

Comments on Energy Markets

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Impacts of Passive Commodity Investors on Energy Markets and Energy Prices

Wall Street has made commodities a new asset class. Beginning in 1990, Goldman Sachs, followed by other investment firms, has advised investors to allocate a portion of their portfolios to baskets of commodity futures. These companies have bolstered their marketing effort by using studies written by very well known and respected academics such as Ken Froot, Gary Gorton, and Geert Rouwenhorst.¹ These analyses demonstrate that properly structured commodity portfolios have produced historical returns that matched returns on equities and bonds over a 20 to 30-year period while being negatively correlated with bonds and equities.

The investment institutions counseled investors to purchase fully funded futures contracts. Since commodity futures are margined transactions, proponents suggested that purchasers allocate the “face” amount of a futures contract to each transaction, putting up the necessary funds to go long the future and placing the remainder in Treasury bills. For example, an investor buying a crude oil futures contract at \$60 per barrel would be told to set aside the full amount of the contract, \$60,000, posting margin of, say, \$5,000 and

putting the rest of the margin money in liquid, short-term Treasury bonds. This way, the investor can tap into the Treasury bonds to meet variation margin calls should prices fall.²

Advocates of investing in commodities as an asset class explain that investors will earn three types of returns: interest on collateral, appreciation (if any) due to price rises, and the “roll” return. The key component of return on these investments is the roll. Those writing on the subject argue that the normal state of commodity markets is backwardation, where futures prices are less than cash prices. (The term “normal backwardation” originated with John Maynard Keynes.³) Under these circumstances, sponsors of commodity funds show that investors can profit by purchasing a nearby future, holding it until it gets close to maturity, and then selling it and buying a futures contract expiring at a later date. The process is called “rolling.” We show an illustrative example of how the roll works using data from the crude futures market in Figure 1 (page 2).

¹ See Kenneth A. Froot, “Hedging Portfolios with Real Assets,” *Journal of Portfolio Management* 21, No. 4 (Summer 1995), pp. 60-77; Gary Gorton and K. Geert Rouwenhorst, “Facts and Fantasies about Commodity Futures,” *Financial Analysts Journal* 62, No. 2 (March/April 2006), pp. 47-68.

² The leveraged nature of futures contracts requires traders to post initial margin when taking a position and then put up variation margin if the market goes against them.

³ See John Maynard Keynes, *A Treatise on Money; the Applied Theory of Money* (1930), in Robinson and Moggridge (eds.), *The Collected Writings of John Maynard Keynes* (London: Macmillan, 1971), Vol. 6, p. 128.

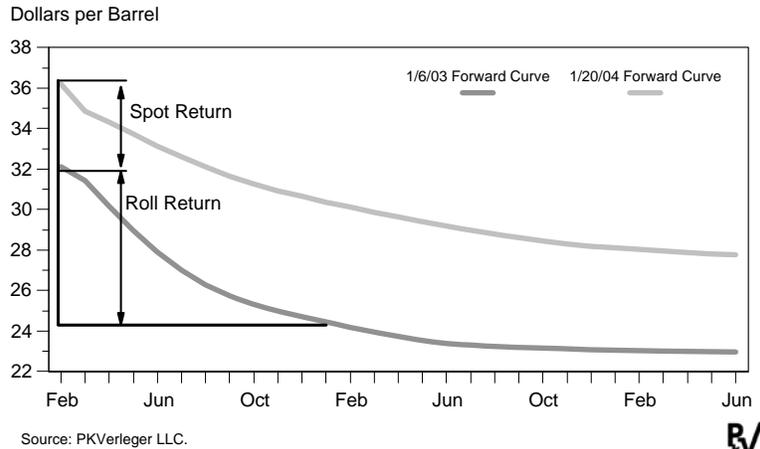
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The returns advertised for passive commodity indices have attracted significant investment amounts. By the end of 2006, analysts believed \$100 billion had gone into the two principal commodity indices: the Goldman Sachs Commodity Index (now the S&P GSCI) and the Dow Jones-AIG commodity index. During 2007, another \$13 billion has been invested (see Figure 2).

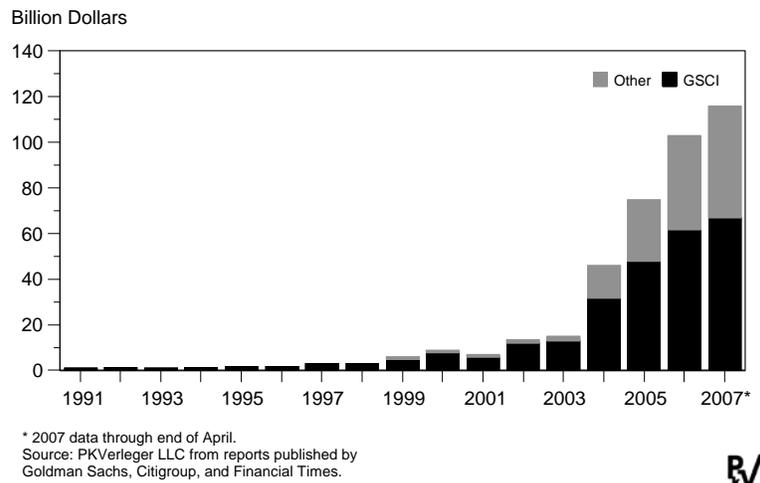
The injection of cash has contributed to the increase in open interest in Brent, light sweet crude, heating oil, gasoil, and natural gas futures contracts. Today, 500,000 (24 percent) of the two million open contracts in light sweet crude on the NYMEX and ICE, as well as 170,000 of the 670,000 ICE Brent contracts, are held by commodity index investors. Both markets would be much smaller without the investors. Figure 3 (page 3) displays the rise in open interest in crude futures from 1991 to 2007.

Futures are bilateral transactions. This means the purchase of futures for investors in index funds must be balanced by sales of futures by a second party. Proponents of the index funds had assumed that risk-averse producers would sell futures contracts to meet the demands of investors, thus keeping markets in backwardation. This

**Figure 1
Illustrative Spot Return vs. Roll Return Example —
February 2004 Contract Purchased December 2002**



**Figure 2
Estimated Growth in Global Commodity Investment**



assumption has proven false, which should not have come as a surprise. Research by economists focused on commodity markets (not financial economists) demonstrated more than 20 years ago that producers were not risk-averse, as proponents of the GSCI and

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DJ-AIG assumed.⁴ More recent research on corporate risk management concluded that companies should generally limit sales of futures or purchases of put options to protecting future cash flows associated with large investments in projects or acquisitions.⁵

The injection of cash into futures, as a result, pulled markets from backwardation to contango. The phenomenon has been noticed in the natural gas and heating oil market. It is, however, particularly obvious in the crude market. Figure 4 shows spreads between futures and cash for the first six contracts from January 1986 to May 11, 2007. The observations are Friday settlements.

The increased sales of futures came primarily from two commercial sources: banks writing put options to producers seeking to protect against the down side if prices should fall, and companies adding to inventories. Much of the selling seems to origi-

Figure 3
Open Interest in Three Principal Crude Contracts,
1991 to May 11, 2007

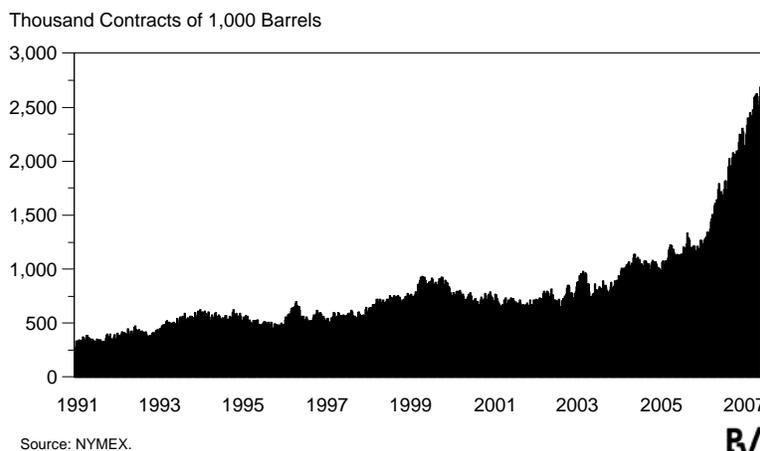
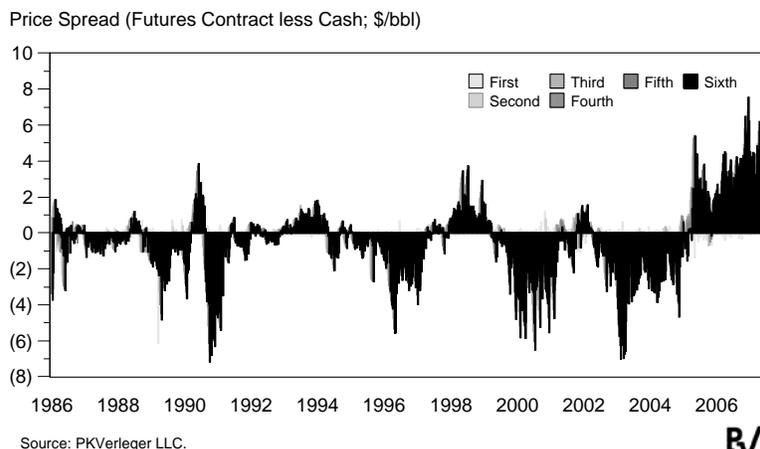


Figure 4
Price Spreads for Crude Oil — First Six Futures Contracts,
1986 to 2007



⁴ See Jeffrey C. Williams, *The Economic Function of Futures Markets* (Cambridge, England: Cambridge University Press, 1986), as well as Jeffrey C. Williams and Brian D. Wright, *Storage and Commodity Markets* (Oxford, England: Oxford University Press, 1992).

⁵ See Kenneth A. Froot, David S. Scharfstein, and Jeremy Stein, "Risk Management: Coordinating Corporate Investment and Financing Policies," *Journal of Finance* 48, No. 5 (December 1993), pp. 1629-1658.

nate from companies seeking to profit by storing. In the case of some commodities, financial returns have risen to as much as five or 10 times the return of risk-free instruments. Given the structure of physical delivery for oil and natural gas futures contracts, the return for holding inventories has been essentially risk free.

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Figures 5 and 6 show returns to storage for crude oil and distillate fuel oil. Figure 5 shows returns to storage for holding a barrel of crude roughly 45 days. The shaded area displays the normal range for returns computed over a 20-year period. The solid lines show returns for 2006 and 2007. Note that returns today are at the top of the normal range, just as they were in 2006. Note also that returns were well above the risk-free rate from May 2006 through early 2007.

Figure 6 shows returns to storage for distillate fuel oil at annual rates measured on July 1 for distillate held until the end of the year. The average is 18 percent, indicating that the incentive to accumulate hedged stocks has generally been strong.⁶ In 2006, the return was 40 percent.

The increased financial incentive to accumulate stocks (contango) has had two effects. First, commercial firms have increased inventories. Second, companies have built new storage facilities at strategic locations. Capacity at Cushing, Oklahoma, has been boosted so that more firms can hold crude in delivery locations. Storage

⁶ The industry has historically accumulated stocks in the summer for sale during the heating season. Thus, a return above the cost of money should be expected.

Figure 5
Financial Returns to Storage for Conducting a One-Month Cash-and-Carry Transaction for Distillate Fuel Oil

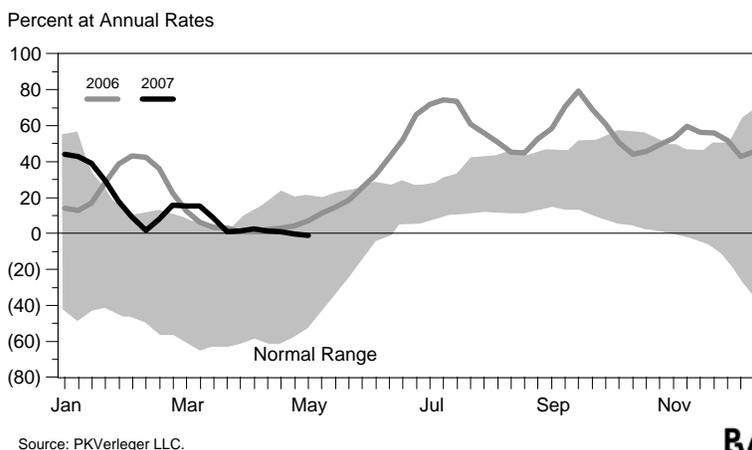
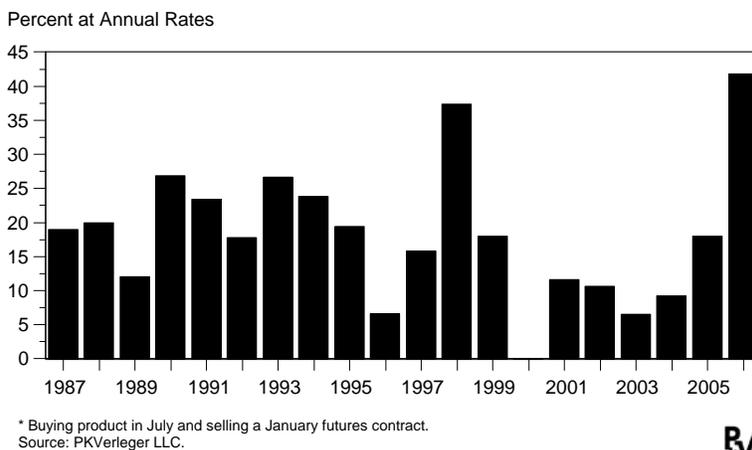


Figure 6
Returns to Storage for Conducting a Six-Month Cash-and-Carry Transaction for Distillate Fuel Oil*



facilities for natural gas have been expanded. Finally, product storage facilities have been augmented.

The new facilities have now been filled. This inventory rise has stymied a two-decade-long effort by firms to reduce stock levels. Ten years ago, Mobil received widespread (and unwanted) publicity for its KILL policy.

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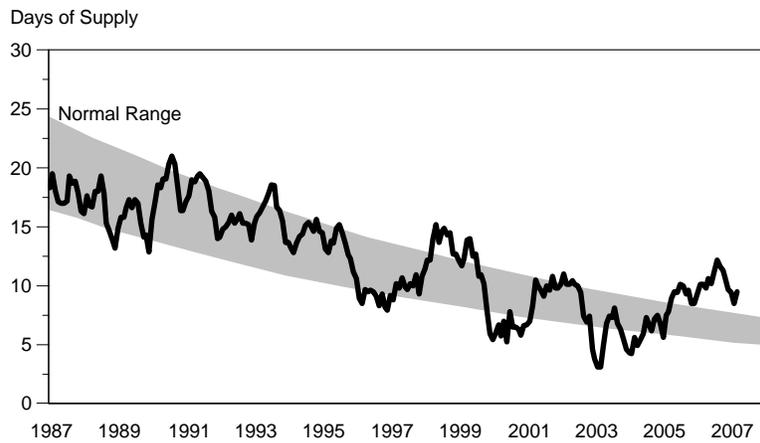
KILL meant “Keep Inventories Low and Lean.” In 1999, OPEC took over the effort. In March of that year, Saudi Arabia announced that OPEC members would work aggressively to keep stocks low (and markets in backwardation) in order to boost crude prices from \$10 per barrel to \$30. OPEC, like Mobil, was successful.

More recently, the trend has reversed. However, commodity prices have not come under downward pressure thanks to the contango created by buyers of index funds. Currently, owners of these funds contribute between \$15 and \$30 billion per year toward inventory accumulations.

Figure 7 shows how the generous donations of commodity index fund participants have been rewarded through stock increases. This chart shows useable commercial stocks held in OECD countries measured in days of supply (stocks divided by consumption).

Figure 8 shows the accumulation or liquidation of crude oil and products held in OECD countries from January 1990. One can observe that stocks rose steadily until 1998 and then fell sharply following OPEC’s action in 1999. Stocks diminished further through 2004 as refining profits collapsed. Since 2004, however, cash injec-

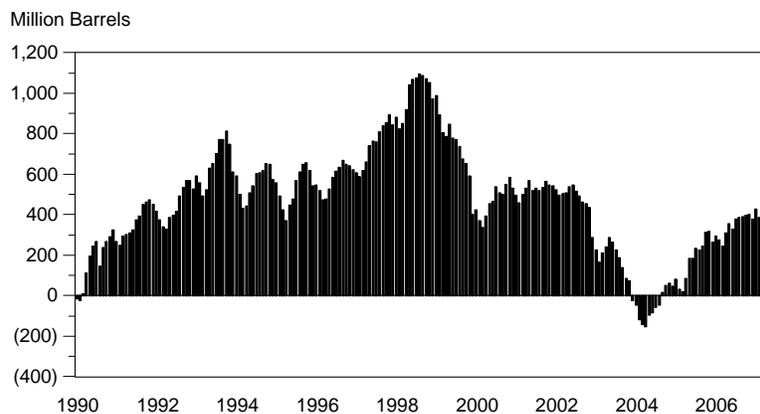
Figure 7
Usable Commercial Stocks in OECD Countries, 1987 to 2007



Source: Energy Intelligence Group; PKVerleger LLC.



Figure 8
Accumulation and Liquidation of Crude Oil and Product Inventories in OECD Countries, 1990 to 2007



Source: Energy Intelligence Group.



tions from commodity index investors have funded inventory growth.

We conclude then by noting that a group of investors (generally pension funds) have put more than \$110 billion into fully funded commodity futures in anticipation of earning returns that correlate negatively with bonds and equities. Furthermore, these investors

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were told that most of their gain would come from roll returns, not the appreciation of commodities.

Investors have earned good returns, but these have resulted from rising commodity prices. Roll returns on energy commodities, the predominant portion of these investments, have been negative.

In addition, as is often the case, the entry of commodity investors has changed the behavior of commodity markets. In the case of energy markets, backwardation has been converted to contango. The change occurred because the amount invested more than doubled the market's size. Furthermore, the supply elasticity of short sellers was low.

Looking forward, one must wonder whether commodities will survive as an investment class. Given the increased costs of rolling positions caused by the opportunistic (profit-maximizing) behavior of firms holding inventories, one must question the staying power of investors. For example, investors this year have already paid more than \$5 billion to holders of WTI crude oil inventories to roll positions. In my view then, this investment concept will likely become, to paraphrase Ben Franklin, "a beautiful theory murdered by a gang of brutal facts."