3rd Quarter 2010 Volatility Monitor

Volatility is one of several key inputs into mathematical option on futures pricing models along with market price, strike price, term until expiration and short-term interest rates. While market price movements exert the most obvious impact upon the option premium, volatility remains a very important factor. So much so that many traders strive to predict future levels of volatility and engage in so-called "volatility plays" as a result.

Traders may "buy volatility" generally by buying options; or, "sell volatility" by selling options, often in concert with the placement of a hedge in the futures market structured by reference to the net delta associated with the option positions.

This report represents an update of volatility through the 3rd quarter 2010 in the most significant CME Group products.

Historic Volatility – There are many ways to measure volatility in any particular option market. "Historic volatility" is a reference to the annualized standard deviation of day-to-day price movements in the market that underlies the option of interest. This figure is generally calculated over a particular prior time period, *e.g.,* 30 days, 60 days, 90 days, etc. Note that over the past month (roughly 30 calendar days), there are generally 21 trading days; 42 trading days over the past 60 calendar days, etc. An annualized historic volatility (HV) is generally calculated using the following formula, assuming that there are 252 trading days in a calendar year.

$$HV = \sqrt{252} \cdot \sqrt{\left(\frac{1}{n}\right)\sum_{i=1}^{n}(X_i - \bar{X})^2}$$

$$X_{i+1} = \ln\left(P_{i+1}/P_i\right)$$

Where:
P = Price of underlying market
N = Number of business days in period, generally 20 for 1 month; 40 for 2 months, etc.

Implied Volatility - Implied volatility (IV) may be thought of as the volatility that is implicit in the premium associated with any specific option. You can use any number of available mathematical option pricing models to derive the (theoretical) option on futures premium as a function of the current market price (P), strike price (S), volatility (V), term until option expiration (t) and short-term rates (r).

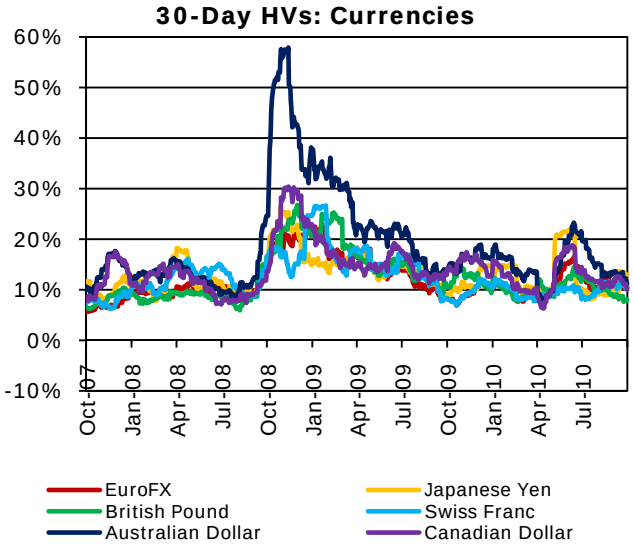
$$Premium = f(P, S, V, t, r)$$

But there may be no need to calculate the theoretical option premium when the premium may be observed in a competitively traded marketplace. An implied volatility (IV) is derived by solving the option pricing formula to find volatility as a function of market price, strike price, term and short-term rates.

$$IV = f(Premium, P, S, t, r)$$

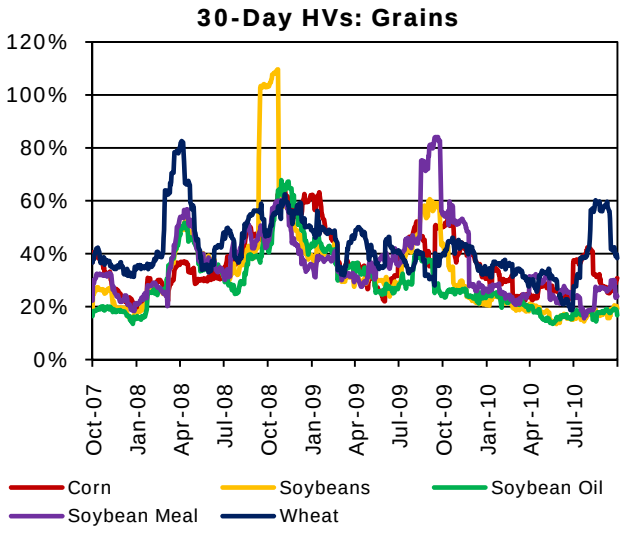
Unfortunately, solving a mathematical option pricing model such as the Black formula (1976) for options on futures results in an unsolvable polynomial. However, it is possible to utilize a computer assisted iterative methodology quickly to converge to a solution.

Mean Reversion – While volatilities may vary considerably over time in the context of any given market, they do tend to hover towards a long-term mean or characteristic level. Thus, option traders often find it useful to study those average levels in the hopes of identifying mispriced options.

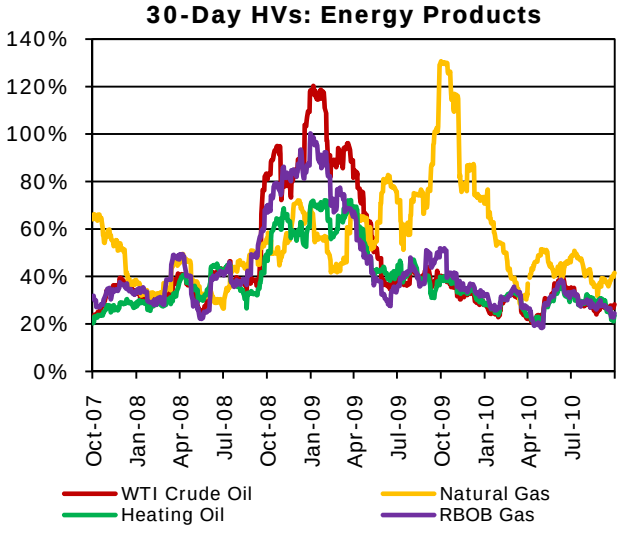


One popular technique is to study the average (median) volatility observed in the marketplace over the past year or past three (3) years. The tables found at the conclusion of this document provide the median, maximum and minimum levels of 30-day historic volatilities in a sampling of some of the most actively traded CME Group markets including the interest rate, stock index, currency, energy, grain, precious metal and livestock complexes.

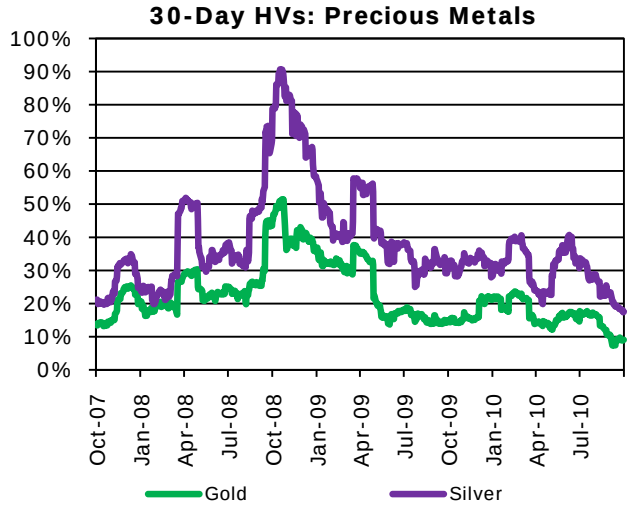
We further include graphics of 30-day historic volatilities over the past several years. Generally, we examine volatility in the lead or nearby month, with the exception of Eurodollar futures where the 3rd month generally represents the most actively traded contract.



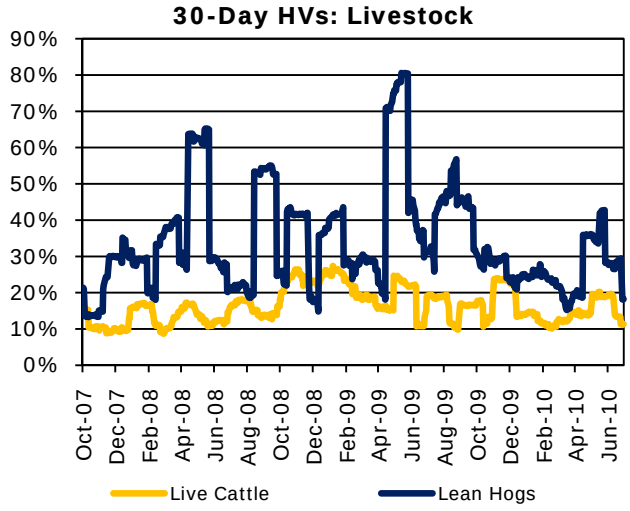
Comparing HV and IV - We might compare those levels to current implied volatilities in actively traded options to get a feel for whether options are reasonably priced relative to historic averages.



E.g., a call exercisable for December 2009 corn futures was struck at $3.45/bushel and settled at 16-½ cents per bushel on September 30, 2009. December 2009 corn settled at $3.44/bushel and, therefore, the 345 call may be considered to be at- or reasonably near-to-the-money. The implied volatility for this option may be calculated at 33.11% while the 1-year median observation for 30-day HVs in nearby corn futures was at 34.46%. Thus, this at-the-money call volatility was reasonably close to observed volatility over the past year, falling somewhere between the 40th percentile and the median HV observed over the past year.



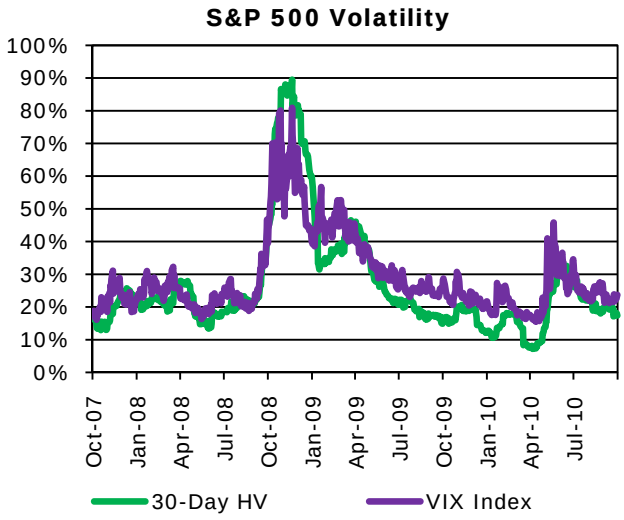
The 3-year median observation for 30-day HVs was at 30.10%. The IV of 33.11% is below the median but above the 40th percentile observed over the past 3 years. Either way, the current IV looks reasonable but maybe a little low by historic standards.



The 1,055 struck call exercisable for December 2009 S&P 500 futures traded at 44.15 on September 30, 2009 for an IV=23.11%. This is above the 1-year median of 21.42% and lies between the 60th and

75th percentiles. It is likewise higher than the 3-year median at 18.03%, falling between the 60th and 75th percentile.

Implied Volatility Index – Traders often reference the IV associated with at- or near-the-money calls or puts as standard reference for where traders (implicitly) believe volatility will be between the current point in time and option expiration. As such, IVs are "forward-looking" while HVs may be regarded as "backwards-looking."



But the IV for any particular option may be a bit different than the IV for another option even where the two options are based upon the same underlying instrument with the same expiration date. That may be explained by the fact that traders may impute more or less value to options that are in- or out-of-the-money.

The CBOE S&P 500 VIX Index is a popular measure referencing IVs. It represents an average IV sampled over a variety of liquid CBOE S&P 500 options. While the VIX and 30-day HVs typically run up and down in parallel, the 30-day HV tends to be a bit over-reactive relative to the VIX. *I.e.,* traders' aggregate expectations regarding volatility in the S&P 500 tend to be a bit more stable than the 30-day historic average.

Concluding Notes - Finally, please be aware that volatilities associated with Eurodollar futures are calculated based on the implied yield of the instrument where yield = 100 less the quoted price. Because yields have fallen to historical lows, the base of the volatility calculation becomes very low and tends to inflate the calculated volatility.

We do not, of course, purport to offer specific trading advice. Rather, our purpose here is to provide an enhanced understanding of volatility as one of the prime drivers of option premiums and to illustrate a simple but popular way of regarding volatility.

For more information, please contact …

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30-Day Historical Volatilities over 1-Year Window

(10/1/09 to 9/30/10)

	Percentiles								
	Max	90%	75%	60%	Median	40%	25%	10%	Min
INTEREST RATES									
Eurodollar (3rd Month)	143.55%	106.13%	85.58%	79.18%	**72.95%**	23.97%	53.32%	41.82%	21.43%
T-Bonds	22.28%	18.24%	14.59%	13.03%	**12.20%**	8.46%	10.06%	9.11%	7.52%
10-Yr T-Notes	17.54%	12.29%	9.67%	8.24%	**7.75%**	5.70%	6.58%	5.49%	4.27%
STOCK INDEXES									
S&P 500	89.48%	44.62%	27.84%	22.70%	**21.42%**	16.01%	17.57%	13.88%	7.23%
Nasdaq-100	90.55%	39.58%	29.47%	24.71%	**22.53%**	18.40%	18.51%	15.26%	7.67%
CURRENCIES									
EuroFX	22.98%	18.25%	14.15%	11.18%	**10.50%**	6.74%	8.98%	8.00%	5.57%
Japanese Yen	26.39%	18.18%	15.31%	13.35%	**11.70%**	9.29%	10.04%	9.13%	7.00%
British Pound	26.77%	20.65%	14.38%	11.81%	**10.60%**	7.31%	8.91%	7.98%	5.95%
Swiss Franc	26.64%	17.58%	14.75%	12.51%	**11.11%**	7.33%	8.97%	8.06%	6.24%
Australian $	57.91%	32.65%	21.39%	16.64%	**15.11%**	12.55%	12.60%	10.26%	7.96%
Canadian $	30.40%	18.92%	15.61%	14.18%	**13.20%**	10.96%	10.81%	8.62%	6.30%
ENERGY									
WTI Crude Oil	120.25%	88.86%	43.23%	38.36%	**36.52%**	32.04%	30.29%	25.87%	20.29%
Natural Gas	130.66%	77.29%	64.95%	54.42%	**50.00%**	54.93%	40.99%	33.69%	26.46%
Heating Oil	72.14%	62.68%	43.67%	37.78%	**34.23%**	25.26%	29.24%	25.90%	19.92%
RBOB Gas	100.27%	77.46%	48.48%	39.29%	**36.51%**	31.98%	30.64%	27.08%	18.31%
GRAINS									
Corn	63.51%	52.02%	42.55%	36.91%	**34.46%**	26.61%	28.22%	24.16%	18.80%
Soybeans	109.63%	53.24%	41.08%	33.35%	**29.49%**	21.35%	20.43%	17.12%	13.42%
Soybean Oil	67.78%	44.95%	36.74%	30.52%	**26.42%**	18.34%	19.23%	16.64%	13.51%
Soybean Meal	84.08%	54.17%	43.98%	37.31%	**32.68%**	26.18%	26.57%	23.05%	15.63%
Wheat	82.53%	57.41%	48.81%	42.78%	**40.19%**	35.37%	34.76%	31.46%	18.72%
PRECIOUS METALS									
Gold	51.44%	36.41%	26.35%	22.16%	**20.14%**	14.61%	15.78%	14.04%	7.37%
Silver	90.65%	57.69%	41.22%	35.94%	**33.44%**	21.17%	28.78%	22.83%	17.39%
LIVESTOCK									
Live Cattle	27.34%	23.48%	18.97%	16.58%	**15.08%**	10.04%	11.85%	10.45%	8.70%
Lean Hogs	80.56%	54.01%	41.43%	33.54%	**29.42%**	15.04%	23.71%	18.99%	13.29%

30-Day Historical Volatilities over 3-Year Window

(10/1/09 to 9/30/10)

	Percentiles								
	Max	**90%**	**75%**	**60%**	**Median**	**40%**	**25%**	**10%**	**Min**
INTEREST RATES									
Eurodollar (3rd Mo)	122.73%	98.71%	83.67%	78.93%	**73.99%**	70.32%	65.98%	52.15%	41.08%
T-Bonds	14.81%	13.23%	12.10%	11.18%	**10.83%**	10.28%	9.70%	9.23%	7.79%
10-Yr T-Notes	7.97%	7.65%	7.23%	6.75%	**6.58%**	6.26%	5.49%	4.99%	4.27%
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