumb estimate is unworkable.

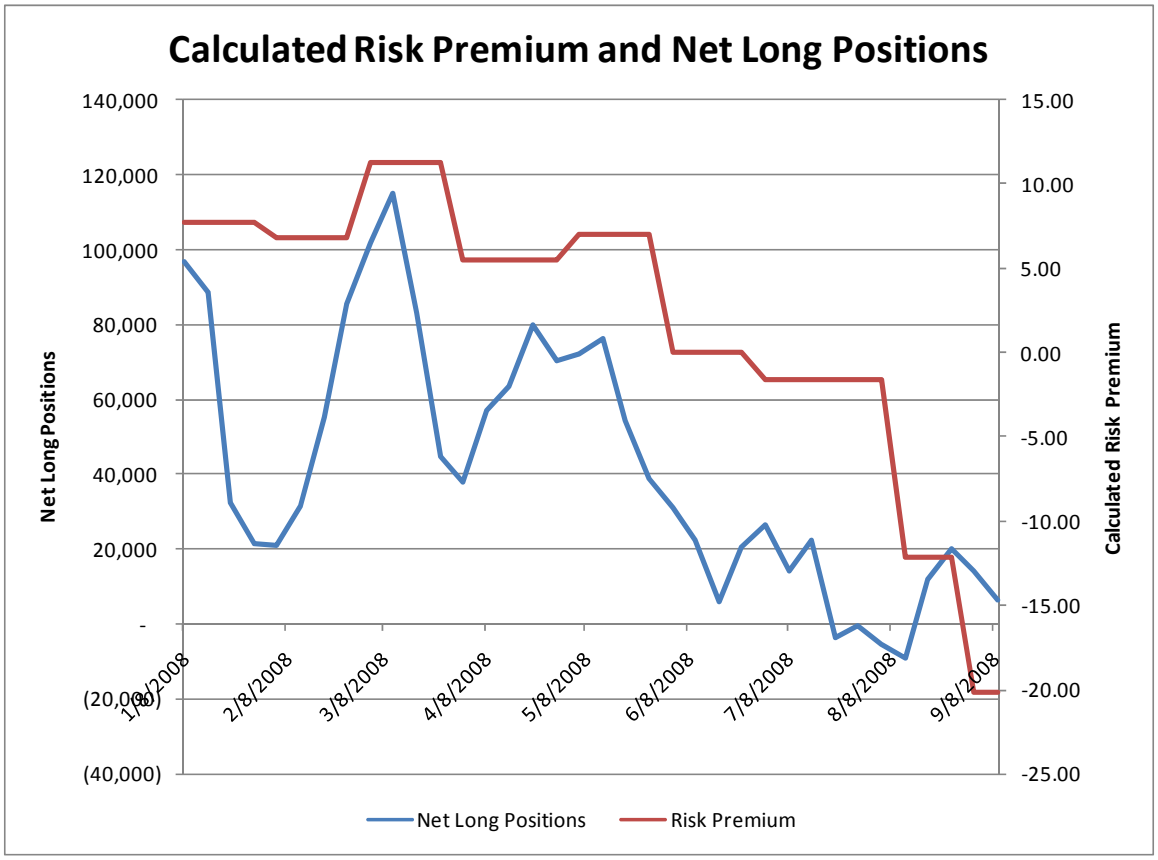
In a perfect world, we could view the difference in prices from the EIA Short Term Forecast and the NYMEX forward curve to estimate the risk premium. As mentioned above, the forward price is equal to the forecast plus the risk premium. Unfortunately, the EIA forecast lacks substantial credibility. Over the past seven months, the EIA has apparently calibrated its forecasts to spot. While this avoids recognition that EIA's analysis of fundamentals is not matching spot prices, it also reveals a lack of precision in the estimating process:



While the EIA forecasts are not perfect, they do allow us to compare the forecasted prices with the NYMEX forward curve. According to economic theory, the forecast is the actual price expectation. The NYMEX forward curve is the price traders require to take a forward position. The difference between the two is an estimate of the risk premium. These risk premiums range from $11.00 to a negative $4.00. It is suggestive, although not definitive, that the risk premium calculated in this fashion has fallen during the same period in 2008 where the substantial long positions were liquidated by the non-commercial traders.[14]

[14]There are more sophisticated tools. One approach is to see if the variance of forward price estimates increases or decreases the forward curve. Statistically, the term for this is GARCH in Mean. While the mathematics can be complex, the explanation is simple. If the relationship between spot and forward prices becomes difficult to forecast, this will increase the VAR and require a larger risk premium.

This approach does not allow numerical results for small datasets: significant amounts of data are required to perform the calculations. The results from the beginning of January 2008 to the end of July 2008 indicate that the risk premium has become negative over this period.



Overall, non-commercial market participants liquidated their long positions in 2008. As they liquidated their positions, the risk premium fell approximately $30 per barrel.

Spot Forward Gambits

In July of 2001, Hunter Shively, a mid-level Enron gas trader, initiated an exploit to manipulate Henry Hub natural gas futures on the NYMEX. The CFTC complaint provides a blueprint on how to conduct a spot forward gambit:

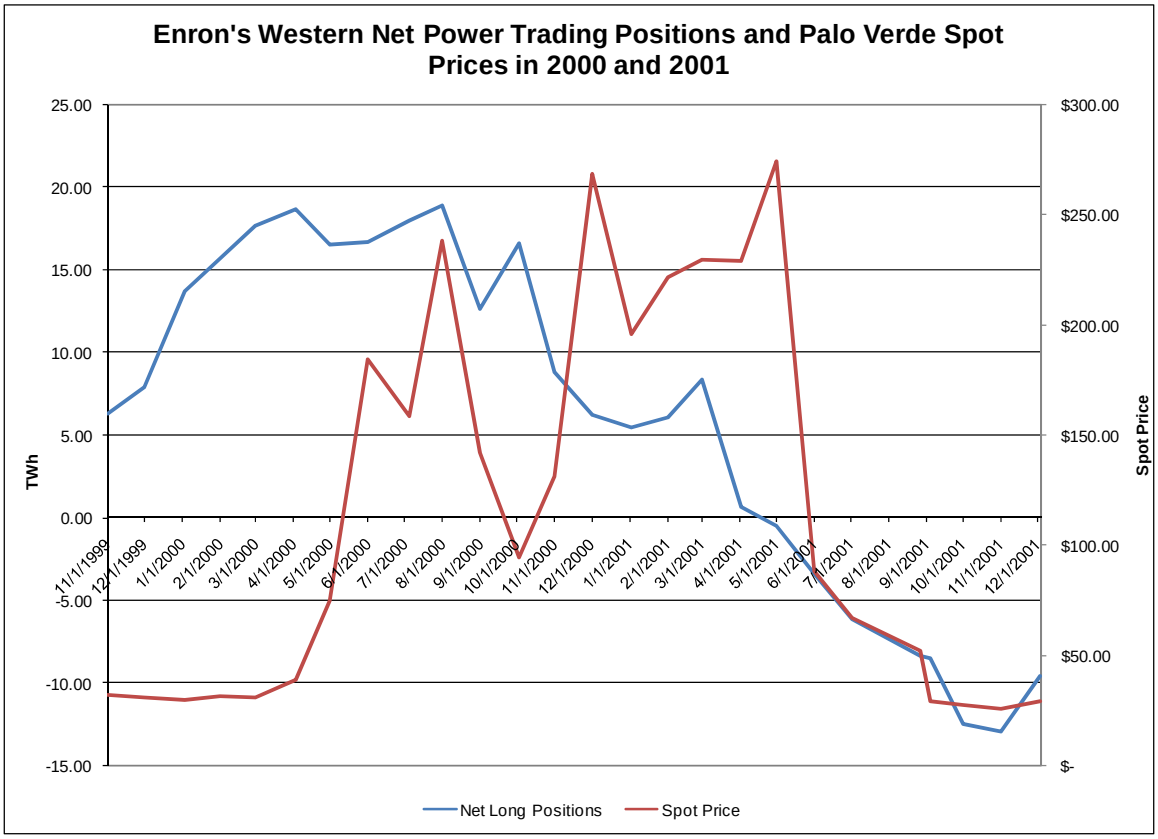
> B. The Manipulative Scheme
>
> 23. On or about July 19, 2001, Shively, with the assistance of at least one other Enron natural gas trader, engaged in a scheme which manipulated prices in the HH Spot Market, and had a direct and adverse affect on NYMEX Henry Hub August 2001 Futures, including causing prices in NYMEX Henry Hub Futures to become artificial.

24. Defendants' manipulative scheme involved a plan among Enron traders to purchase an extraordinarily large amount of HM Spot Market natural gas within a short period of time (the "Manipulative Scheme").
25. Defendants effectuated their Manipulative Scheme through a variety of acts and practices that were intended to, and did, manipulate prices in the HH Spot Market. NYMEX August 2001 Henry Hub Futures were affected by Defendants' Manipulative Scheme as well, including causing NYMEX Henry Hub Futures prices to become artificial.
26. Enlisting the assistance of the East Desk Enron trader who managed the HH Spot Markel on EOL, Defendants bought a very large amount of natural gas in the HH Spot Market in a very short period of time, approximately fifteen minutes, in the morning of July 19, 2001, causing prices to rise artificially.
27. Immediately following the pre-arranged buying spree, Enron began unwinding its HH Spot Market position and prices declined in that market. Prices in the HH Spot Market declined in the first ten minutes while Enron unwound its position.
28. Before Shively implemented the scheme, other Central Desk traders learned that Shively was going over to the East Desk to bid up the HH Spot Market. The head of Enron's NYMEX desk was also informed of Shively's plan. Later, at some point during Enron's HH Spot Market trading, an Enron trader indicated to the Central Desk that the East Desk was "bidding up" the HH Spot Market. Shortly thereafter, a trader at the Central Desk stated that the East Desk was going to sell the HH Spot Market.
29. To ensure the participation of the Enron East Desk trader who managed the HH Spot Market on EOL, Shively agreed to cover any trading losses that trader incurred by participating in the Manipulative Scheme.
30. On or about July 19, 2001, to cover the losses of that East Desk trader, Shively directed that over $80,000 be transferred from an administrative trading account he controlled to the trading account of the Enron East Desk trader who agreed to participate in the Manipulative Scheme.

> 31. Shively acted in the scope of his employment in carrying out and directing the conduct of other Enron employees in furtherance of the Manipulative Scheme.[15]

A similar, though less well-documented exploit was conducted by Timothy Belden in the winter of 1999. Enron's senior west coast trader gradually accumulated a portfolio for forward contracts. His position was so large that it became the dominant risk position for the entire corporation. While this speculative position would have appeared foolhardy based on the fundamentals (even Enron's own forecasts indicated that it was a foolish speculation), it was not nearly as speculative as it appeared. Belden's trading position showed prescience. His liquidation of his long position was even more prescient since he sold his inventory just before the California energy crisis ended in June 2001. We now know his prescience was no more or less than the product of his market manipulation efforts. If FERC's Electric Quarterly Report had been in existence in 1999, Belden's dramatic gamble would have been detected quite early and the Western Market Crisis might well have been averted.

[15]Docket H-03-909 CFTC Complaint, March 12, 2003, pages 5-6.



In summary, a powerful case can be made for market power, not fundamentals, as a contributing factor to the oil price spike on July 3, 2008. The spike has the following characteristics that cast doubt on fundamentals and speculation as causes:

1. Short duration, reflecting no specific supply disruption or increase in demand.
2. Events in June, to the degree they were present, should have lowered the prices in July, not increased them.
3. A large speculative position was liquidated just before the spike.
4. Long term prices followed the very brief spike in lockstep fashion.
5. Evidence exists, both anecdotally and statistically, for increased concentration in the NYMEX long positions.
6. Evidence exists that may indicate an increasing differential between some well head receipts and market prices.

Five Recommendations

1. The FTC and the CFTC should accumulate data on spot and forward markets for oil that will allow the identification of market shares. If supply and demand are tight, this is exactly the situation where economic theory would predict the existence of pivotal suppliers. Given the probability that market participants have a very good idea of the market shares and pricing, there is no logical public policy reason why this information should not be accumulated and provided to regulators and decision-makers.

2. The current chaotic state of CFTC market surveillance should be corrected. At the moment, the department store detective only watches one exit. This is worse than useless because it provides the illusion of market surveillance while allowing sufficient room for any offender to escape observation.

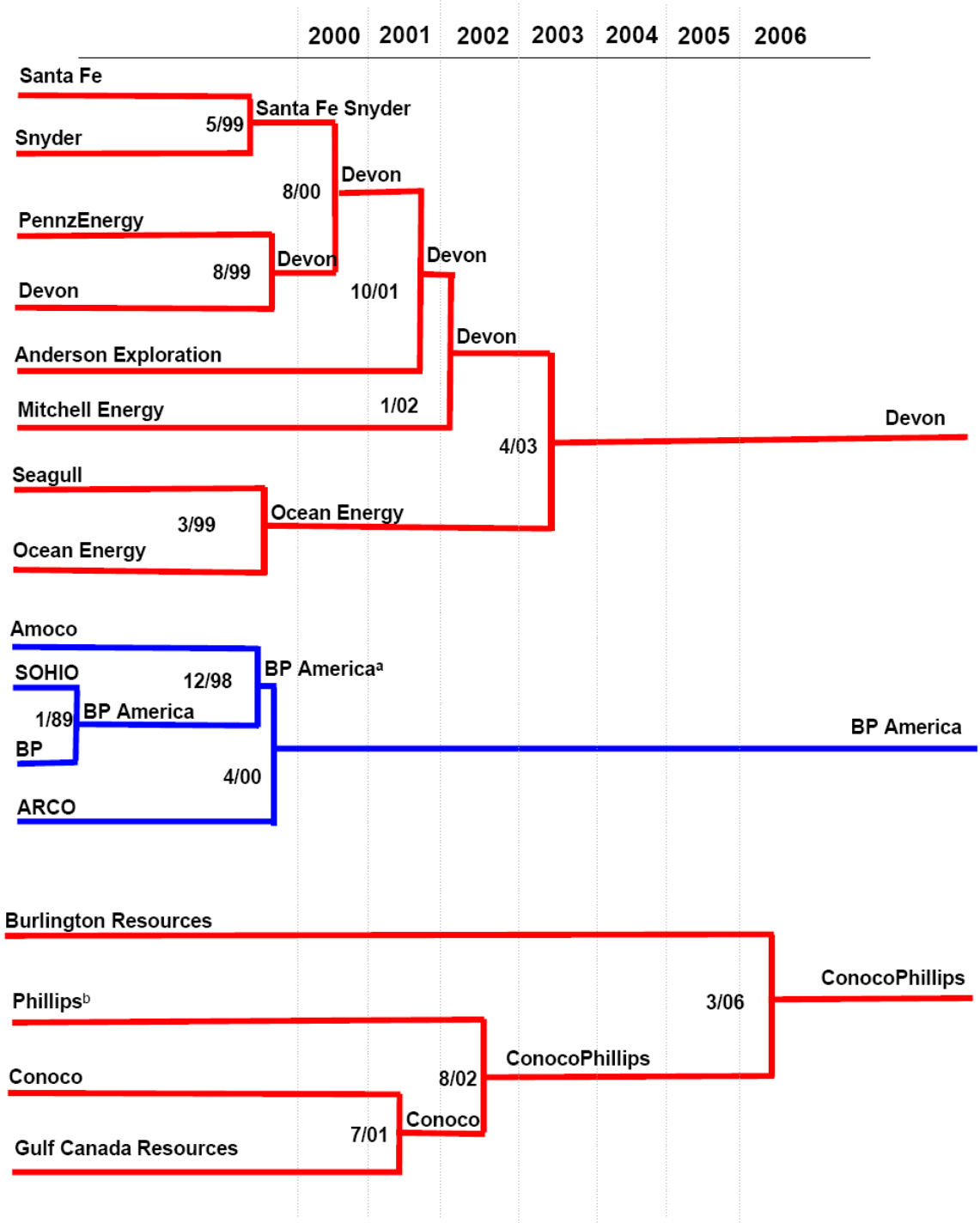
3. The Commitments of Traders reports should be expanded to incorporate the same concepts and measures used elsewhere in the industry. Specifically, the report should provide HHI for both NYMEX and ICE. It is important to include data on forward trades in the OTC transactions. In sum, we will only be able to detect the influence of excess speculation if we have the measure of the entire market, not just a portion.

4. The CFTC should adapt FERC's detailed Electric Quarterly Report to oil transactions. It is logical that reports for electricity would be useful in evaluating the situation in oil.

5. The EIA should develop a methodology for reporting well head prices for the ten largest suppliers to the U.S. This report should be issued on the same frequency as other EIA reports so that regulators and decision-makers can make contemporaneous judgments concerning price spikes.

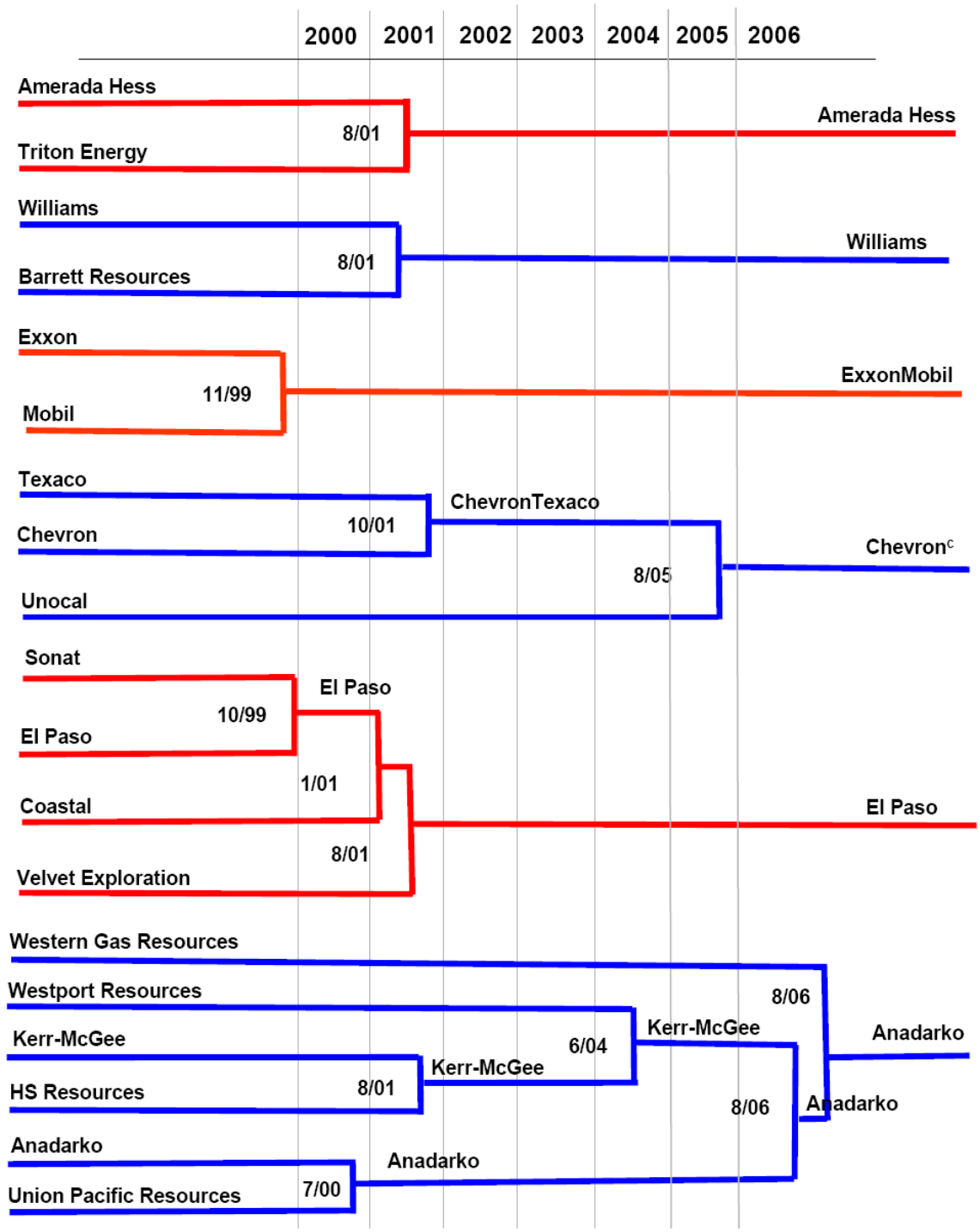
Appendix A

Genealogy of Major U.S. Oil and Gas Producers



Footnote and source notes are at the bottom of these figures.

Genealogy of Major U.S. Oil and Gas Producers (continued)



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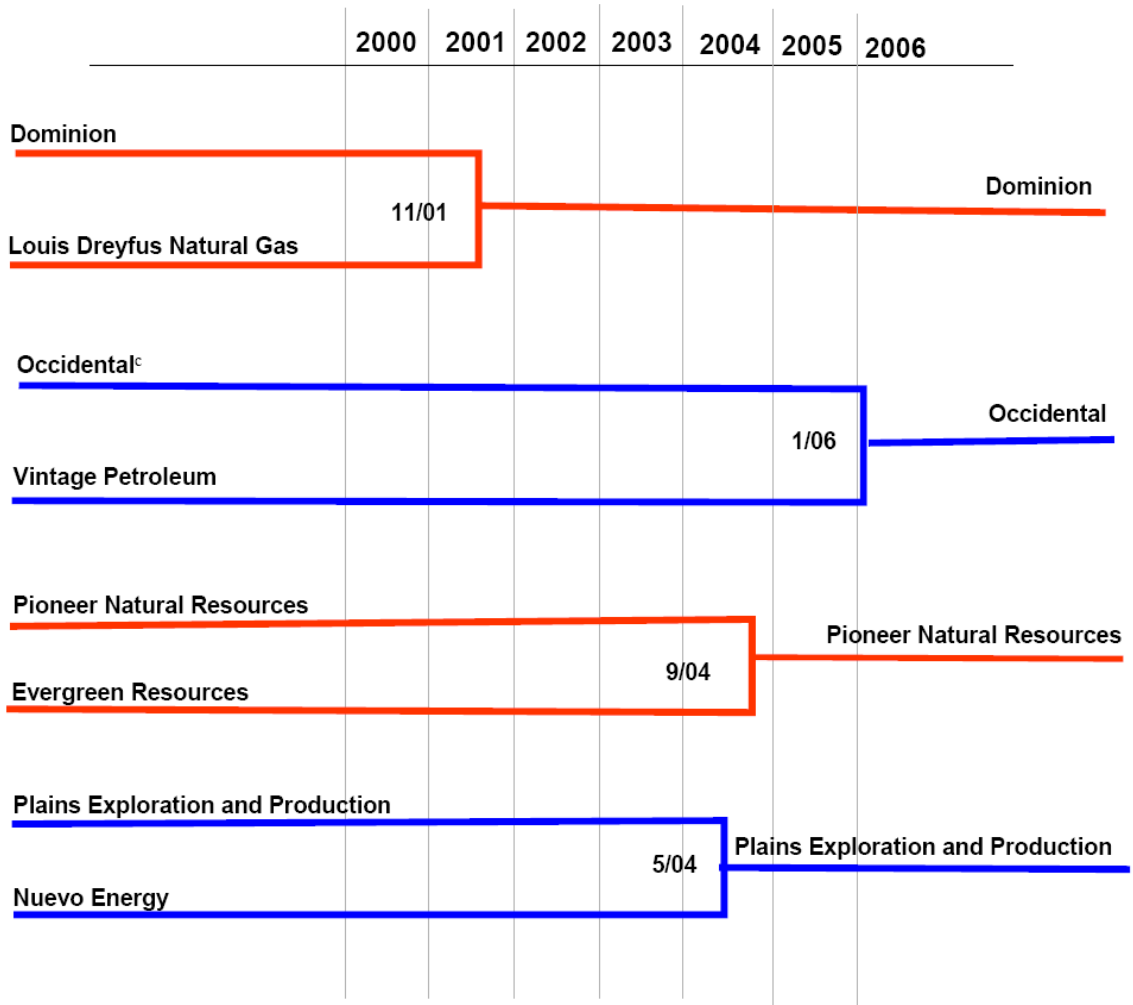
Genealogy of Major U.S. Oil and Gas Producers (continued)



[a]The company resulting from BP's merger with Amoco was called BP Amoco initially (including at the time of the acquisition of ARCO), but subsequently reverted to BP America.
[a]Phillips acquired control of ARCO's Alaska assets from BP America in April 2000 as part of the consent agreement that was part of the U.S. Federal Trade Commission's approval of BP Amoco's acquisition of ARCO in April 2000.
[b]ChevronTexaco renamed itself Chevron on May 9, 2005.
[c]Occidental acquired control of Altura Energy, a limited partnership owned by BP Amoco and Royal Dutch/Shell (through Shell Oil) at approximately the same time as it acquired ARCO Long Beach. Altura Energy was the largest oil producer in the state of Texas at the time of the transaction. See Energy Information Administration, "Aspects of Occidental Petroleum's Purchase of Altura Energy and ARCO Long Beach" (April 18, 2000). This is available on the Internet at http://www.eia.doe.gov/emeu/finance/mergers/oxyindex.html (as of November 28, 2006).
Sources: Company news releases and other public disclosures.

Appendix B Statistical Results

ARCH family regression

Sample: 1 - 43 — Number of obs = 43
Distribution: Gaussian — Wald chi2(5) = 170.88
Log likelihood = -116.7598 — Prob > chi2 = 0.0000

	Coef.	OPG Std. Err.	z	P>|z|	[99% Conf.	Interval]
spot						
utilization	4.808101	.6070383	7.92	0.000	3.244474	6.371728
stocks	-.000444	.0001157	-3.84	0.000	-.000742	-.000146
emancipati~r	-1.23323	1.32833	-0.93	0.353	-4.654782	2.188322
saudiincre~e	.1071586	11585.26	0.00	1.000	-29841.54	29841.75
chinawillr~i	6.527547	11585.76	0.00	1.000	-29836.41	29849.46
_cons	449.2628	228.2324	1.97	0.049	-138.6248	1037.15
ARCH						
arch						
L1.	1.352897	.5912113	2.29	0.022	-.1699627	2.875756
_cons	1.868268	3.037674	0.62	0.539	-5.956261	9.692798

ARCH family regression

Sample: 1 - 43 — Number of obs = 43
Distribution: Gaussian — Wald chi2(4) = 5226.78
Log likelihood = -84.65834 — Prob > chi2 = 0.0000

	Coef.	OPG Std. Err.	z	P>|z|	[99% Conf.	Interval]
dec16						
spot	.7629325	.0227878	33.48	0.000	.7042351	.8216299
saudiincre~e	-.6430962	.6771591	-0.95	0.342	-2.387342	1.10115
russianpro~n	-1.482364	.6302147	-2.35	0.019	-3.10569	.1409614
commoditym~y	-5.703386	.4450542	-12.82	0.000	-6.84977	-4.557003
_cons	33.44583	3.083366	10.85	0.000	25.5036	41.38805
ARCH						
arch						
L1.	2.147227	.7847901	2.74	0.006	.1257415	4.168712
_cons	.3651205	.4092933	0.89	0.372	-.6891493	1.41939