It's A Gas

When we were young and impressionable, Aesop's fable of the Ant and the Grasshopper was presented to us. The choice was clear: be diligent and like the Ant, or perish.

This ancient parable is replayed annually in the natural gas market. This truly is amazing: fewer things are more predictable than residential heating demand returning in the winter or peak-load electrical generating demand returning in the summer. One might expect the market to discount these factors reasonably well and produce a fairly constant price. Price smoothing is supposed to be one of the major social benefits of futures markets in the first place.

Natural gas prices are anything but smooth. In its short history since April 1990, the contract has demonstrated eye-popping volatility, both on an interday and on an intraday basis. Needless to say, both special trading opportunities and risks are presented.

Industry Structure And Economics

The long battle over natural gas price regulation, fought between the 1954 *Phillips* decision, which gave the old Federal Power Commission authority over wellhead prices, and the final decontrol in the mid-1980s, was the second most divisive regional conflict in American history. Complete market freedom, where anyone in the supply chain was free to own, transport, and store natural gas did not arrive until the promulgation of Federal Energy Regulatory Commission Order 636 in 1993.

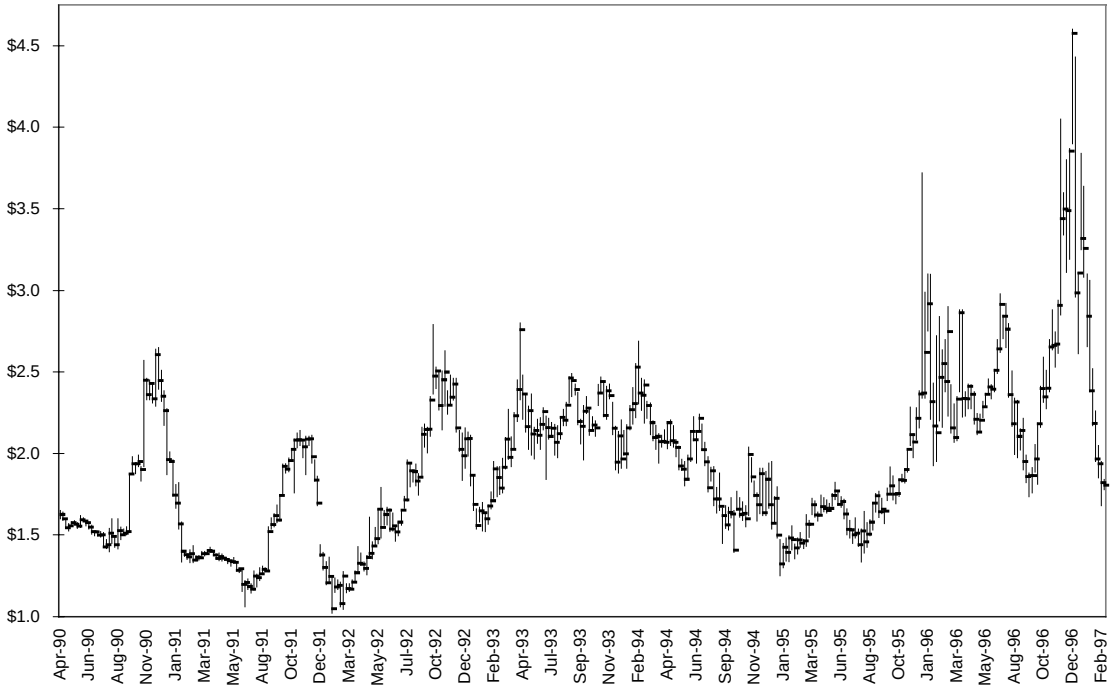
Therefore, over the past twenty years, the industry has evolved from a state of steady prices whereunder risk was absorbed by the producer in the form of unsold gas to one of violent price changes where risk is absorbed by all parties: producers, pipelines, local distribution companies (LDCs), and users. While many pipelines and LDCs operate storage facilities in anticipation of peak seasonal demands, very little gas -- well under 5% of demand -- is stored on a percentage basis throughout the supply chain.

Moreover, while some large fuel users can switch to a cheaper fuel during a price surge, few residential and commercial customers have this capability. Thus the LDCs are in a position to pass on higher costs to these customers, whose only choice is to either pay or freeze. The penalty for a LDC not capping its costs is absent, but the penalty for getting stuck with unsold gas is large. The overall result is small swings in both supply and demand can produce huge swings in price (inelasticity, in economic jargon).

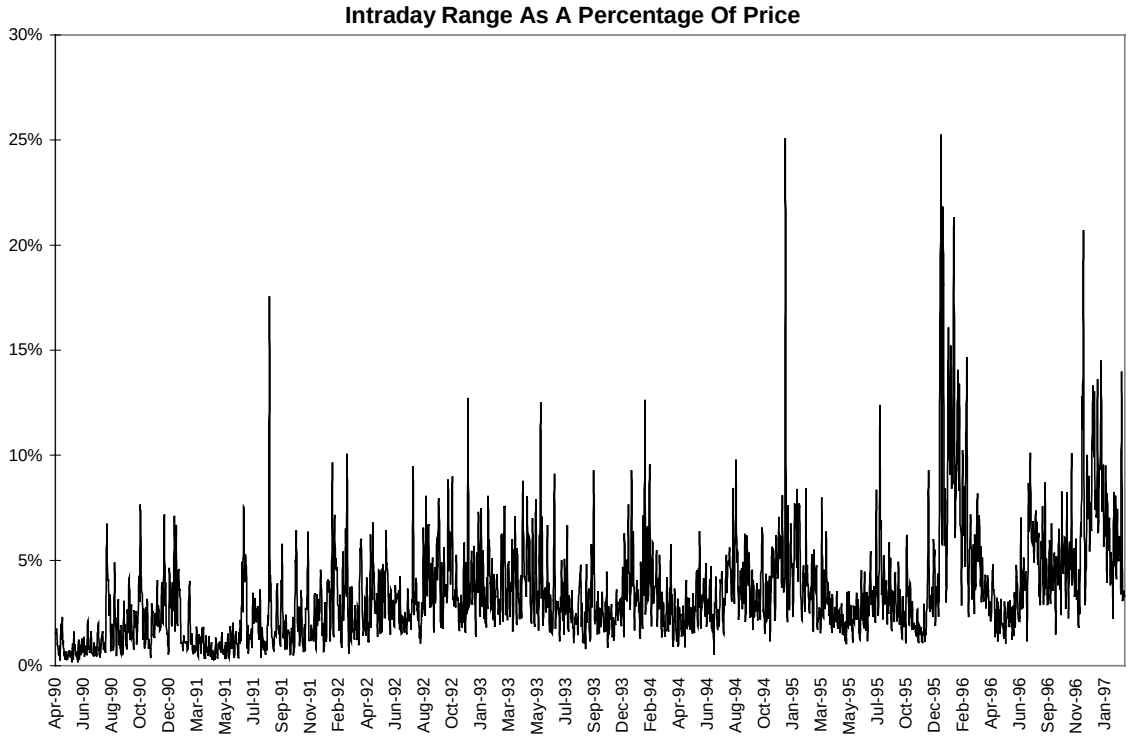
The Price Rollercoaster

A weekly chart of the spot futures contract only begins to illuminate the degree of price volatility in the market. Even before the large price spikes in the winters of 1995-96 and 1996-97, we see annual ranges greater than 100% with the tops almost always coming in a "spike" fashion. The surges seen in the last two winters both involved prices doubling from lows in the early autumn, and the retracements are just as sudden, especially the one in the winter of 1996-97. This would be like the price of gold going from $400 to $1000 and back to $400 in a period of five months, a situation for which America's headline writers can only wish.

Spot Natural Gas Weekly Future



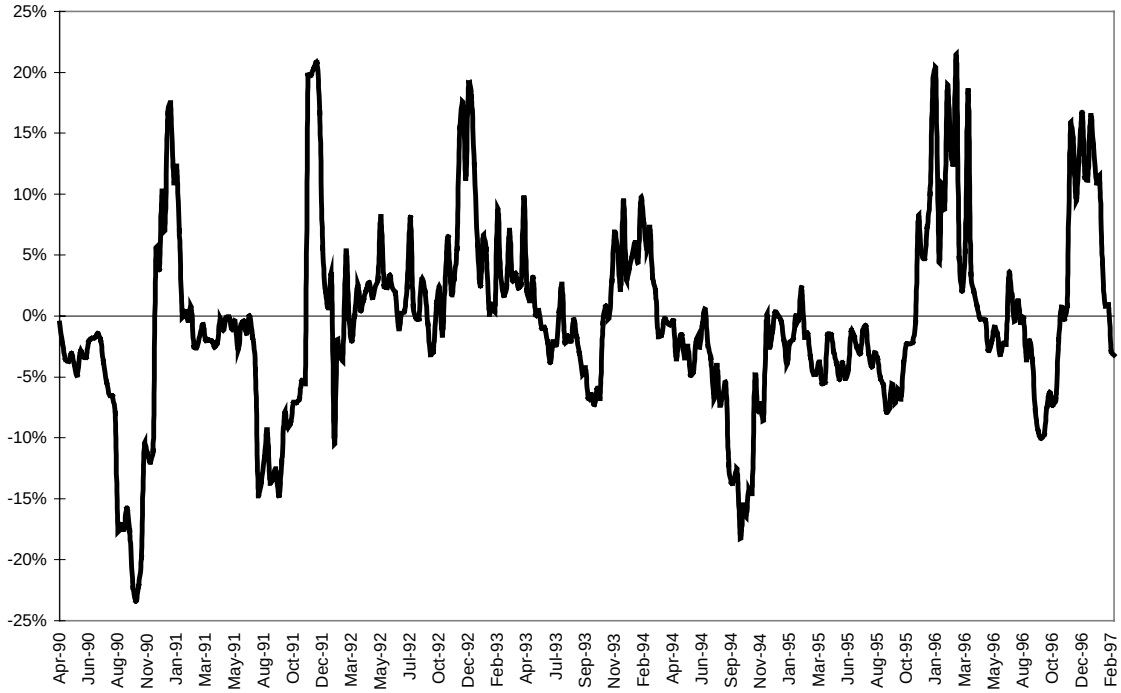
The weekly chart above actually masks the day-to-day price uncertainty in the market. If price represents a convergent search process for underlying economic value (see "Adapting Moving Averages For Changing Markets," *Futures*, May 1994), then large interday price changes are supposed to happen if the underlying economic value is changing as well. However, a large intraday range in relation to the interday change is indicative of extreme price uncertainty and an inefficient search process; the probability of at any given point in time of price representing value is diminished severely. This certainly appears to be the case in natural gas, where intraday ranges in excess of 10% of the price occur frequently.



Another part of the story is told by the spot / nearby spread, often the best thermometer of the market's demand for incremental supplies. A graph of this spread taken as a percentage of the nearby future price shows both the unsurprisingly strong seasonality of this as well as its extreme magnitude. These large spreads are facilitated by the following conditions:

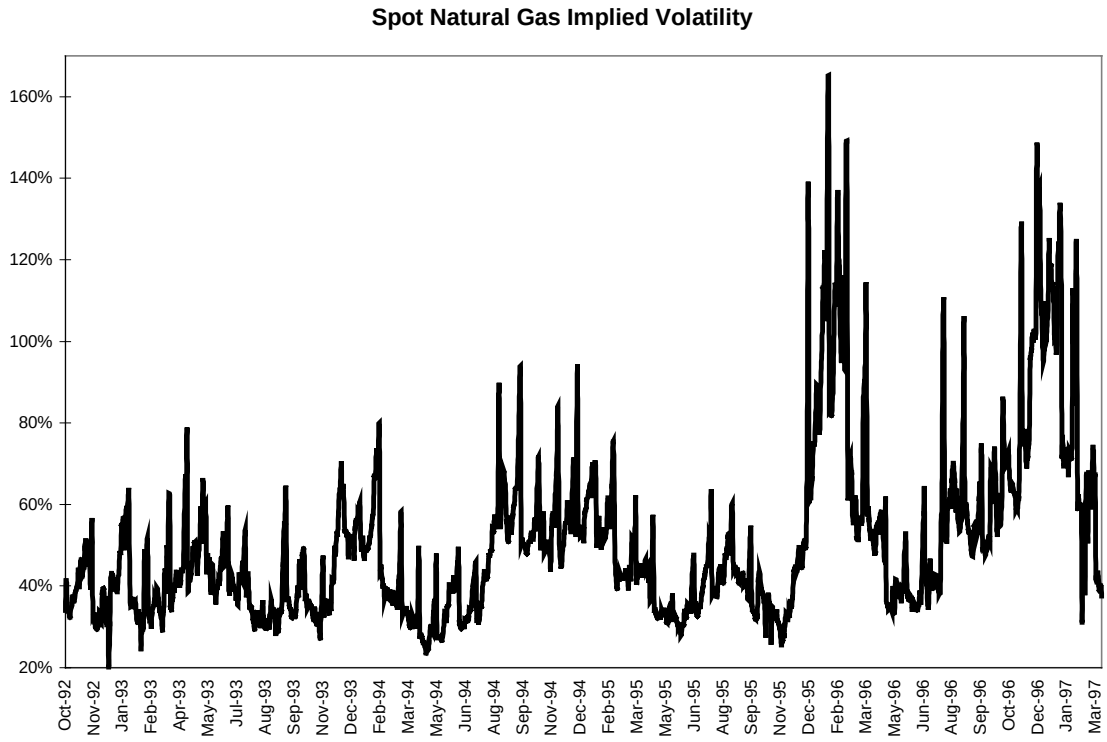
1. Producers are charged with the burden of storage in the form of unsold gas;
2. Consumers are charged with the burden of absorbing price shocks; and
3. Distributors have inadequate storage facilities to smooth out these price movements and spreads, as futures theory would dictate.

Spot / Nearby Spread As A Percentage Of Nearby Price



Compounding the difficulties presented by turbulent price and spread movement is the high cost of obtaining insurance in the natural gas option market. The lowest implied volatilities seen in natural gas options would be quite high for all other markets. Crude oil, notoriously volatile, only saw volatilities greater than 100% during the Persian Gulf War. The S&P 500, irrationally exuberant at times, only sees these levels during market crashes. For natural gas, however, these levels are unremarkable.

As is the case in any insurance market, too-expensive insurance encourages people to remain uninsured and to gamble that adverse consequences can either be avoided or thrust upon someone else. As discussed above, in the case of the natural gas market, the transport and distribution chain can try to stick producers with unsold gas and consumers with high prices.

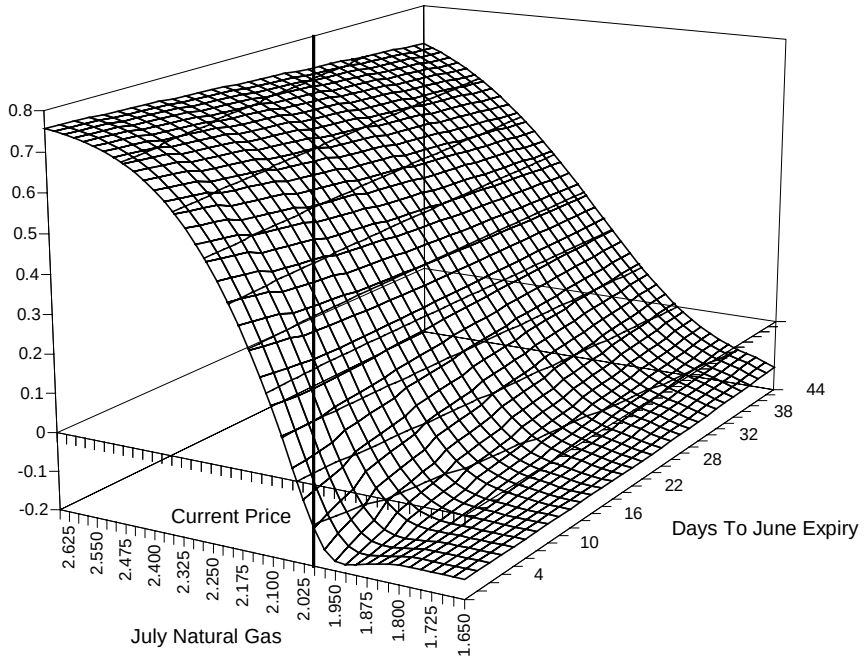


Trading Opportunities: Options

One inference we can draw from the data above is if we can maintain a position in natural gas that is long price or long backwardation, sooner or later we will have an opportunity to profit. The risks and costs associated with this approach are obvious and considerable. However, we can put natural gas' high volatility to work for us through the Dynamic Option Selection System (DOSS, see "Using Options The Spec Way," *Futures*, July 1994).

Using data from the close of business on April 8, 1997, the recommended DOSS position for buying the equivalent of 100 July futures (1 trillion BTU) is a "backwards calendar bull put" consisting of buying 410 June $1.95 puts at $0.082 and selling 410 July $2.20 puts at $0.270. The profit profile of this trade across the dimensions of July price and time remaining on the June options, with the June / July spread held constant, is depicted below.

Profit Profile On Backwards Calendar Bull Put



The profit profile of the trade has a rather modest downside in relation to its upside potential. While it is subject to the risk of increased backwardation, it is being emplaced at a time of the year when the spot / nearby spread tends toward contango, as shown in the graph above. Perhaps of greater interest is the incremental advantage of the DOSS trade to the base case of buying July futures: DOSS outperforms at both higher and lower price levels at the cost of underperformance in quiet markets.

Incremental Advantage Of Backwards Calendar Bull Put