FC HistVol and FC StochVol:

Volatility Analysis

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There are many ways to define the concept of volatility. Some use the standard deviation, some the historical volatility or Chaikin's Volatility. Most of the time I use historical volatility: the standard deviation of the natural logarithm of the price change multiplied by the squared root of the yearly trading days.

Many software programs can calculate this indicator, but the current analysis of this indicator is quite simple. Every trader uses a different length, but very few analyze this indicator in depth. In my opinion, this is a mistake. Compared to momentum indicators, the analysis of volatility gives you an advantage. Oscillators tell you what is happening, while volatility tells you what is likely to happen or not.

Every trader considers a different historical volatility, thus I tried to create for my studies something similar to Pring's KST,[1] a weighted mix of different historical volatilities in order to obtain an indicator that considers several cycles.

FC HistVol[2] is a weighted average of five different historical volatilities. I found the following parameters based on Fibonacci series work well in most markets:

Historical Volatilities	Weight
10 days historical volatility	3
21 days historical volatility	3
34 days historical volatility	2
55 days historical volatility	1
89 days historical volatility	1

For currencies, it's probably better to use higher parameters because the cycles of volatility are longer. In any case, you can change weights and lengths of volatilities in order to find what works best for a market. The idea behind this indicator is a kind of "mix and match" of volatilities that have different behaviors such that the influence of every cycle is included.

The cyclicity of FC HistVol is evident. One can use trendlines, find supports, resistances and the most common reversal patterns. Remember this indicator is an algorithm of the price action, so its behavior is, or should be, technical.

The indicator that must be built on FC HistVol is called FC StochVol.[3] It is a 30-day[4] stochastic of FC HistVol with a 5-day slow stochastic. This indicator can be read as a common stochastic. With this indicator, it is possible to estimate if the level of FC HistVol is extremely high or low, entering positions when volatility is bottoming. If you enter a trade when volatility is low, and you are on the right side of the market, the next increase of volatility will push the market up;[5] while if you are wrong and the volatility is increasing, you still have time to reverse your position. Many times the increasing volatility will sustain the trend, pushing the market up to cover your previous loss.

75% of the time, trend following systems perform better with a low volatility filter based on the equation **FC StochVol** < α, where α is a number defined after backtesting. Since I always look for a robust system, I tried to define this parameter in a statistical way without any optimization. Let's suppose that the distribution of the values of the FC StochVol indicator is similar to a Gaussian bell curve.[6]

This hypothesis seems fair, especially if we consider that FC StochVol has a range between 0 and 100. Then, we can create a 126 days Bollinger Band of the indicator with one standard deviation. I chose a 126 days Bollinger Band because 126 days are equal to six months of trading days, and one standard deviation because it identifies an 84.13% interval of confidence[7] that seems to be a meaningful parameter to activate an entry rule for a trading system.

This means every time the indicator falls below its lower Bollinger Band, it tells us that the market is living an "extreme situation" of low volatility that will not last for long.

Orson System is a trading system based on a Moving Average Convergence Divergence (MACD) model with a low volatility filter. If the price oscillator crosses the zero line while the FC StochVol is below its lower Bollinger Band, the system enters the trade; exiting the position at the crossing of the price oscillator with its trigger line. The length of the exponential moving averages (7 and 23) and the length of the trigger line were defined through a statistical analysis after backtesting on 30 securities to determine the parameters that provided steady and consistent results.

This system enhances the features of a simple MACD trading model. It works well in trending markets; avoids the trades with toppish or decreasing volatility, exactly when trading ranges are likely to occur and enters a trade only when a trading range is likely to be broken, or when volatility is compressed and has bottomed. *Orson System* can also be used to trade options, buying At the Money (ATM) calls when it enters long and buying ATM puts when the system enters short. The exit signals must be used to close the options positions.

Orson System	MetaStock 6.0 code	TradeStation 4.0 Code
Enter Long	cross(mov(c,7,e) mov(c,23,e) and fml("FCStochVol")< BBandBot(fml("FCStochVol"),126,s,l)	If xaverage(close,7) crosses above xaverage(close,23) and FCStochVol< BollingerBand(FCStochVol, 126,-1) then buy this bar on close
Close Long	Cross(Mov(OscP(7,23,e,$),6,e),OscP(7,23,e,$))	If MACD(close, 7, 23) crosses below xaverage (MACD(Close,7,23),6)then exitlong this bar on close
Enter Short	cross(mov(c,23,e) mov(c,7,e) and fml("FCStochVol")< BBandBot(fml("FCStochVol"),126,s,l)	If xaverage(close,7) crosses below xaverage(close,23) and FCStochVol< BollingerBand(FCStochVol, 126,-1) then sell this bar on close
Close Short	Cross(Mov(OscP(7,23,e,$),6,e),OscP(7,23,e,$))	If MACD(close, 7, 23) crosses above xaverage (MACD(Close,7,23),6)then exitshort this bar on close

Sometimes this system enters too early, so you will have to wait a few days for the move, or it requires a reversal of position, but you will be in the market in the next sharp move.

I tested this filter with several entry and exit points such as RSI overbought/oversold crossovers, Directional Movement Index (DMI) and breakouts, and 75% of the time it increased performance and the average win/average loss ratio. On the other hand, the main disadvantage of this filter is that it reduces the number of trades.[8] An end-of-the-day trader needs to run a system based on this filter on many instruments, because the number of trades is really low. As for real-time trading, I strongly suggest using this filter, but using a time frame higher than 30 minutes, because many times volatility at lunch times decreases during those hours; the system could be whipsawed.

Obviously, this indicator is helpful in options trading. It tells you when it is better to buy or sell options, or, as options traders say, "buy or sell volatility." With this indicator, one can trade just one options strategy: long Out of the Money (OTM) strangle and short OTM strangle. When the volatility is extremely low and the indicator is below α, you can buy some straddle or OTM strangle. In that situation you will pay a low implied volatility, and when volatilities are so compressed, it is likely that a sharp move will occur in the next few days.

You can also wait for a crossing of the FC StochVol above its trigger line before entering the trade; but you will pay a little higher implied volatility because the first step of the move, which causes the increase in the FC StochVol indicator, has already been made. Then, it is possible to close the wrong side of the strangle and transform it into a long call or a long put. In this part of the volatility cycle, when the volatility is extremely low and it starts to increase very quickly, it is very risky to trade against the trend; every reversal signal should be used just as an exit point.

This oscillator can be used as a trend forecaster indicator. Compared to conventional trendiness indicators, FC StochVol has an advantage. While ADX, Vertical/Horizontal Filter (VHF), R-Squared tell you the trendiness and the strength of the current move, FC StochVol tells you what is likely to happen, or not. This means that in some cases one can't say what will happen but one can say what is not likely to happen. Consider an upside move and resistance that are going to be tested with a toppish FC StochVol above both 80 and α.[9] In my opinion, this resistance is likely to be confirmed because volatility reached its top. This does not mean that I know if the market will reverse the trend or if it will form a congestion phase; it only means that I can suppose what the market will not do. This is a major advantage if one writes options. In this case, one can sell some OTM calls or strangles[10] taking advantage of a very high implied volatility.

My personal theory is that markets work as a spring-loaded toys. When the FC StochVol is very low and is bottoming, the spring is charged and the strength of the next move will be related to that low, while price tops and bottoms following a sharp vertical move are related to toppish behavior. Ralph Acampora taught me, "the longer the base, the longer the trend." Think about it in terms of volatility: a long and narrow trading range reduces the standard deviation and, consequently, the volatility[11]. Length and magnitude of the trading range charge the spring, creating a stronger move; we can say "the lower the volatility, the stronger the move."
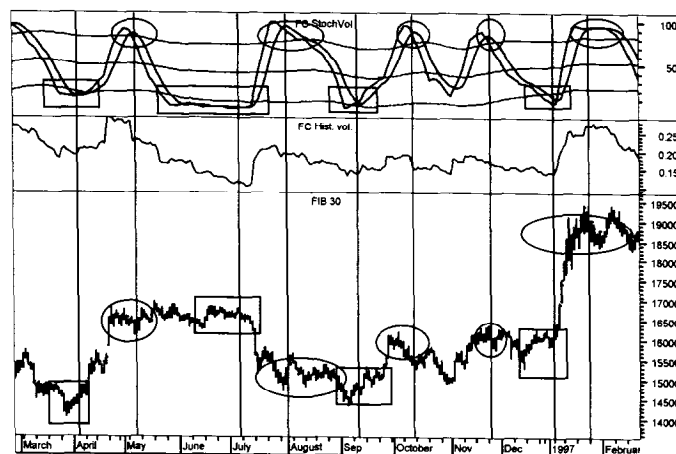
Let's look at a few charts:

Exhibit 1 : FIB 30 Italian Stock Index Future

Exhibit 1 shows the perpetual contract of the Italian Stock Index Future FIB 30. Every rectangle shows a situation of very low volatility with the FC StochVol below its lower Bollinger Band. The vertical lines indicate the crossing of FC StochVol with its trigger line while the price is in a trading range and ready for a vertical move. In April 1996 there was very low volatility, followed by a big vertical move and an explosion of FC StochVol. Just after the rally, the oscillator FC StochVol above 80 and its upper Bollinger Band indicated that market and volatility were toppish. Think about selling some OTM calls!

After several days, the market formed a narrow trading range and volatility reached its lowest low. The FC StochVol indicator was telling us that something was going to happen. Even if we didn't know where the market was going, we could have purchased some ATM strangle, paying low implied volatility. In the next few days the market had a strong correction. But after this move, we could identify another trading opportunity with toppish volatility, playing the trading range after the identification of the support or selling some OTM put. Time and decreasing volatility did do the rest.

Again, after the activation of the "low volatility filter," it was possible to enter a new trade. Even if one couldn't identify the direction of the next move, buying an ATM strangle would have been a good idea. Usually, when the indicator crosses below its adaptive level, the market is ready for a new vertical move that will increase the implied volatility. In this case, the long strangle position would take advantage from this phenomena on both sides; the price of the put would be sustained a little because of the increase of volatility, while the price of the call would explode.

Now look at what happened in December 1996: very thin market because of Christmas holidays formed a trading range that pushed FC StochVol below 15. Three days before Christmas day, I sold a strangle 15000-16500 January at 142 and I recovered it on January 8 at 31 because the volatility was too low and I was waiting for another vertical move. The next few days were an "inferno" for traders that shorted calls. The market and implied volatility exploded and the call I recovered at 19 went up to 1200 in three days.

Now let's look at an American stock: Motorola. The rectangles indicate the bottoms of volatility while the ellipses indicate the tops. Again, lows of volatility are related to horizontal moves while tops of volatility are related to important tops or bottoms. This means we can realize when a new move is likely to come or when the market is going to form a congestion phase.
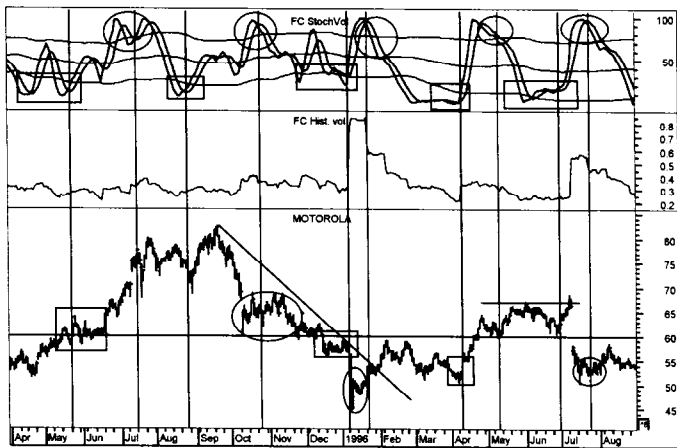
Exhibit 2 : Motorola

In June 1995, a consolidation phase reduced volatility, then there was a vertical move to the upside. Please note that the first top of the double top was made with toppish volatility and FC StochVol above 80. During the formation of the reversal pattern, the indicator collapsed, but after the breakout of the support at $70, the volatility reached a relative top above 90. That was the time to sell options and wait for a possible confirmation of major supports and resistances. In fact, since FC StochVol crossed below the trigger line, it took 18 trading days to break the support at $60. The indicator formed three higher lows in August, November and December. Volatility continued to be high – a sign of the strength of the current trend. At the end of December 1995, volatility reached a relative low and then the stock collapsed because earnings were worse than expected.

In March 1996, FC StochVol was below its lower Bollinger Band boundary but after its crossing of the trigger line a nice rally[12] occurred. In June and July 1996, Motorola was in a trading range between $60 and $67, volatility reached lows, FC StochVol was constantly below 20, then the stock gapped down and collapsed. Just when volatility reached the top and the FC StochVol indicator crossed below the trigger line, the security found and confirmed support at $52-1/2.
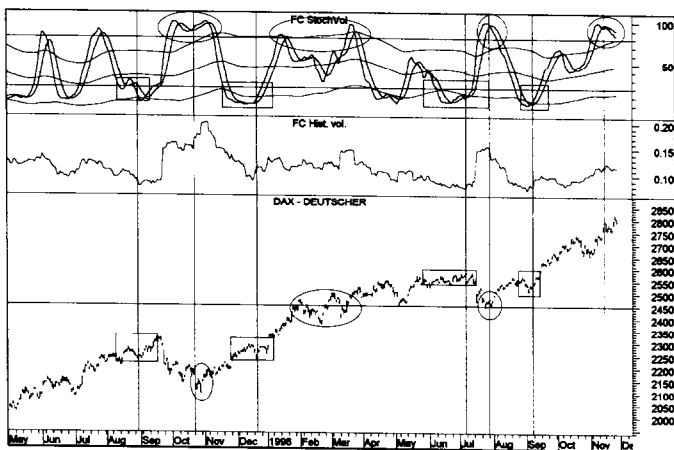

Exhibit 3 : IBIS DAX German Stock Exchange Index

The DAX shown in Exhibit 3 is the stock index of the German Stock Exchange. Most of the time the FC StochVol indicator worked well. Tops of volatility were in conjunction with important tops and bottoms, while narrow trading ranges made FC StochVol fall below its lower boundary.

Between June and July 1996, the FC StochVol showed very low volatility and when the indicator crossed above the trigger line, the market made a 10% downside move finding the bottom in conjunction with the top of FC StochVol. In the last half of December 1995, the FC StochVol fell below its lower band, while the DAX was testing major resistance at 2300. The volatility charged the "spring-loaded toy" and the German index rallied 200 points, reaching 2500 at the end of March while the indicator was crossing the trigger line in overbought area.

In July 1996 the DAX was in a narrow trading range and the indicator was close to zero. Then, the market collapsed from 2570 down to 2450 in three trading days while the FC StochVol was rising quickly. Again, when FC StochVol reached the top boundary and crossed below the trigger line, the market confirmed support at 2450. In the first half of September, the FC StochVol indicator fell below 20 and crossed above the trigger line. The DAX broke resistance at 2570 and rallied another 200 points up to 2750.
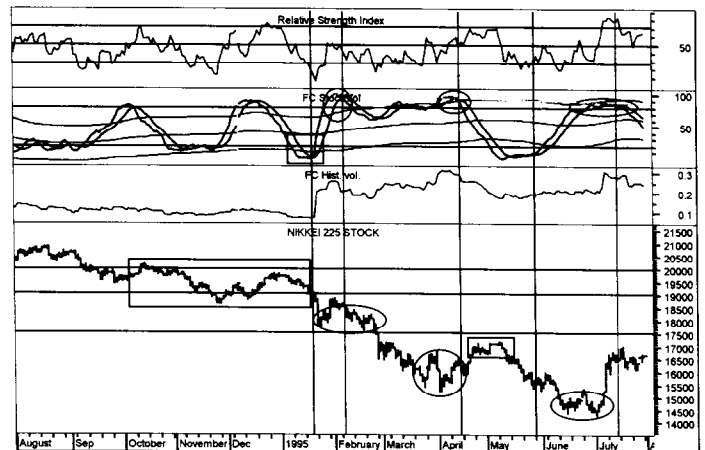

Exhibit 4 : Nikkei Japanese Stock Exchange Index

Exhibit 4 shows the Nikkei 225 Index between August 1994 and July 1995. In the last half of December 1994, the Nikkei formed a narrow trading range between 19500 and 20000. When the indicator fell below 20, the "spring was loaded." In the next few days the market suffered a 1000 points correction testing and confirming support at 18000. When the indicator rose above 80, the market confirmed support at 18000, and when the indicator crossed below the trigger line, the Nikkei ended its pullback, finding a short-term resistance.

Nevertheless, during those days, the Japanese market remained very volatile and continued its correction. The indicator crossed above the moving average confirming the extreme volatility of the market, but when FC StochVol crossed for the second time below the trigger line and fell below 80, it stated that the market had reached major support. Between April and May, the Nikkei made a pullback, retested the 17500 resistance, while the FC StochVol indicator fell below 20. Then, the market continued the previous downtrend, breaking down support at 16500 while the indicator crossed above the trigger line, another confirmation of the strength of the current trend.

The volatility reached the top and FC StochVol rose above 80. The index formed a double bottom between 14500 and 15500 that decreased volatility and the oscillator crossed below the trigger line.

This chart also displays the Relative Strength Index. Note the long-term positive divergence RSI – Nikkei – FC StochVol. Three consecutive lower lows for the price, three consecutive higher lows

for the RSI ,and three consecutive lower highs for the FC StochVol with the first two highs above the upper boundary and the third that failed the crossing of the adaptive level. This can be read as a loss of momentum of volatility, something like "the spring charge is weakening," confirmed by the RSI that formed a positive divergence. We can say that a divergence between price and RSI (or any other momentum indicator), confirmed by toppish FC StochVol, means that the current trend is ending. In fact, divergences in momentum indicators imply a loss of momentum of price, weakening of the current trend and possible reversal, while toppish FC StochVol is related to possible consolidation phases. Divergences in momentum indicators, filtered with toppish FC StochVol above its upper Bollinger Band, provide fewer whipsaws because the loss of momentum of price action is confirmed by a loss of momentum of volatility. This is an excellent entry point for options writers who want to sell volatility.

Summary

■ Historical volatility is useful for both technical analysis and options trading.

■ Bottoms of volatility confirmed by FC StochVol indicator below 20 and/or below its lower Bollinger Band boundary are related to possible breakout of congestion phases.

■ Tops of volatility confirmed by FC StochVol indicator above 80 and/or above its upper Bollinger Band boundary are related to temporary interruption of the current trend and formation of congestion phases (rectangles, triangles, flags, pennants).

■ Higher lows of FC StochVol indicator are related to strength and continuation of the major trend.

■ Lower highs of FC StochVol indicator are related to maturity of the major trend and formation of important peaks or troughs, especially if the most recent highs fail to cross the upper boundary.

■ Divergences in price-momentum oscillators confirmed by toppish FC StochVol above 80 and/or above its upper Bollinger Band boundary are more reliable.

■ Traders should consider volatility more precisely. Too often I meet traders considering volatility as "the unknown beast" or, more commonly, talking about it in a very confusing manner and many of them, when they lose money, accuse "the volatile market" for their losses. I hope this article will help them because volatility helps me every trading day.

Footnotes

1. *Many thanks to Martin Pring; KST is for "Know Sure Things."*

2. *Where FC HistVol is for "Francesco Cavasino Historical Volatility."*

3. *Where FC HistVol is for "Francesco Cavasino Stochastic of FC HistVol."*

4. *The length of the stochastic can be modified to change the reactivity of the indicator. I found that lengths from 21 up to 80 work well on a daily basis.*

5. *Or down.*

6. *N(0,1).*

7. *The likelihood of the hypothesis (lower band < FC StochVol < higher band) is asymptotic to 68.6% but the likelihood of the hy-*

pothesis (lower band < FC StochVol) is asymptotic to 84.13% based on the hypothesis that the distribution of the values of the indicator is similar to a standard bell curve N(0,1).

8. *A trading system based on crossing of two moving averages and a low volatility filter usually enters from 5 to 12 trades per year.*

9. *Where α is the value of the upper Bollinger Band of FC StochVol.*

10. *Better if delta neutral.*

11. *This means a low value of FC StochVol.*

12. *From $57 up to $67.*

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Dottore Francesco G. Cavasino was graduated in 1996 from Bocconi University in Milan, and wrote a thesis entitled "Comparing Western and Japanese Technical Analysis Charting Techniques," which was published by Società Italiana di Analisi Tecnica (SIAT), the Italian member of IFTA. He studied technical analysis at the New York Institute of Finance and he is a professional trading systems developer and options trader. Francesco will teach the forthcoming options course of SIAT. He dedicates this paper to *Orson Indios dell'Armida.*