

Natural Gas Can Leave You Cold

Is there a more recurrent theme in art, literature and religion than temptations and how we handle our urges in their presence? We can throw trading and finance into this mix as well, especially when we are talking about weather, weather-driven markets and firms who ostensibly should profit from changes in the weather: The temptations to draw simple conclusions are powerful.

The chain of causality in a weather-driven market such as natural gas allegedly works as follows: It gets cold, heating fuel use rises and inventories are reduced thereby. Traders jump in front of the anticipated demand for rebuilding those inventories, and firms whose business is supplying natural gas or whatever the commodity in question is see their shares rise accordingly. It all looks like a testable set of assumptions, so let's take a look.

A Degree A Day

The measure of energy demand for either heating or cooling is the degree-day, which is the maximum of (0, (65° - current temperature)) for a heating degree-day or the maximum of (0, (current temperature - 65°)) for a cooling degree-day. Considerations such as the wind chill factor, the temperature-humidity index or whether anyone actually turns on the air conditioning at 67° do not factor into the equation. Can we predict the price of natural gas using temperature as the sole predictive variable?

No, not at all: Neither the price of natural gas, overall economic activity, prices and availability of alternative energy sources nor the health of natural gas consuming industries such as fertilizer or petrochemicals enter into the equation. Each of these factors is quite important; I suspect, for example, those who use gas heat have turned down their thermostats and have taken other conservation measures now that \$6.00 natural gas is common. During the 1990s, when \$3.00 natural gas was high, buyers could afford to be more profligate in their habits.

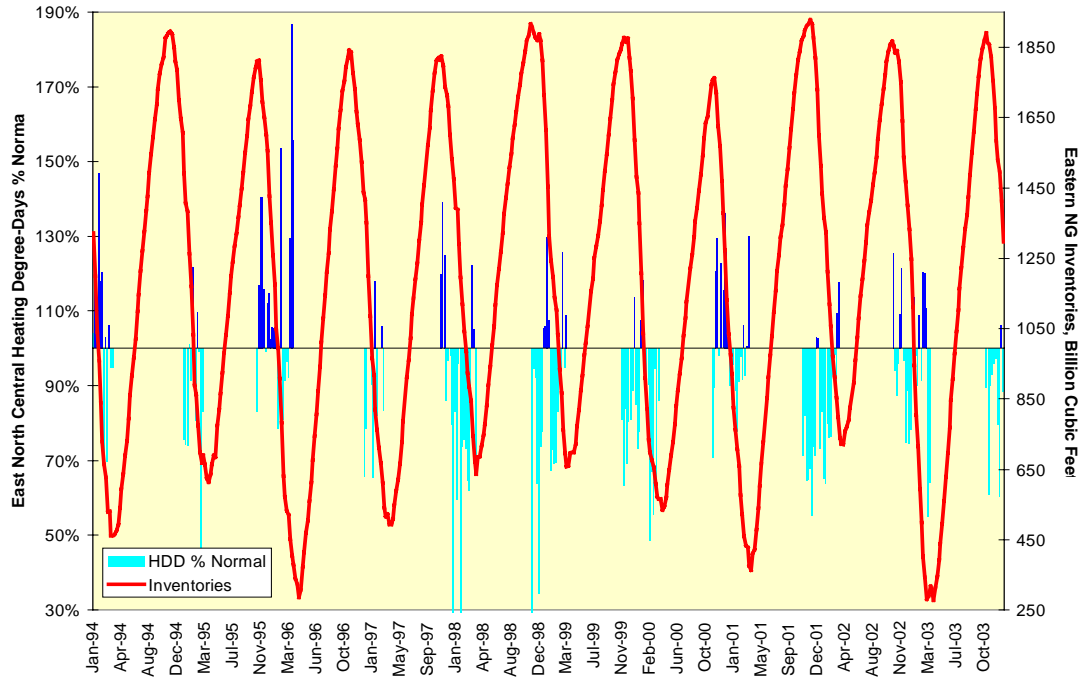
Any model for either trading natural gas directly or for pricing weather derivatives - bets that pay off on the state of weather variables such as temperature or precipitation - that seeks to link natural gas demand solely to heating-degree days is likely to be too simplistic.

We can compare the Department of Energy's Eastern Consuming Region inventories for natural gas against heating degree-days in the East North Central region expressed as a percentage of normal over the November-March heating season. The American Gas Association weather data were used prior to November 28, 1997, and National Weather Service data were used thereafter. The winters of 1995-1996 2000-2001 and 2002-2003 stand out for their combination of cold weather and inventory drawdowns.

The winter of 2000-2001 in particular began the heating season from a low starting point in inventories as it followed a hot summer that forced utilities to use natural gas-fired generators to meet their demand surges. This also was the summer where water reservoir levels in the Pacific Northwest were low, which reduced hydroelectric power available to the western states and led to the various machinations of Enron and others in the California power market.

Even with all of the special factors taken into consideration, the intuitively pleasing conclusion that colder-than-normal weather will lead to more rapid inventory drawdowns of natural gas appears acceptable.

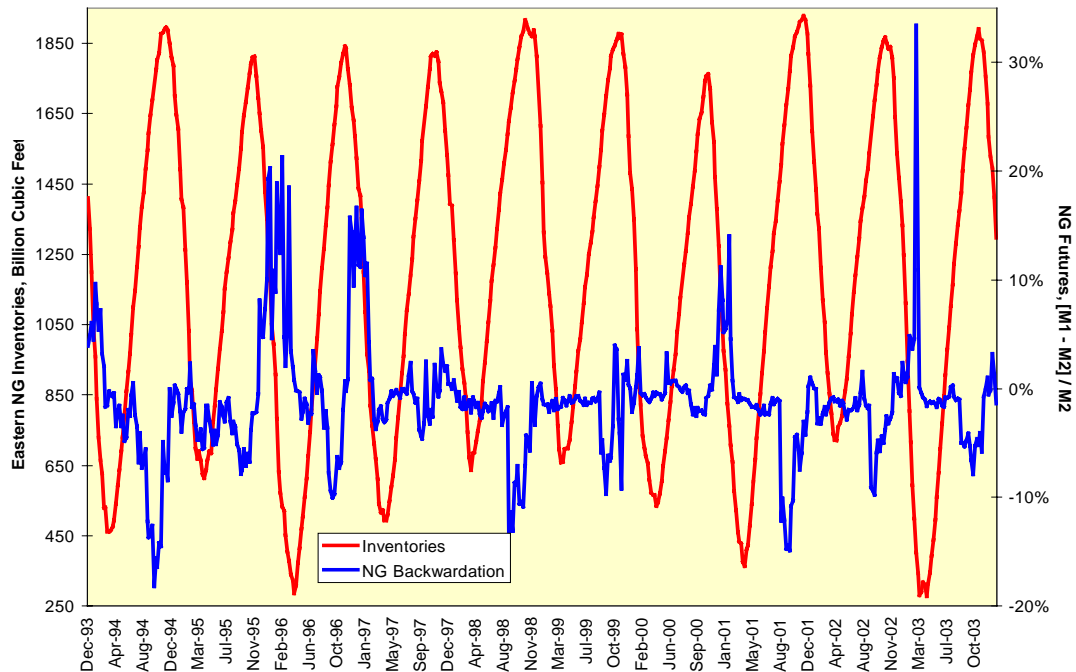
Natural Gas Inventories And Cold Weather



Inventories And Price

From inventories we have to move to price. Traders in financial markets often lose sight of the physical constraints involved in physical markets. While stocks, bonds and currencies can be zapped instantly and at low cost across continents, natural gas must be moved through pipelines and other chokepoints that have limited capacities. Should demand rise by more than expected, the premium for immediate delivery should rise accordingly. This in turn should increase the premium of front-month futures to the second month, a quantity known as backwardation.

Natural Gas Inventories And Deliverability Pressure

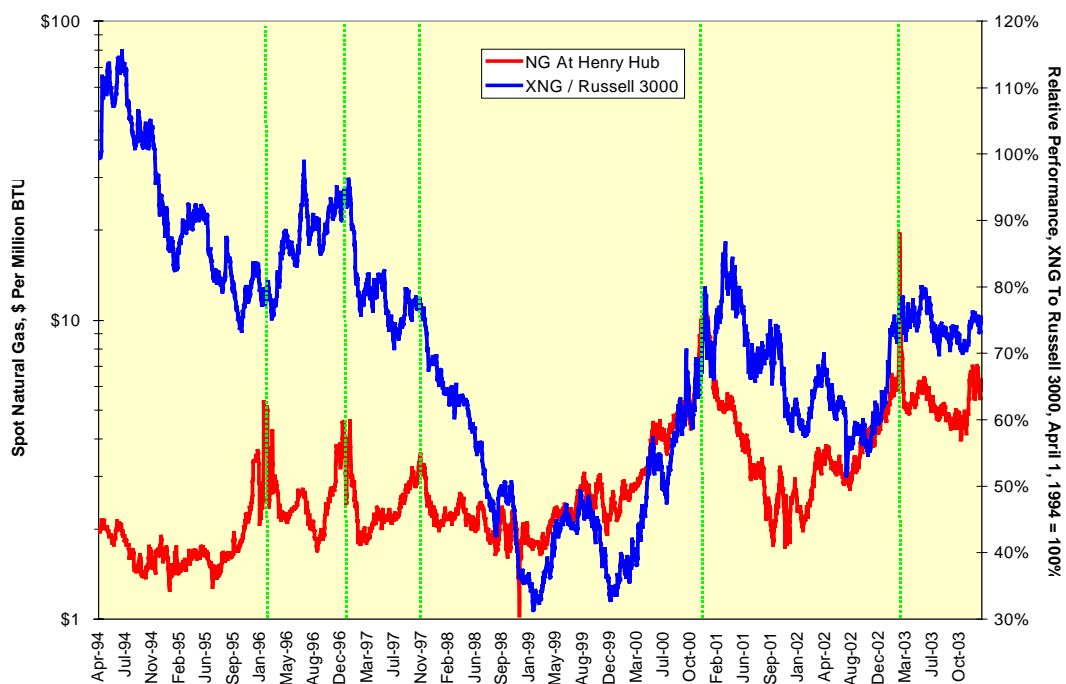


Unsurprisingly, several episodes of strong backwardation occurred in February, when the intermonth comparison was between March and April futures. These occurred in 1996, 1997, 2001 and most spectacularly in 2003, all years when eastern inventories fell to particularly low levels.

Taking Stock Of Inventories

One of the attributes of backwardation is that both buyer and seller regard the present price as unsustainably high and due for a fall in the near future. If this is the case, then periods of cold weather, high prices, inventory drawdowns and backwardation should be the worst time to buy natural gas stocks. This has appeared to be the case over the past decade.

Buying Price Surges Does Not Pay



If we take the relative performance of the AMEX Natural Gas Index to the Russell 3000 index, as a proxy of the relative reward or alpha for buying natural gas equities as opposed to simply buying the market as a whole, we see this relationship confirmed in general. A XNG buyer would have enjoyed outperformance in 1996 by buying when gas prices spiked early in the year, a performance repeated only once and for a short time, during the dreadful spring of 2001. In all other cases, buying the XNG as opposed to the market as a whole simply constituted chasing a market at the top.

So, the next time the mercury hits bottom in early winter, investigate the backwardation trade in natural gas of buying the March futures and selling the April. But succumbing to temptation and buying the XNG will just leave you cold.