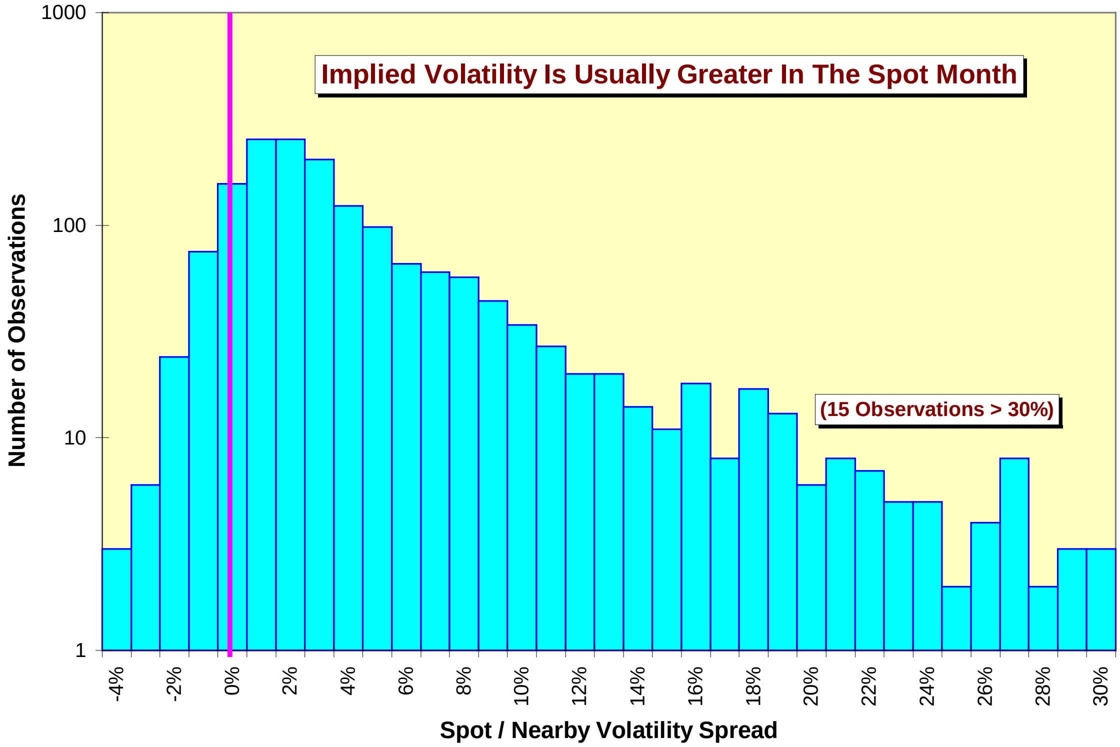
A Risk Is Not A Risk, A Buy Is Not A Buy

This fundamental thing holds true as time goes by: Four out of five traders surveyed prefer root canals without Novocain to paying option premium. The resistance to paying for options is understandable in the sense that the buyer of an option is both borrowing money and buying insurance. In both cases, buyers should strive to minimize both their activities and the costs involved. However, just like everything else in the world of option trading, what you see may not be what you get.

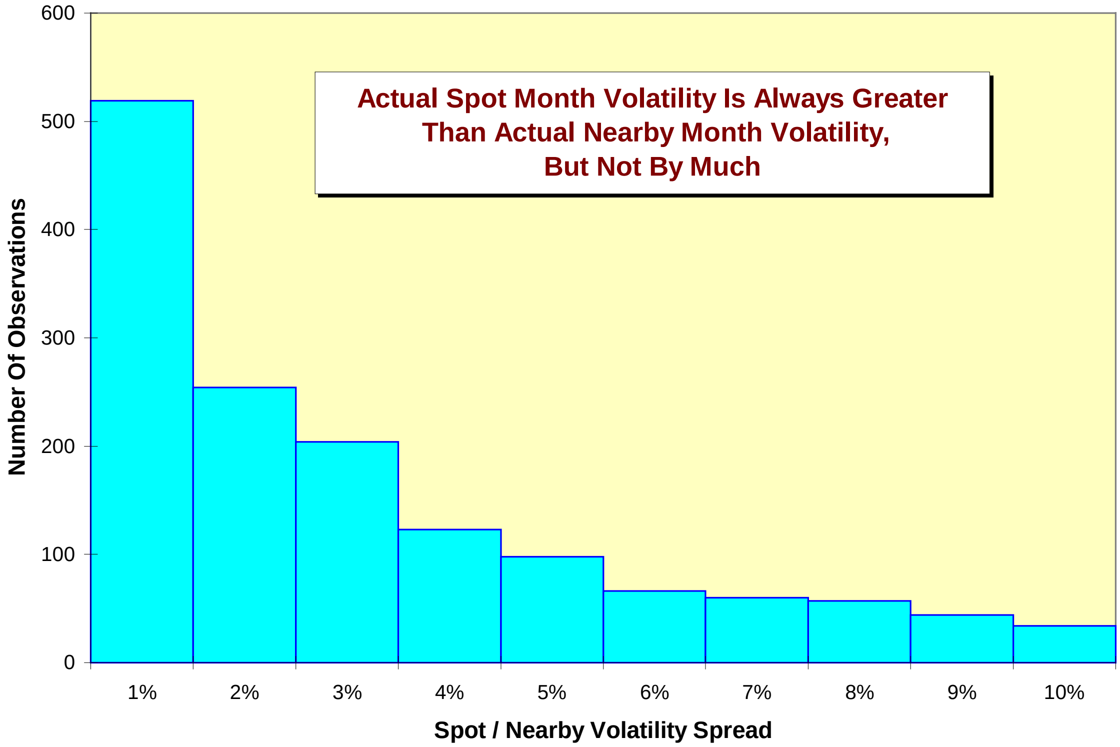
Consider the oft-repeated observation that implied volatility declines from the spot month to the more distant month; some even consider the volatility curve over time to have a natural backwardation. On the surface, this is true, as illustrated by the spread between the spot month volatility and first nearby month volatility in the NYMEX crude oil market between March 1991 and November 1997. While there are a number of cases (108 out of 1676, to be exact) where the spot month volatility is lower, the normal situation is for higher – and often significantly higher – volatility in the spot month.



Does this mean that back month options are "cheaper?" The pursuit of bargains in a market is a Loser's Game; the links between futures, options, and cash markets preclude such inefficiencies (see "Backwardation Has Its Price," *Futures*, June 1994). We have a solid academic reason, the Samuelson Hypothesis, to expect the underlying price volatility of the spot month future to be greater as it is the more actively traded month and more information is available in regard the final supply/demand balance. We can calculate the 21-day close-to-close actual volatilities using the formula below for both the spot and nearby months of crude oil.

$$\sqrt{\frac{260}{21} * \sum_{t=-20}^{0} \left(\ln\left(\frac{C_t}{C_{t-1}}\right)\right)^2}$$

The results conform to prior expectations quite well, as illustrated in the graph below. The actual volatility is for the spot month is always greater than that of the nearby, but the excess is nowhere near either the magnitude nor the dispersion of the differences seen in the implied volatility comparison. Clearly, other factors must be at work.



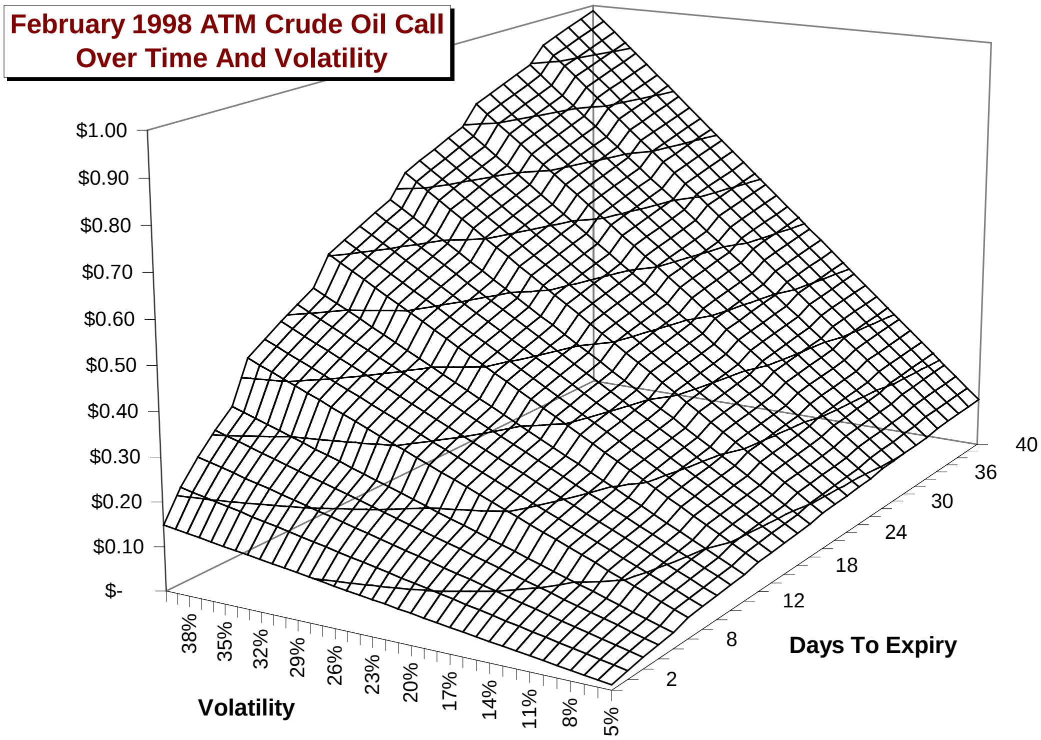
Time Premium

All option prices can be split into intrinsic value, the amount by which the option is in-the-money, and time premium. Time premium is in turn a function of time remaining to expiration, interest rates, and volatility. This is parallel to pricing a loan, which is a function of maturity, interest rates, and credit quality; both volatility in the options markets and credit quality in the capital markets represent in some part the probability of adverse events occurring.

The analogy between loans and options breaks down quickly as the three components of time premium increase. A loan has no upper bound: If we keep increasing the maturity or interest rate, we will keep increasing the value of the loan. However, option prices have upper bounds: A call option on a stock, for example, can never exceed the price of the stock; otherwise, why buy the call instead of the stock? The same is true for a put option, since a put that was more expensive than the underlying asset would imply a willingness to sell for a price less than zero.

The same observed price, time premium, must accommodate the interactions between these three components. In addition, the final option price must accommodate the arbitrage relationships between the forward curves of both interest rates and the underlying futures. It is these accommodations that produce the declining forward curve of volatility.

Since short-dated options are not very sensitive to interest rate fluctuations, let us focus on the interactions of time to expiration and volatility. Please notice in the graph below that the effects of volatility on the price of a February at-the-money (ATM) crude oil call option are linear, all else held equal, but that the effects of time decay accelerate as a function of $\sqrt{days/260}$. As volatility increases, the monetary effects of time decay become even greater as expiration approaches since time premium must, by definition, decay to zero by expiration.



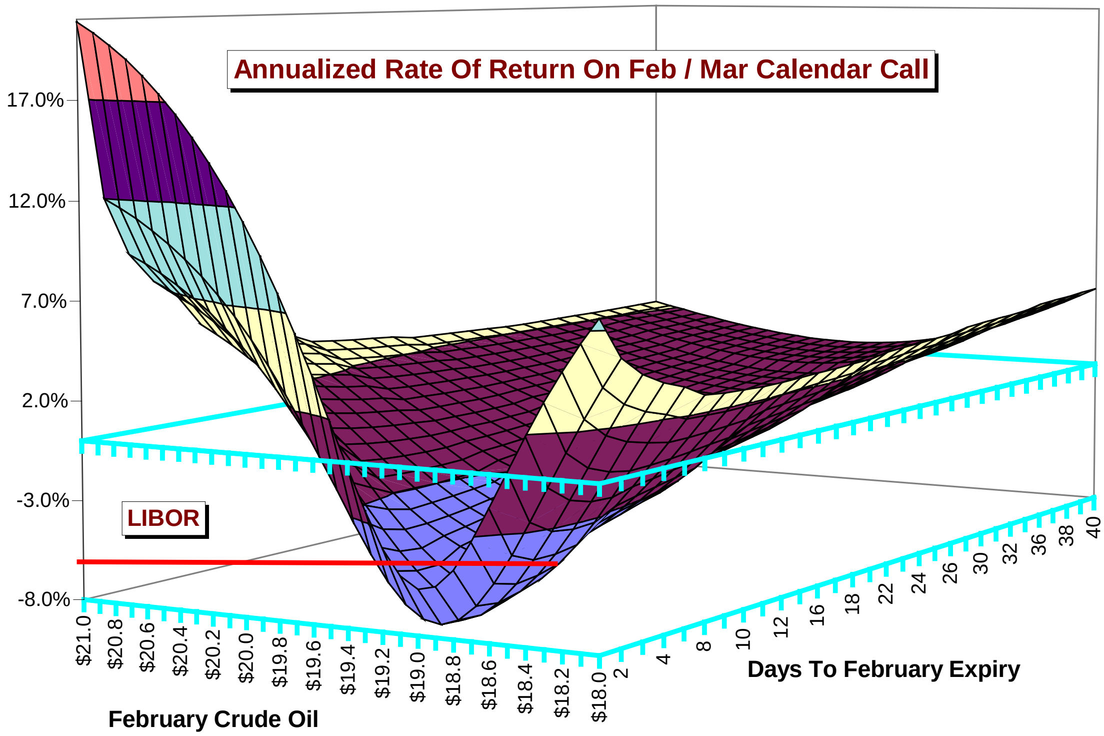
A Synthetic Loan

Now let's compare the market conditions for February and March 1998 crude oil at the close of business on December 5, 1997.

	Feb	Mar
Future	$ 18.98	$ 19.13
$19 Call	$ 0.61	$ 0.84
Volatility	23.99%	22.69%
Days	43	75

The crude oil market is in a carry, as opposed to its more common state of backwardation. In our base case, we should expect the March price to converge downward to the current February price, which in turn should converge downward to the current January price of $18.71. The $0.15 Feb/Mar spread should expand to the current Jan/Feb spread of $0.27 by the time the February options expire.

We can construct an annualized rate of return map of our expected gains from buying the February $19.00 call at $0.61 and selling the March $19.00 call at $0.84. This annualized rate of return can be compared to LIBOR, repurchase agreements, or commercial paper. The annualized rate of return for the calendar call spread -- which can be restated as the net interest rate derived from borrowing in February and lending in March -- must be lower than the comparable interest rate level at expiration and around unchanged price levels in order to reflect its far greater risk. This is confirmed in the graph below.



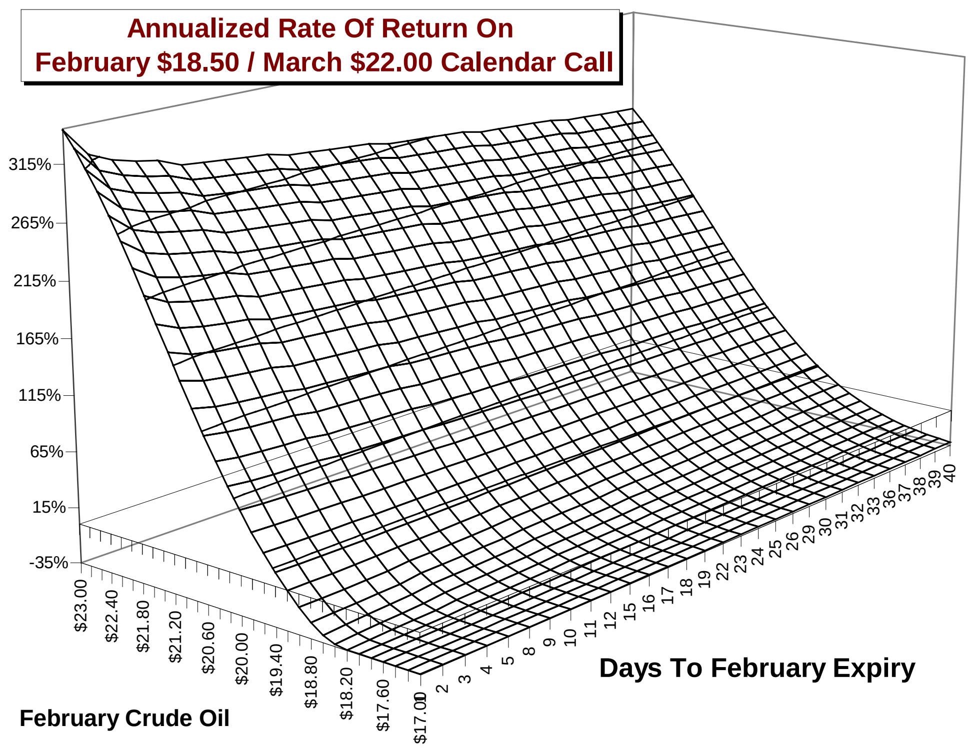
Once volatility levels start to rise in the back months, so does the possibility of making money on the type of trade seen above. If we were to raise the volatility on the March $19.00 call from 22.69% to 23.99%, a fairly small move, we would raise the minimum rate of return in the graph above from a cost of 7.85% to a cost of 5.05%. This level would approximate the one-year Treasury Bill rate, and markets do not reward risky borrowers who wander in seeking a risk-free rate.

Making A Difference

While the February / March $19.00 calendar call spread involves the expectation of paying a net interest cost, and does not provide much in the way of participation in price moves, we can structure a position using the Dynamic Option Selection System (DOSS, see “Using Options The Spec Way,” *Futures*, July 1994) that opens the door to becoming both a net lender and a participant in upward price moves. The recommended DOSS calendar call spread is:

Buy the February $18.50 call at $0.81 and sell the March $22.00 and $0.12

The net annualized return on this trade looks considerably different than the $19.00 calendar call spread. First, the return has a very low exposure to time decay. Second, the return profile over price and time looks rather like that of a call option itself, with a definite bottom near a 35% net borrowing cost and an open-ended net lending wing. Third, the worst-case occurs as the result of a directional move, and not as the result of stagnation over time.



This return structure results not from searching for any sort of “cheaper” volatility, which we have seen cannot exist due to interest rate considerations, but from the nature of position itself. By purchasing an in-the-money option, we trade off greater initial cost for lower exposure to time decay, which is the same thing as increasing a down payment and reducing subsequent interest costs. By selling an out-of-the-money option, we trade off lower initial cash receipts for a higher probability that the March $22.00 call will expire worthless.

Four out of five traders may hate paying option premium. Many traders, speculators and hedgers alike, are fearful of option trading. Maybe there’s a connection here.