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April 23, 2010

David Stawick, Secretary
Commodity Futures Trading Commission
Three Lafayette Centre
1155 21st St NW
Washington, D.C. 20581

Re: Proposed Federal Speculative Position Limits for Referenced Energy Contracts and Associated Regulations, 75 Fed. Reg. 4144 (Jan. 26, 2010)

Dear Mr. Stawick:

My name is Philip K. Verleger, Jr. I submit the attached comments on the CFTC proposed regulations on position limits in certain energy futures as requested in the CFTC notice published in the *Federal Register* on January 26, 2010.

I am the David Mitchell EnCana Professor of Global Strategy and International Management at the Haskayne School of Business at the University of Calgary and president and owner of PKVerleger LLC, a private consulting company that publishes reports on energy commodity markets. I am also a Senior Advisor to The Brattle Group, an internationally recognized consulting firm.

I submit these comments as a private citizen and not on behalf of any interested party. I also submit these comments as a student of energy commodity markets. I have been following the growth of these markets since 1982. Since that time, I have written two books and many articles on their development.

My paper, "The Evolution of Oil as a Commodity" in Gordon et al. (1987) was the first major academic paper to document the emergence of oil as a commodity and one of the first to predict the consequences. I have tracked the development of oil and other energy sources as they emerged from their cosseted, price-controlled, and integrated world to become true commodities ever since.

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Sincerely,

Philip K. Verleger
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Comments on Federal Speculative Position Limits for Referenced Energy Contracts and Associated Regulations, 75 Fed. Reg. 4144 (Jan. 26, 2010)[1]

Philip K. Verleger, Jr.

April 23, 2010

I submit these comments on the CFTC's proposed federal speculative position limits in response to the Commission's request for comments as published in the *Federal Register* on January 26, 2010.[2]

Here I will discuss the interaction of physical commodity markets with futures markets. I will show that the growth of oil commodity markets has promoted the accumulation of inventories and helped stabilize prices. I will also show that the success of these markets has helped achieve a long-term goal of energy policy. Finally I will comment on the positive and negative impacts of the proposed regulations with regard to energy policy goals.

I. Conclusions

This analysis begins by noting that consuming countries have focused their energy policies for 30 years now on accumulating petroleum inventories. Governments of these na-

[1] I submit these comments as a professional economist and not on behalf of any interested party. I do not trade any commodity futures contract now. I also have no financial interest in any party directly trading commodity futures. I have received no financial support for this paper from any interested party. I have, however, benefited from comments from several interested parties who have separately filed responses with the Commission. Those comments have contributed to the clarity of this document, not its conclusions.

[2] See "Federal Speculative Position Limits for Referenced Energy Contracts and Associated Regulations," *Federal Register* 75, No. 16, January 26, 2010, pp. 4144-4172.

tions have spent billions building strategic reserves that total more than 1.2 billion barrels. The stocks have been built up in the belief, supported by economic theory, that higher inventories tend to dampen price fluctuations.

In recent years, passive investors such as pension funds have allocated a portion of their assets to buying commodity futures to diversify portfolios. This diversification has had the ancillary effect of promoting the accumulation of privately held oil inventories. The rise in these stocks has tended to reduce price variations, as predicted by economic theory. Thus the activities of passive investors have supported the goals of energy policy.

At the same time, the inventory accumulation stimulated by passive investment has not affected oil prices because a cartel controls the level of global oil output. That organization has boosted oil production to compensate for the oil going into stocks.

Under these circumstances, I conclude that imposing position limits as proposed by the Commodity Futures Trading Commission would work against the goals of energy policy and the objective of price stability. Inventories will decline if the regulations are adopted as proposed and price volatility will increase. Consumers will pay higher prices. Firms that use options to hedge (producers and consumers) will see costs rise as well.

The effect of the proposed CFTC rules on global inventories may be muted somewhat by the fact that exchanges in Europe are not bound by them. Thus hedging activity and passive investment may move abroad. Oil stocks will follow. U.S. consumers might need to

rely on inventories held thousands of miles away in the event of a demand surge. In fact, this has already happened. On one occasion in 2005, the need to pull supply from such distant supplies cost consumers more than $10 billion.

II. The Long-Term Goals of Energy Policy

Energy policy has been an important issue for overall economic policy for 37 years now. Following the 1973 Arab oil embargo, the United States and other OECD members met at the Washington Oil Summit in 1974. Willrich and Conant (1977) noted the resulting agreement "in principal for an Integrated Energy Program (IEP) which combined provisions to share oil supplies and restrain demand during supply emergencies with longer range efforts to conserve energy and develop alternative energy sources" (p. 200). While the phrase "price volatility" does not appear in their discussion, the steps taken at the Summit were clearly focused on reducing it.

Since its inception in 1974, one of the key elements of the International Energy Agency (IEA) has been the creation of government-controlled inventories, or strategic stocks. Between 1974 and 2010, IEA member countries have accumulated more than 1.2 billion barrels of petroleum stocks that can be used to address market disruptions. The value of these holdings exceeds $100 billion at current market prices. The U.S. government alone has accumulated more than 700 million barrels of crude oil, which are held in salt domes along the Gulf Coast.

Strategic stocks have been sold into the oil market on several occasions over the last 20 years. They were first used in January 1991 as coalition forces attacked the Iraqi invaders occupying Kuwait. Strategic stocks were also released in the fall of 2005 when the U.S. petroleum industry was devastated by Hurricanes Katrina and Rita. On both occasions, the release helped ease prices.

More generally, economists have often sought to moderate commodity price volatility. Newbery and Stiglitz (1981) conducted a detailed examination of the potential for stabilizing commodity prices. They concluded that price volatility has macroeconomic costs and hence found that stable prices promote growth. They also found that providing improved access to futures markets and expanding these markets both help achieve price stabilization.

The research of Stiglitz and Newbery builds on the pioneering work of Keynes (1942), who complained that raw materials prices tended to be very volatile, making it impossible to manage production of these commodities. As Keynes noted,

> The whole world is now conscious of the grave consequences of this defect [price volatility] in the international competitive system. Apart from the adverse effect on trade stability of the truly frightful *price* fluctuations which we have learnet [sic] to accept as normal, they impose obstacles to the holding of an adequate *quantity* of stock, the eventual effects of which are not less injurious. For although the difficulty of rapidly altering the

> scale of output, especially of agricultural crops, leads to what appear to be huge stocks at the bottom of the market, nevertheless, when the turn of the tide comes, stocks turn out to be insufficient for the reason that it just as difficult to rapidly increase the scale of delivered output as it had been to diminish it. Prices rush up, uneconomic and excessive output is stimulated, and the seeds are sown for a subsequent collapse (Keynes, 1942, pp. 113-114).

Keynes proposed a solution to this problem, suggesting that governments cooperate to create commodity buffer stocks and manage global inventories of key commodities. Following the end of World War II, his proposals were tried for a number of commodities, including coffee and rubber. International agreements were negotiated, buffer stocks accumulated, and production agreements established. In every case, the agreements eventually collapsed. However, the failure of these agreements has not prevented government officials from pursuing price stabilization to this day.

Indeed, energy producers and consumers met at the end of March 2010 in Cancun to discuss the stabilization of energy prices. At the meeting, Lord Hunt, the UK's Minister of State for Energy and Climate Change, summarized a commonly held view when he said, "Oil price volatility has very negative consequences for the world as a whole. We need stable and efficient energy markets. We need them both in terms of ensuring future in-

vestment and development but also need them in helping the globe as a whole recover from the financial problems that we see in the last two years."[3]

Unfortunately, energy policy officials across the globe are uniformly uninformed of the role played by commodity markets. Invariably, speculators and outside participants are attacked for their activities when the evidence shows that these "outsiders" actually promote price stability. Apparently, almost all energy policy officials yearn for the days when a few companies controlled oil supplies, refining, and distribution through a well-run oligopoly. This system was best described by the various writers who attacked it in the late 1960s and early 1970s. One academic, MIT's Morris Adelman (1972), documented the oligopoly's operation in detail.

III. The Role of Futures Markets

Today's energy market is well understood by those versed in agricultural economics but clearly not comprehended by those making energy policy in most international institutions.[4] Stated simply, futures markets allow traders to move commodities from one period to a future period. This is accomplished by buying a "lot" of the physical commodity, storing it, and selling a futures contract against the stored lot. The process is called hedging.

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[3] "UK Backs IEF [International Energy Forum] Charter; Sees Benefit for World Economy: Minister," *Platts Online*, March 31, 2010.

[4] The U.S. Department of Energy has been an exception. At the recent IEF meeting in Cancun, the United States' representative said that energy prices should be set by supply and demand. This view differed from those expressed by apparently every other person who attended the meetings.

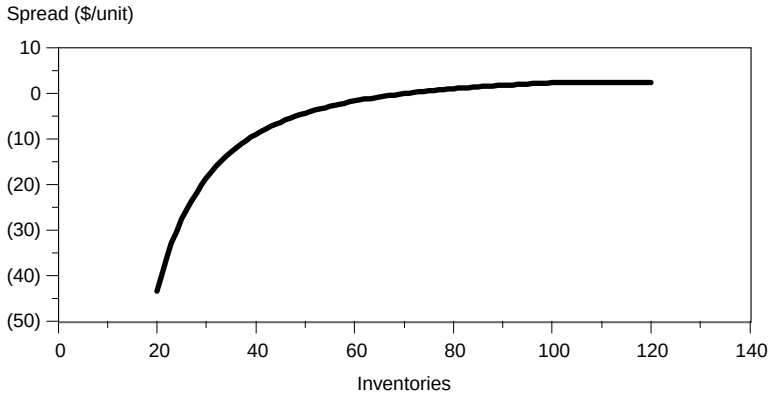
Working (1962) did a thorough analysis of the explanations for such economic behavior. Williams (1986) updated this exploration of why economic agents might hold inventories.

Research by Working (1949) and Brennan (1958) demonstrated empirically that a nonlinear relationship, called the supply of storage, exists between commodity inventories held by economic agents and price spreads. In this relationship, inventories tend to rise as the forward price increases relative to the cash price. Williams (1986) offered an abstract illustration of this correlation, shown here as Figure 1.

The supply-of-storage concept described by Working and Brennan fits within an economic theory of arbitrage. Under the theory, the profit earned by purchasing a physical commodity, storing it, and selling a future against it increases as the futures price rises relative to the cash price.

The return to storage also rises as the cost of holding stocks declines and/or as the cost of financing the inventory decreases. Williams (2001) reported that

Figure 1
Theoretical Supply-of-Storage Curve —
Relationship between Inventories and Price Spreads



Source: Jeffrey C. Williams, The Economic Function of Futures Markets (Cambridge, England: Cambridge University Press, 1986).

a nonlinear negative relationship was found for every commodity studied (p. 763) and then explained that "commercial firms, nationwide or worldwide, look to the spreads in the principal futures market as the guide to their inventory decisions" (p. 764).

This view of the role of futures markets has been largely ignored in the financial literature. Instead, futures contracts have been viewed as a financial instrument similar to equity or debt instruments. Recent literature on futures markets for physical commodities almost totally skips over the potential profitability of hedging. Yet reports in the daily financial press document many instances where firms have earned very large returns by purchasing physical commodities, selling futures, and holding the commodity for delivery.[5]

Empirical economic research—as well as the academic work of Working, Williams, and Brennan—documents the linkage between conditions on futures markets and inventory levels. Inventories build as the forward price rises relative to the cash price (described as increasing contango). Inventories fall when the price offered for supplies delivered in the future declines relative to the cash price. (The term "in backwardation" is used to describe a market where futures prices are less than cash prices.)

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[5] Perhaps the most visible story concerns U.S. bank JPMorgan. On June 3, 2009, Bloomberg reported that JPMorgan Chase had hired a newly built supertanker to store heating oil off Malta. The ship could hold about 273,000 tons. Bloomberg calculated that JPMorgan Chase paid 3.85 to 4.5 percent to store the oil from June to August 2009. Bloomberg also calculated that JPMorgan Chase paid $553 per ton to buy heating oil in Europe and could have sold the oil for delivery in August for $580 per ton. Deducting storage costs, JPMorgan's profit was probably around $20 per ton if the oil was sold for delivery in August. The return on the investment for the three-month period would have been well in excess of 100 percent at annual rates if JPMorgan Chase financed 90 percent of the cost through the Federal Reserve. See Alaric Nightingale, "JPMorgan Hires Supertanker for Storage, Brokers Say," Bloomberg, June 3, 2009, for details on the transaction.

IV. The Bilateral Nature of Futures Contracts

The word "bilateral" rarely appears in papers or books on futures markets. Yet the fundamental foundation of a futures market is the two-sided nature of contracts. For every buyer, there must be a seller. This fact distinguishes futures markets from equity markets.

Futures contracts also carry an obligation. Most energy futures contracts obligate the contract buyer to take delivery of a specified amount of the commodity when the contract expires unless the buyer "offsets" its position by selling the futures contract before the expiration date. Most energy futures contracts obligate the contract seller to deliver a specified amount of the commodity when the contract expires unless the seller "offsets" its position by purchasing a contract.[6]

In equity markets, a firm's board of directors determines the number of its shares outstanding. The board of Google®, for example, and only the board of Google decides how many shares of Google are available to the market at any time. This can change as holders of restricted stock grants are allowed to sell shares. However, the timing of the sale is set by the grant offered by the board.

In contrast, the number of contracts outstanding in a commodity is determined by the number of agents willing to sell the commodity at any one time and the number of agents

[6] Some contracts are settled by cash payments. "Cash-settled contracts" require the buyer to pay the seller an amount determined in the physical market at the end of trading on the day the contract expires rather than the buyer taking delivery. In practice, most futures contracts are settled by offset rather than delivery.

willing to buy contracts. An increased interest in buying futures will only lead to an increased number of contracts outstanding if the buying interest is matched by an increased willingness to sell.

For example, at the end of March 2010, there were approximately 41,000 contracts outstanding on feeder cattle. There would be no increase in the number of contracts outstanding tomorrow were buyers to suddenly offer to purchase another 100,000 contracts unless sellers of a like number of contracts could be found. No doubt, some sellers would appear as prices were bid higher. However, it is not clear whether enough sellers would step up to meet the demand for the additional 100,000 contracts or if the buyers would be willing to pay the higher price required to realize the purchase.

This point is often overlooked. Below, I note that those who advocate using commodities as an alternative investment have failed to understand that increased demand for futures contracts from such investors must change price relationships. Again and again, economists seem to ignore the fact that forward prices will rise relative to cash prices if a large number of buyers of forward contracts enter the market.

The bilateral nature of futures contracts also extends to options on futures contracts. Options give the buyer the right to be long or short a futures contract but not the obligation. For example, an airline can purchase calls on heating oil with a strike price of $2 per gallon for November 2010 delivery, assuming of course that some other party is willing to

sell calls to the airline.[7] If heating oil rises above $2 per gallon, the airline can demand that the seller hand over a futures contract for November 2010 with a purchase price of $2 per gallon. The airline can then take delivery of heating oil for that price. However, in practice, the airline would take the profit (the difference between the market price and the $2 per gallon), while offsetting the contract. If prices fell below $2 per gallon, the airline would allow the option to expire.

Producers will purchase puts to protect against a fall in prices. For example, a producer could buy puts on crude oil for delivery in March 2011 with strike prices of $80 per barrel. If prices fell below $80, the producer could demand that the seller transfer futures contracts based on the $80 price into their accounts.

The bilateral parties in options trading will buy futures if they write calls or sell futures if they write puts. The number of contracts bought or sold relative to the number of options written will be determined by the difference between the market price and the strike price (price spread), the number of weeks or months until the option expires (duration), and the expected price variance (called the "implied volatility"). The finance literature is replete with books and articles purporting to show the variation in how many futures should be bought or sold to cover a specific options position given the price spread, duration, and implied volatility in the market.

[7] Heating oil is the petroleum product traded on futures markets most similar to jet fuel. Airlines can also purchase over-the-counter options on jet fuel. The financial institutions writing such options frequently hedge their obligation with heating oil futures.

V. The Linkage between Inventories and Price Spreads in Energy Markets

Research by Working (1949), Brennan (1958), and Williams (1986) has quantified the linkage between inventory levels and price spreads. As noted above, the relationship is nonlinear. When inventories are high relative to demand, forward prices tend to trade at a premium relative to cash prices, a condition called contango. Furthermore, under the non-linear relationship, large changes in inventories tend to lead to small price changes.

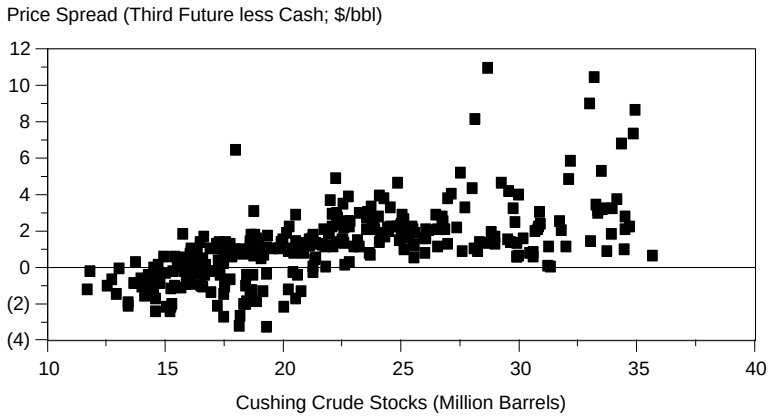
In contrast, this well-understood research shows that cash prices tend to trade at a premium when inventories are below normal levels, a condition called backwardation. The nonlinear relationship also dictates that small changes in inventories lead to large changes in spot prices when stocks are low.

Location also matters, although there is as yet little published academic research on the subject. At least in the case of energy commodities, the linkage between inventories and price spreads is better when one examines the limited amounts of energy held in the delivery market rather than the national or global inventory levels. The increase in correlation is explained here by the increased ease of delivery. Firms seem more willing to accumulate inventories if they can be hedged at a nearby delivery location.

The nonlinear relationships postulated by Working, Brennan, and Williams are observed in the oil market. Figures 2 through 4 provide clear illustrations of the effect. Figure 2 focuses on crude. The graph shows the inventory/price spread relationship observed for privately held U.S. crude inventories in Cushing, Oklahoma.

Cushing is the delivery location for crude oil under the NYMEX futures contract. Firms holding a long position and going to delivery must take delivery of the oil in Cushing unless an alternative delivery location can be negotiated in the few days after futures trading ends. Firms that are short futures contracts must make delivery in Cushing unless they can negotiate an alternative delivery in the first days after the contract expires.

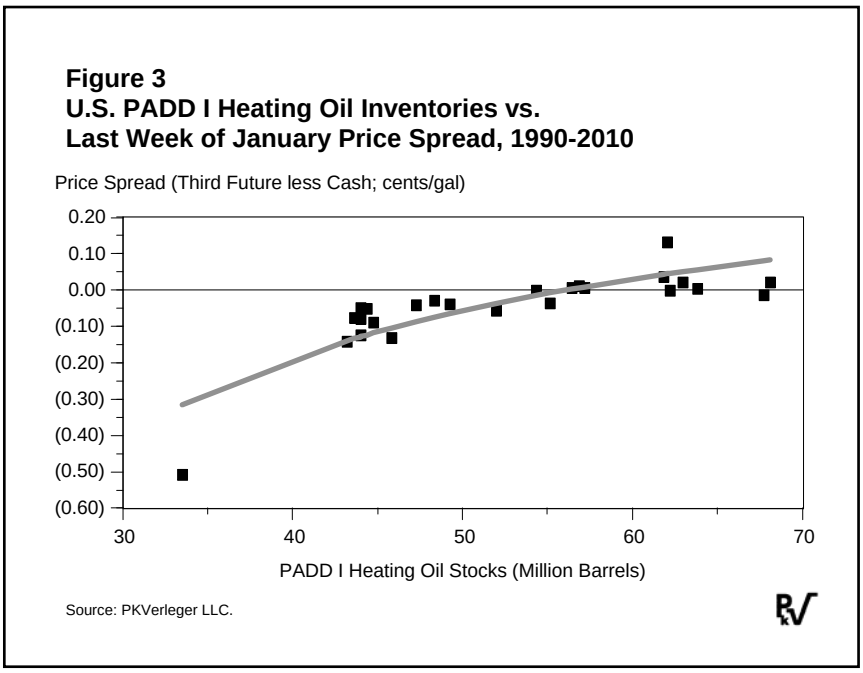
Figure 2
Privately Held U.S. Crude Oil Inventories in Cushing (OK) vs. Price Spread, 1990-2010



Source: PKVerleger LLC.

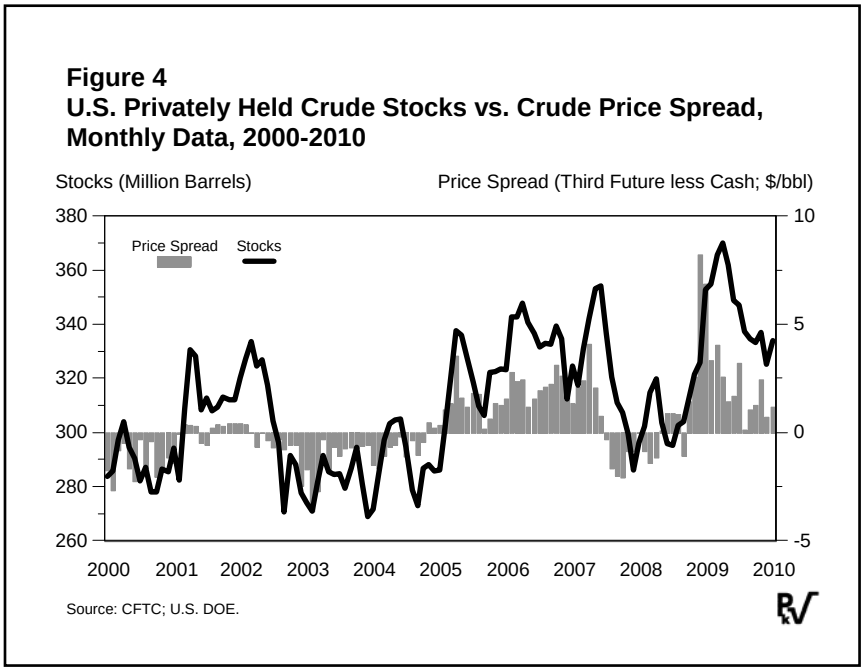
A similar relationship exists for heating oil. Figure 3 (page 14) compares heating oil inventories held in the delivery market (technically referred to as PADD I or Petroleum

Administration for Defense District I) with price spreads. These inventories are held in East Coast facilities near the delivery location.



For heating oil, we show observations for the last week of January from 1990 through 2010. Data are presented in this manner because with heating oil, there is a significant fluctuation in stocks over the course of a year. Again one observes that Working's conjecture is validated.

This last conclusion is reinforced by Figure 4. Figure 4 compares U.S. crude oil inventories with crude oil price spreads from 2000 to 2010. The price



spread (third future less cash) is graphed against the right vertical axis and is shown as vertical bars while the level of privately held crude oil inventories is graphed against the left vertical axis and shown as a line. The graph demonstrates that inventories tend to be higher when price spreads are positive than when spreads are negative.

VI. Oil Commodity Markets: A Persistent Lack of Longs

The bilateral nature of commodity markets requires that every short position be matched by a long position. Historically, there have been a plethora of "shorts." Unfortunately, longs have not been as plentiful. The absence of longs has tended to push markets into backwardation and discourage innovatory accumulation.

Gasoline provides an ideal example of the problem. In theory, there should be a group of consumers willing to purchase volumes of fixed-price gasoline. Clearly, astute consumers could be convinced to buy gasoline in advance because they no doubt know of the historical tendency of gasoline prices to rise in summer as driving increases. After all, many heating oil and natural gas consumers have been willing to "lock in" winter heating fuel prices in the fall. A similar strategy would make sense for gasoline.

However, a large number of impediments prevent consumers from adopting this approach. First, most consumers patronize more than one gasoline station. In fact, they most likely stop at whatever station is convenient when their vehicle's tank nears empty. As Theodore Levitt (1960) noted in his seminal paper "Marketing Myopia,"

> It can be shown that motorists strongly dislike the bother, delay and expense of buying gasoline. People actually do not buy gasoline. They cannot taste it, feel it, appreciate it, or really test it. What they buy is the right to continue driving their car. The gas station is like a tax collector to whom people are compelled to pay a periodic toll as the price of using their car.[8]

Consumers may join golf clubs, yacht clubs, or churches, but few show much affinity for gasoline suppliers unless the supplier offers something of value, such as a discount. Recently, Wal-Mart and Costco have gained market share here. Other integrated companies have also won customer loyalty by offering credit or debit cards tied to MasterCard or Visa.

The integrated oil companies cannot offer fixed prices to their customers through their dealer networks because dealers are independent businessmen. Federal and state statutes prohibit the integrated firms from setting retail prices charged by distributors. A specific law, the Petroleum Marketing Practices Act, passed following the 1973 Arab oil embargo, makes it impossible for a multinational oil company (ExxonMobil, for example) to require a distributor marketing its gasoline to honor a fixed-price contract between the company and the customer.

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[8] Theodore Levitt, "Marketing Myopia," *Harvard Business Review* (July-August 1960) (reprinted in HBR Reprint 75507, September-October 1975), p. 9.

Gasoline hedging is further complicated by differences in state motor fuel taxes. The gasoline tax in Georgia is 7.5 cents per gallon, while the Rhode Island tax is 32 cents per gallon. Since gasoline margins are often less than ten cents per gallon, a firm that sold fixed-price gasoline in Georgia would face financial ruin if its customers purchased fuel in Rhode Island.

These complications have made it impossible to market fixed-priced gasoline to consumers. As a result, the market has historically been short of "longs."

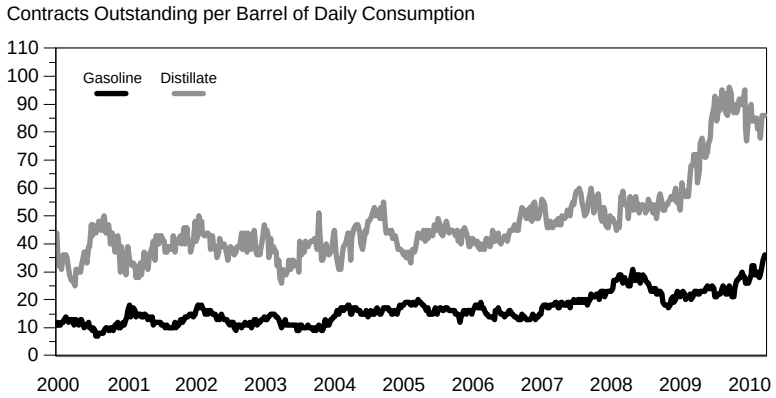
Distillate markets offer a sharp contrast. Heating oil consumers have been large users of fixed-price contracts. Airlines have also been large forward buyers of fixed-price jet fuel, the price of which is linked to heating oil. Trucking companies have also been able to enter into fixed-price contracts for diesel fuel with the two or three major marketers.[9]

One can measure the relative importance of the futures markets by comparing the ratio of open interest in a futures contract to consumption. The higher the ratio, the greater the potential is for hedging. Figure 5 (page 18) shows futures coverage relative to consumption. On this graph, I show the number of contracts outstanding at a moment in time divided by the Department of Energy's estimate of consumption at that point. For example, in January 2000, there were 11 futures contracts outstanding for each barrel of gasoline consumed daily. On the same date, there were 44 futures contracts outstanding for each

[9] In the United States, three firms, Flying J, Loves, and Pilot provide much of the over-road fuel consumed by trucking companies. These three firms own their own stations, thereby avoiding the problems associated with the Petroleum Marketing Practices Act. Furthermore, their customers are sophisticated enough to understand and accept differences in prices by region.

barrel of daily heating oil consumption. Ten years later, there were 36 futures contracts per barrel of daily gasoline consumption outstanding but 86 contracts of heating oil futures contracts per barrel of daily consumption.

Figure 5
Gasoline and Distillate Futures Contracts Outstanding per Barrel of Daily Consumption*



*Ratio of open interest in gasoline and distillate futures divided by comtemporaneous U.S. consumption.
Source: PKVerleger LLC.

These coverage ratios are important to many firms that seek to produce and market gasoline or heating oil. Over the last 20 years, the U.S. Federal Trade Commission has aggressively worked to promote competition in the refining business by requiring that large integrated companies shed refineries as a condition for mergers. Many refineries once owned by integrated companies such as BP, Chevron, Conoco, ExxonMobil, and Shell have been sold to firms such as Frontier, Tesoro, or Valero. The companies selling the refineries have historically been able to buffer profits or losses in refining with profits from crude production. The buying firms have no such protection.

The ability to profitably hedge inventories provides financial protection that allows independent refiners to accumulate stocks. The inability to profitably hedge inventories forces

firms to hold fewer stocks. Hence, the creation of buyers of futures to take the other side of the hedged sale is very important. The lack of longs discourages inventory accumulation.

VII. Passive Investors: Taking the Role of the Missing Long

Investment banks began to tout commodities as an alternative investment instrument to clients as early as 1990. In 1994, Goldman Sachs published a detailed report on the subject that contained a paper by Kenneth Froot, then a professor of finance at MIT's Sloan School. The Froot paper was later published (1995) in *The Journal of Portfolio Management*.

Froot suggested that returns earned from a diversified portfolio of commodities would be negatively correlated with returns earned on equities and returns earned on fixed-income assets such as bonds. These findings led him to suggest that investors should consider putting money in commodities to diversify portfolios. In the accompanying Goldman Sachs publication, another economist showed that investors could achieve this diversification by pursuing commodity futures contracts that would expire in a relatively short time, holding the futures until the expiration date approached, then selling the futures contract, and buying the next expiring contract.

Goldman Sachs introduced the Goldman Sachs Commodity Index (GSCI) in 1991, a diversified portfolio of commodities. Goldman provided a formula (a set of weights) that, if followed by investment managers, would allow investors to construct a diversified port-

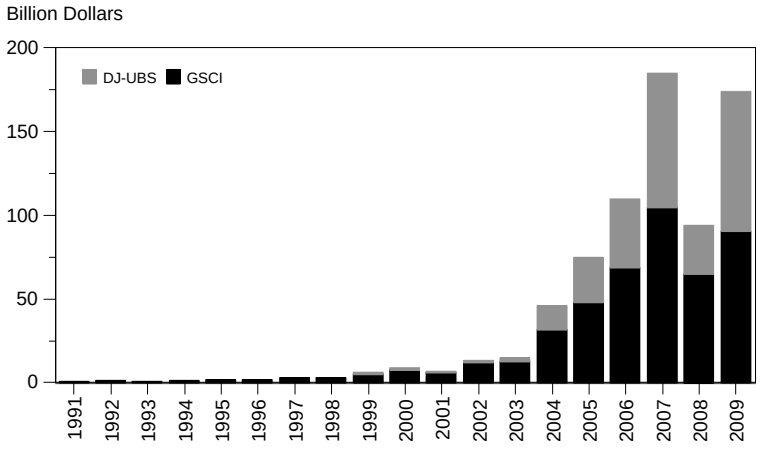
folio of commodity futures that Goldman claimed mirrored the importance of the commodities in the economy.

In 1994, JPMorgan followed Goldman Sachs with a second index. The JPMorgan index was designed to achieve the same effects.

The Goldman and Morgan indices had a second purpose: attracting buyers for the futures sold by producers to hedge positions. In theory, the addition of new longs to the market effectively allowed producers and processors to hedge additional volumes without pushing the market into backwardation.

However, passive investment in commodities did not gain popularity immediately, as can be seen from Figure 6, which traces the notional amount invested in commodities from 1990 to 2009. This chart shows that significant volumes were not invested in commodities for at least 12 years after the concept was introduced.

Figure 6
Amounts Invested in GSCI and DJ-UBS Commodity Indices



Source: PKVerleger LLC.

The failure of investment managers to quickly adopt commodities as an asset class can be explained by a single phrase: career risk. A 1995 *Wall Street Journal* article chronicled the difficulties confronted by those who favored commodities as an asset class:

> Ill-fated adventures in derivatives trading in the past year have further dampened enthusiasm for Wall Street's brave new commodity products, pension managers and consultants agree. "It's called career risk," the risk that new-fangled investments will backfire and the manager get the boot, said one fund manager, who asked not to be named.[10]

The author added that one retirement program had already backed away from investing in commodities. Others were very reluctant to proceed despite the assurances of the large investment banks.

A review of Figure 6 suggests that passive investment became popular in 2004. The year corresponds to the circulation of the first papers on commodity investment by Gary Gorton of Yale and Geert Rouwenhorst of the University of Pennsylvania. The research published by these academics showed that a properly constructed portfolio of commodities was negatively correlated with returns on equities and returns on bonds. This finding led the authors to argue, like Professor Froot, that investors could achieve portfolio diversification by investing in commodities.

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[10] Suzanne McGee, "Respectability Remains Elusive Despite Boom in Prices," *The Wall Street Journal*, May 8, 1995.

Gorton and Rouwenhorst (2004, 2006) provided a very detailed explanation of how investors could earn returns on commodities. They began by noting that the expected return did not come from appreciation. To the contrary, they asserted that investors could earn a positive return from the "risk premium" normally associated with commodity markets. Investment in commodities would normally earn a positive return as long as the futures price is set "below the expected future price" (2004, p. 4).

The authors added that investors in commodities normally earned a risk premium. This risk premium is tied to *normal backwardation*, a concept introduced by Keynes. They stated that, under Keynes' theory, "the risk premium, on average, will usually accrue to the buyer." Gorton and Rouwenhorst noted that Keynes "envisioned a world in which producers of commodities seek to hedge a portion of their output." The authors then explained,

> Speculators provide this insurance and buy futures, but they demand a price that is below the spot price that is expected to prevail at the maturity of the futures price. By "backwardating" the futures price relative to the expected future spot price, the speculators receive a risk premium from producers for assuming the risk of future price fluctuations (2004, p. 4).

Gorton and Rouwenhorst were not the first to advance the normal backwardation hypothesis. Froot (1994) and Walton (1991) both offered the same theory 15 years earlier. The

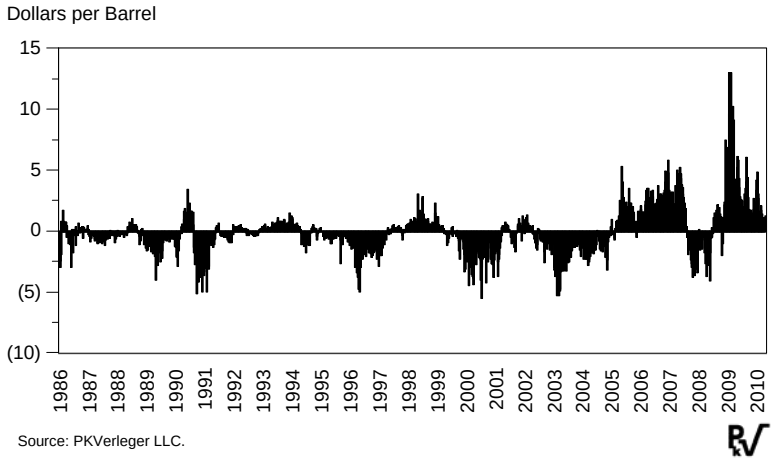
repetition of the theory, however, seems to have convinced investors that backwardation is indeed the normal condition for commodity markets. This happened despite the fact that Williams (1986) had dashed the theory earlier. In a review article published in 2001, he wrote, "If any consensus has emerged [from the literature], it is that no significant downward bias exists in futures prices. By implication, speculators are not attracted to futures markets to earn a risk premium through a naive trading strategy." (2001, p. 771).

Williams' work was ignored, though, in part because it was written for those who study physical commodity markets, particularly agriculture markets. Those practicing in finance either did not recognize there was serious research that cast doubt on the commodity investment theory or chose to ignore the findings.

Consequently, investors, also unaware of Williams' research, poured cash into commodity futures. Figure 6 above shows that investment rose quickly over the last decade. The cash influx was balanced by a shift in the market from backwardation to contango, which can be seen in Figure 7 (page 24). This graph shows the spread between the WTI fourth futures price and the WTI cash price. Negative numbers denote backwardation and positive numbers contango. One can observe that the market oscillated between backwardation and contango until the end of 2004. Then from the beginning of 2005 until August 2007 and then again from June 2008 to the present, the market has been in strong contango. As noted, the contango period is associated with the flow of cash into commodities from passive investors. Their buying caused open interest in crude and other futures to

rise sharply, as can be seen from Figure 8. This increase also contributed to the market's shift from backwardation to contango.

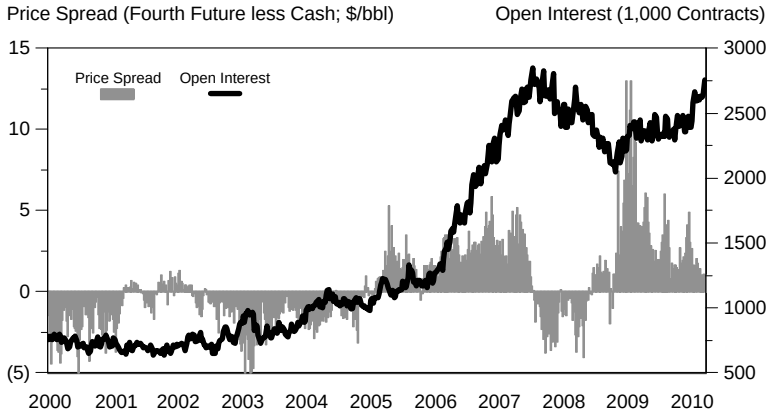
Figure 7
Price Spread between Fourth Light Sweet Crude Contract and Cash WTI, Weekly Data, 1986-2010



Source: PKVerleger LLC.

The shift to contango occurred because those buying futures (passive investors) needed someone to buy from. Sellers were attracted only when the buyers offered the sellers a premium to continue storing their oil or parcels of other commodities rather than selling on the cash market. *This promoted inventory accumulation*.

Figure 8
Open Interest in Three Principal Crude Contracts vs. Fourth Crude Price Spread, 2000-2010



Source: PKVerleger LLC.

Williams and Wright (1991) described the effect of passive investors in their book *Storage and Commodity Markets*. The authors built a multi-period dynamic model in which economic agents that produce output in Period 1 and intend to produce output in future periods must choose between selling the output produced in Period 1 and putting it in storage to hold for delivery in Period 2 or in some later period. The decision to store or sell depends fundamentally on whether the futures price offered for delivery in Period 2 (P_2) exceeds the price offered in Period 1 (P_1) by an amount sufficient to cover storage costs plus insurance costs plus the loss from Period 1 to Period 2 (C). Thus, the storage rule is written this way:

$$\text{Store if } P_2 > P_1 + C$$

Passive investors inadvertently triggered this rule as they purchased futures. Their buying lifted the forward price relative to cash prices, promoting inventory accumulation.

Williams and Wright also explained that market equilibrium occurs when the cash price rises relative to the forward price. As they observed, cash prices (prices in Period 1) will rise relative to forward prices as supply is diverted from the market and stored. This process leads to intertemporal equilibrium under certain stringent assumptions.

The Williams and Wright research could lead one to conclude that futures buying by passive investors tends to lift cash prices as economic agents are prompted to store physical

commodities rather than market them, which reduces contemporaneous supply and drives prices up.

Such conclusions may apply to some non-energy commodities such as grains or metals. It does not, however, apply to oil markets or, at least at present, to natural gas markets. Cash prices do not rise as storage increases because the world crude oil market is not competitive, a key condition for the Williams and Wright finding to hold. (The result does not apply to U.S. natural gas markets today because natural gas storage capacity is insufficient, as we explain below.)

In the case of crude oil, the spot price is generally determined by the amount of oil the Organization of Petroleum Exporting Countries (OPEC) chooses to produce. Commentators who attend the periodic OPEC meetings report that the organization's decision to increase or decrease output is influenced by the cash price. While the organization has not by any means succeeded in establishing a perfect record regarding stabilizing crude prices, the fact that its actions are determined by cash or spot prices neutralizes the possibility of passive investor activity sending cash prices higher.[11]

The situation in natural gas is different. Natural gas production in the United States is highly competitive. The growth in output from shale gas has caused a significant decline

[11] Cash prices can be driven higher by other factors such as environmental regulations. For example, the rise of crude prices to $150 per barrel was caused by environmental regulations imposed by the European Union (see Verleger, 2009). These rules created a situation where refiners were unable to process available volumes of heavy, high-sulfur crude into the product required at the time, ultra-low-sulfur diesel fuel. As a consequence, the world experienced the anomalous situation of having a crude surplus in the Middle East and yet very high crude prices.

in cash prices. Under these conditions, forward buying by passive investors could cause producers to put gas into storage, removing supplies from the cash market and sending spot prices higher *if there were sufficient storage capacity*. The evidence suggests there is not. Strong anecdotal evidence from 2009 points to storage facilities being full, forcing many producers to choose between accepting very low prices and reducing output.

Evidence from current market behavior, then, leads me to conclude that the entry of passive investors has promoted inventory accumulation without causing cash prices to rise. As I noted in Section II above, this has been *the* primary goal of energy policymakers for decades.

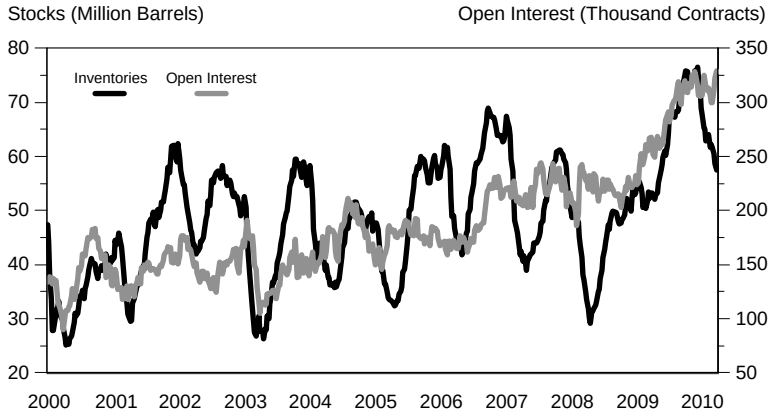
VIII. Evidence of Linkage between Passive Investor Activity and Inventory Accumulations

Economists are often correctly criticized for offering brilliant theories that fail under empirical examination. Here I have argued that investments by passive investors have promoted inventory accumulation. This hypothesis is confirmed by the facts.

Figure 9 (page 28) shows U.S. PADD I heating oil inventories from January 2000 through the end of March 2010. The Department of Energy reports these data weekly. Also shown in Figure 9 are data on open interest in heating oil futures. Due to differences in units, data on open interest are graphed against the right vertical axis and inventory data against the left vertical axis. The graph suggests a clear relationship. Note in particu-

lar that the surge in open interest from June 2008 through March 2010 was matched by an equal increase in stocks.

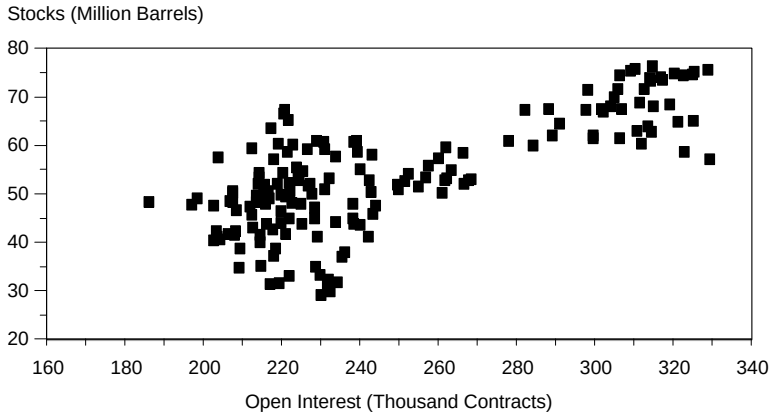
Figure 9
PADD I Heating Oil Inventories vs. Open Interest in Heating Oil, Weekly Data, January 2000 to March 2010



Source: PKVerleger LLC.

This point is emphasized in Figure 10, which compares weekly stock levels from January 2000 to March 2010, graphed against the vertical axis, with open interest, graphed against the horizontal axis. The linkage between open interest and inventories is clear.

Figure 10
PADD I Heating Oil Inventories vs. Open Interest in Heating Oil, Weekly Data, January 2000 to March 2010



Source: PKVerleger LLC.

The conclusion here is that the flow of cash into futures from passive investors has contributed to a rise in heating oil inventories. This suggests that the activities of passive in-

vestors have indirectly promoted stock accumulation by shifting energy markets from backwardation to contango. In the process, these investors have become a force for price stabilization, no doubt causing returns on investment to decline or even become negative. This was not the goal of passive investors nor is it the effect for which they have been criticized.

IX. How the Winter 2009/10 Market Benefited from the Stabilizing Influence of Investors

The regions north of the equator experienced one of the longest and most extreme episodes of cold weather in 50 years during the winter of 2009 and 2010. In Europe, the Eurostar trains running from London to France, one of the world's recent technological miracles, were stopped by cold weather and by snow accumulating on electrical contacts. Workers in Frankfurt and Stockholm were told to stay home for three or four days. In China, the government ordered natural gas supplies diverted from industry and government buildings to residences. In the United States, many states on the East Coast experienced extreme cold.

In the past, such an episode would have been accompanied by a sharp rise in heating fuel prices. However, there was no increase of this type in 2009/2010. Prices remained stable in December 2009 and January 2010 for two reasons: energy commodity markets have finally matured and financial institutions have encouraged a large number of passive investors to allocate a portion of portfolios to commodities. Credit for the absence of a price surge should go to financial engineers and financial institutions that had the fore-

sight to integrate energy markets and investors. This is an area of activity that offers major consumer benefits. As Wall Street continues to undergo a storm of criticism, the institutions and individuals there who helped create this innovation deserve kudos for the achievement, as well as the gratitude of consumers.

The December 2009/January 2010 success occurred because the world entered winter with extraordinarily high levels of heating oil and natural gas inventories. As economists have long acknowledged, plentiful stocks provide a natural buffer to unexpected increases in commodity demand. This winter, global heating oil stocks were 20 to 30 percent above levels observed in prior years. Natural gas inventories were also much higher.

The “extra” stocks were sold to meet the unanticipated demand created by the cold weather. Thus, in the U.S., spot heating oil prices barely budged. In contrast, spot prices jumped almost 70 percent during frigid weather in January 2000. That price increase was attributed to low stocks in subsequent analyses done by the U.S. Department of Energy. DOE also blamed low inventories for the 50-percent price increase during a December 1989 cold snap.

Market forces, not government intervention, created the abundant inventories that buffered markets in 2009 and 2010. Energy futures contract purchases lifted futures prices of commodities such as oil relative to current or cash prices. Commercial players in the markets responded to the rise in futures prices by buying and storing physical volumes of commodities such as natural gas and oil, while selling futures contracts to the investors.

World inventory levels rose through these serendipitous interactions, not because some government official commanded companies to add oil to stocks.

JPMorgan was one of the firms that bolstered inventories. As noted earlier, Bloomberg reported that the company hired a brand new supertanker last June to store two million barrels of heating oil. According to the article, the firm could buy the oil for $553 per ton and sell it for delivery three months hence for $580. This transaction may actually have occurred a few weeks earlier and if so, the bank could have acquired the oil for $400 per ton and sold it for delivery in January 2010 for $500.

The "cash-and-carry" transaction credited to JPMorgan is a well-known practice. Agricultural firms have engaged in such activity for more than 100 years. In 2009, JPMorgan and many other firms acquired oil in this manner, often earning risk-free returns exceeding 50 percent.

Consumers across the globe benefitted from this entrepreneurialism because prices did not rise when the weather turned cold. Instead, the supplies held on tankers moved to the market. As one trader told Platts, "it's now or never." As this sequence of events unfolded, the world's commercial sector demonstrated that energy prices could be held steady if politicians and regulators allowed commodity markets to function as they had for over a century.

The absence of any change in heating oil prices in 2009 and 2010 can be contrasted to what happened in gasoline markets in the fall of 2005. U.S. gasoline production was disrupted in September 2005 by Hurricanes Katrina and Rita. The disruption occurred when inventories were particularly low. As a consequence, retail gasoline prices surged by 20 percent from $2.55 to $3.05 per gallon at the national level and as much as 30 percent in the southeastern U.S. areas most affected by the disruption.

At the time, the United States was forced to appeal to its allies in the International Energy Agency to replace lost production because private inventories were so low. Gasoline supplies were sent to the U.S. from France, Germany, and Japan. These supplies helped moderate the market disruption. However, the relief did not occur immediately because the inventories were located up to 10,000 miles from U.S. markets. As a consequence, consumers had to pay significantly higher prices for up to two months. The total cost to American consumers may have exceeded $10 billion. This expense would have been reduced had U.S. product inventories been higher, and those stocks would have been higher had passive investors been more active in the gasoline market.

As it happens, the ravages of Mother Nature occurred when the oil industry was in transition, making inventory accumulation difficult. A new gasoline formulation, refinery blendstock for oxygenated blending, was being introduced and the NYMEX was bringing

on a new contract. Open interest was very low and hedging was not easy.[12] Thus price increases would have been likely even if markets had been functioning well at the time.

X. Effect of New Position Limits: Frustrated Inventory Accumulation, Increased Price Volatility, and a Likely Boost in Consumer Prices

The Commodity Futures Trading Commission published draft regulations on January 14 to impose position limits on certain participants in petroleum markets.[13] I will not describe the regulations in detail but rather focus here on two elements: the position limits on swap dealers and the barring of traders with hedge positions from acting as swap dealers. I will also note that the rules will drive business to foreign exchanges, which in turn will cause inventories to accumulate abroad rather than in the United States.

First, the new regulations will impose position limits on swap dealers. In the past, swap dealers have been the intermediaries between passive investors and the market, taking long positions on the futures exchanges in energy contracts while simultaneously taking the short position of the passive investors. Under the proposed regulations, swap dealer positions in the key energy futures contracts—natural gas, crude oil, heating oil, and gasoline—would be limited.

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[12] "Spot Gasoline Traders Still Waiting for NYEX/RBOB Changeover," *Platts on the Net*, December 6, 2005.

[13] Commodity Futures Trading Commission, "Federal Speculative Position Limits for Referenced Energy Contracts and Associated Regulation, Notice of Proposed Rulemaking," 17 CFR Parts 1, 20 and 151, RIN 3038 – AC85, January 14, 2010.

Second, the regulations would prohibit traders holding "bona fide" hedging positions outside the spot month that exceed "an otherwise applicable all-months-combined or single month position limit"[14] from functioning as swap dealers.

The first of these two prohibitions would limit the ability of passive investors to take long positions in energy futures markets. To the extent this is the case, the rule would discourage inventory accumulation. As noted above, the increase in the market's contango can be traced to passive investment. The rise in contango in turn led to stock building. The higher inventories have moderated price fluctuations. The proposed rules, by limiting the activities of passive investors, will reduce these effects. Inventories will be lower and prices more volatile.

The second element of the proposed regulations, the proposal to prohibit traders holding bona-fide hedge positions from acting as swap dealers, will compound the problem. Today many large financial firms write options for energy consumers and producers. A bank such as JPMorgan will write calls on jet fuel to United Airlines and puts on crude prices to an independent oil producer such as EOG. JPMorgan may also act as a swap dealer to a pension fund such as TIAA-CREF. (All names used here are chosen as examples. I have no idea if JPMorgan deals with any of these firms.) JPMorgan and other financial institutions need to access the futures market without limit to maintain these hedges.

[14] CFTC, p. 54.

Imposing the proposed position limits would have several impacts on JPMorgan, other financial firms, other institutions such as airlines, and prices.

First, JPMorgan would have to withdraw as a swap dealer, as would other institutions. This would force many passive investors from the market. The number of longs would decline, contango could revert to backwardation, and inventories would decline.

Second, price volatility would increase. The market's reduced size would almost certainly lead to greater price volatility.

Third, United Airlines' hedging costs (I use United as a consumer example here) would rise as price volatility increases. Since airlines typically use options to hedge their activities rather than futures, United and all airlines would probably see their hedging costs go up.

Fourth, EOG would also see its hedging costs rise for the same reason. EOG typically uses options to hedge risk and the costs of options would increase.

Fifth, the decline in inventories would likely boost spot prices and price volatility. End users such as airlines, average consumers, and those who

> heat their homes with oil would all see prices rise. The only beneficiary of such policies would be oil producers, especially OPEC members.

These impacts would be primarily confined to the United States. Consumers in Europe could benefit because there are markets located there that are not governed by the Commodity Futures Trading Commission. Passive investors could move activities to these markets. In fact, some organizations have already shifted activities to London. The shift will partially moderate the effect of the proposed CFTC rules. *However, the shift in market activity will shift the location of physical inventories as well.* As I noted above, firms tend to hold inventories close to the delivery point. Thus inventories of heating oil and jet fuel will likely be higher in Europe and lower in the United States. This will leave U.S. consumers more vulnerable to price volatility, just as in 2005.

I find all of these results to be contrary to the interests of national economic and energy policy. Thus, I recommend that the proposed regulations not be adopted.

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