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[PowerTools for eSignal]

Engineering Better Bollinger Bands

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Folk Finance

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Pete asked me what I thought about “Sigma Channels” by Hamzei Analytics. I had never heard of this indicator, but on first glance, it reminded me of Bollinger Bands. It didn’t take long to figure out that they were Bollinger Bands with two additional “standard deviations” plotted. [DOWNLOAD PDF] The example used in their presentation [...]

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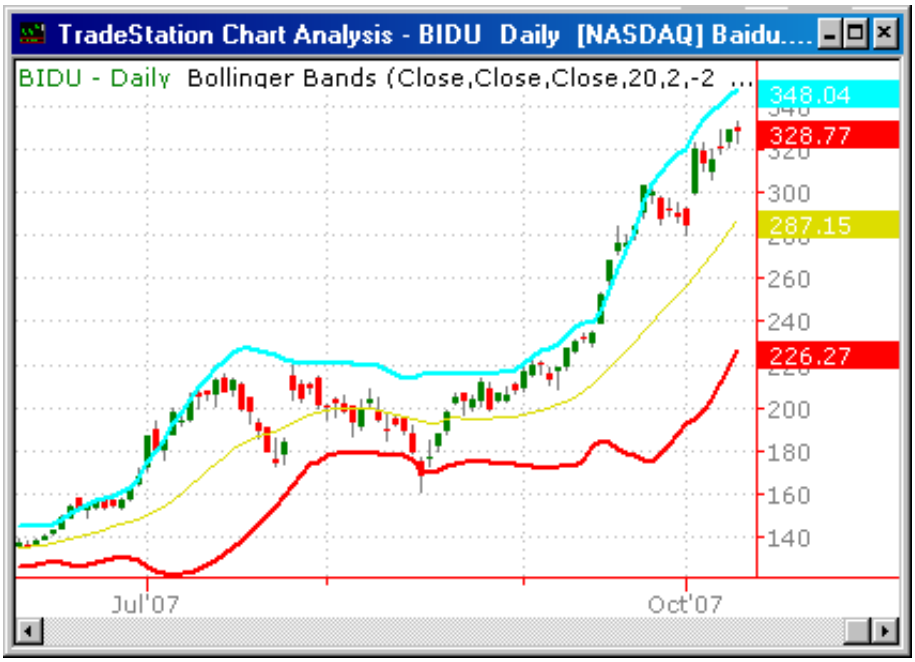
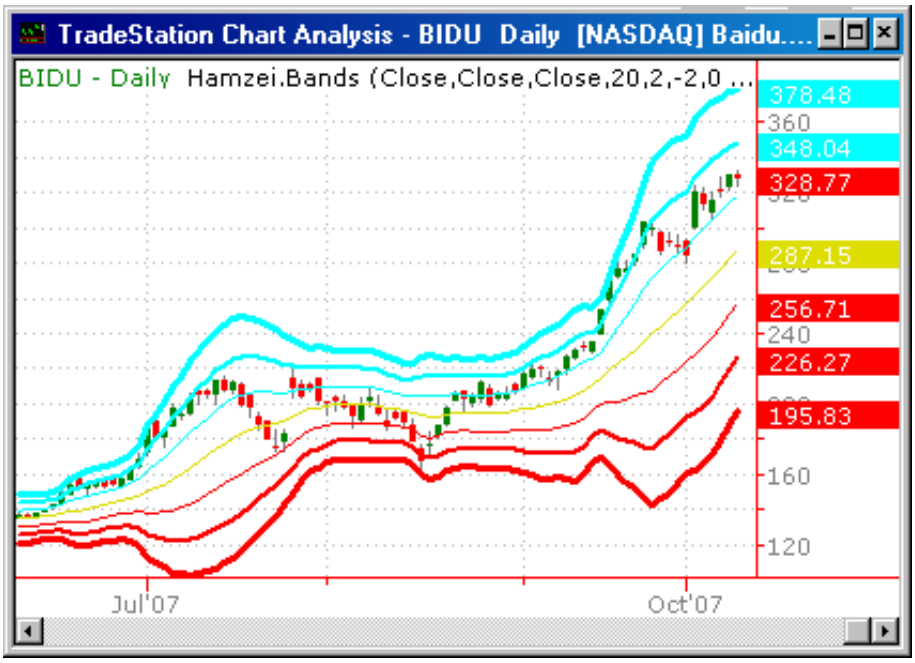
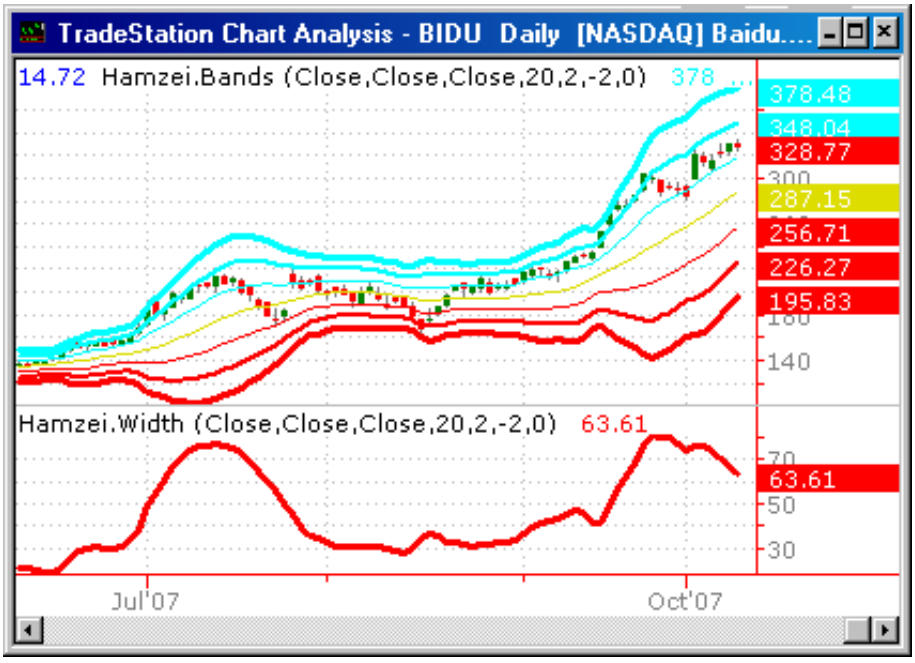


The example used in their presentation was the daily chart of BIDU ending October 9, 2007. Here, I applied Bollinger Bands right out of the can in TradeStation 8. The indicator plots +/- 2 standard deviations of the closing

prices from the last 20-bars around the 20-period moving average. You can see that the upper band, lower band and moving average all match those found on the chart from the Hamzei presentation.



In addition to the Bollinger defaults, Hamzei Sigma Channels also plots +/- 1 and +/- 3 standard deviation of price. Again, all values match the ones found on the chart from the Hamzei presentation.



Next up was the Hamzei Sigma Channel Width. The indicator subtracts the value of the lowest band from the value of the highest band and divides it by the value of the moving average. It is then converted to percent. In this case,

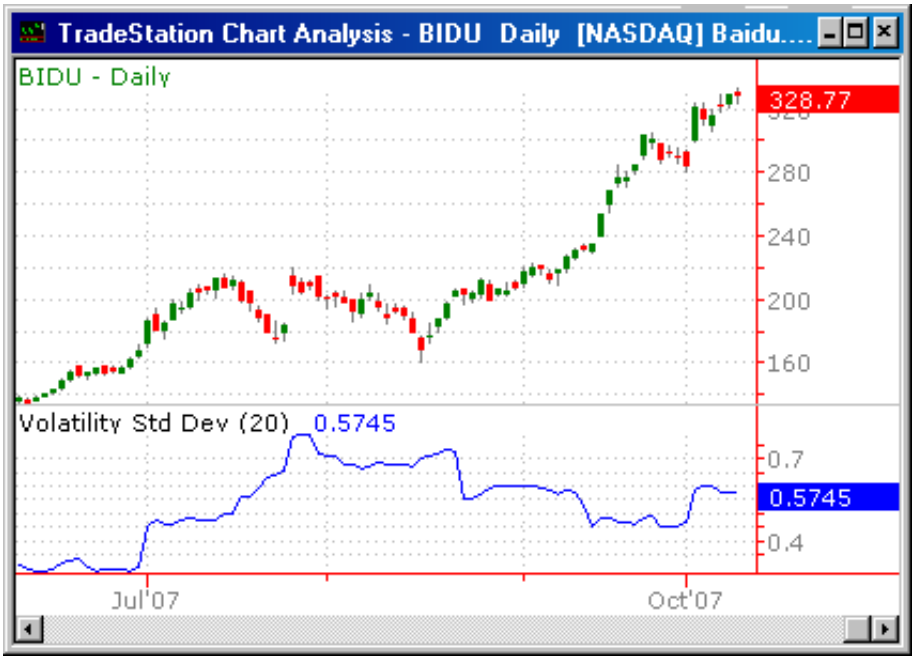
$378.48 – $195.83 = $182.65/$287.15 = 0.6360787 * 100 = 63.60787%

The width of the band is 63.61% of the 20-day average closing price. What this implies is that 99.73002% of prices are expected to fall between $195.83 and $378.48. This type of information wouldn't help me unless I was trading blindfolded. Or playing pin-the-tail-on-the-donkey.

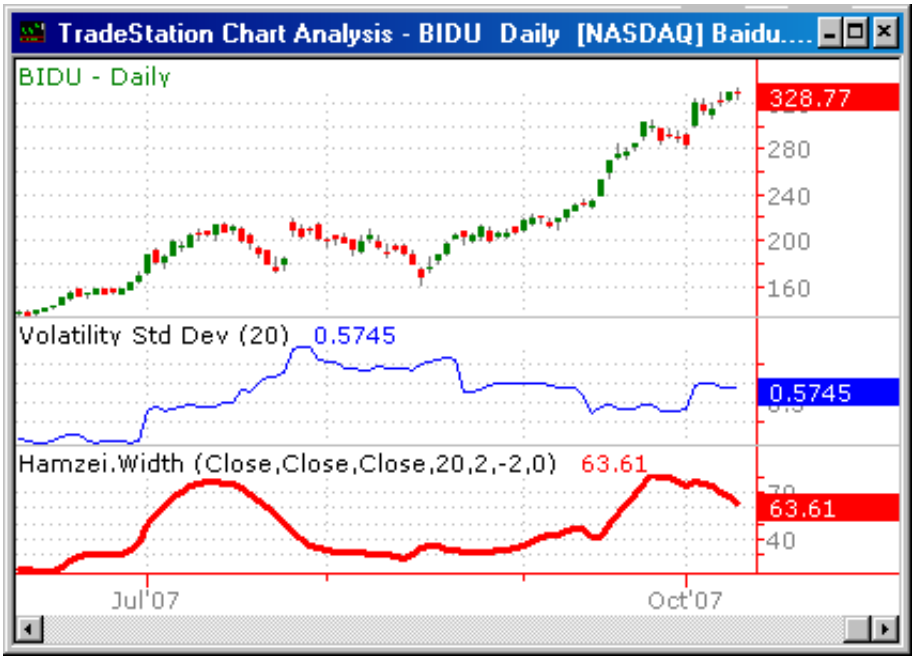
OBSERVATIONS AND COMMENTS

Bollinger Bands and Hamzei Sigma Channels suffer from the same type of flaws as the Kase Dev-stops. To repeat, there are obvious procedural problems in terms of how the numbers are handled. I could go into details, but it's not my mission to fix other people's products. Suffice to say that the numbers are wrong. Better yet, I will prove it.

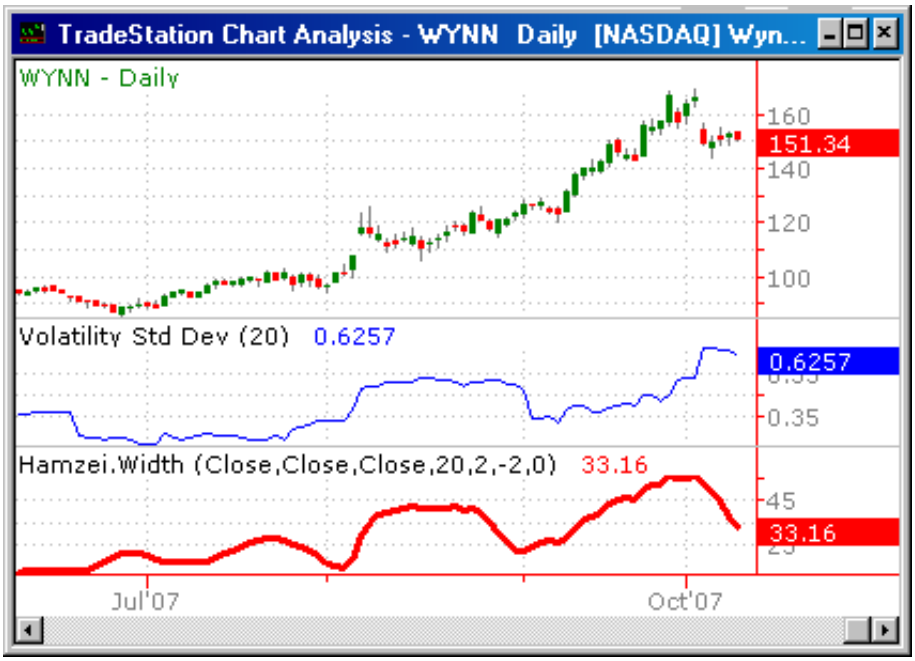
Since volatility can be precisely determined only after the fact, the point of using indicators like these is presumably to provide the best estimate ex ante. This is good news for us, since we can directly compare historical volatility vs. Bollinger Bands a.k.a. Hamzei Sigma Channels. If the curves are not a good match, we have our answer.



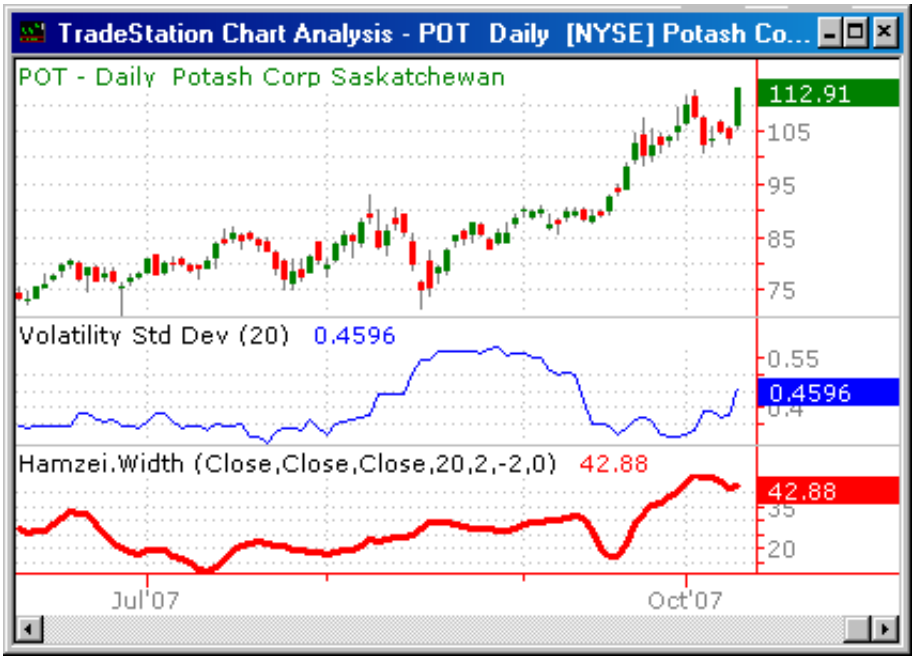
This chart shows the actual historical volatility values. We use a 20-day window to match the moving average used in Bollinger Bands. Historical volatility is a standard indicator in TradeStation.



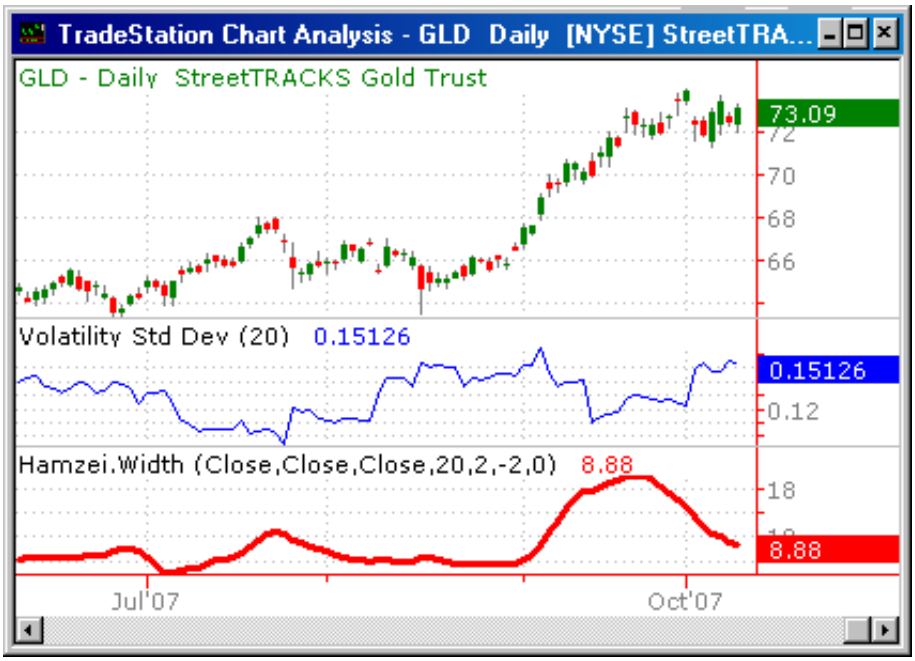
The Hamzei Channel Width was compared to historical volatility. The shape of the curves are not even close.



Let's look at some others, starting with WYNN.


TradeStation Chart Analysis - POT Daily [NYSE] Potash Co...
POT - Daily Potash Corp Saskatchewan
112.91
105
95
85
75
Volatility Std Dev (20) 0.4596
0.55
0.4596
Hamzei.Width (Close,Close,Close,20,2,-2,0) 42.88
42.88
20
Jul'07
Oct'07

POT


TradeStation Chart Analysis - GLD Daily [NYSE] StreetTRA...
GLD - Daily StreetTRACKS Gold Trust
73.09
72
70
68
66
Volatility Std Dev (20) 0.15126
0.15126
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Hamzei.Width (Close,Close,Close,20,2,-2,0) 8.88
18
8.88
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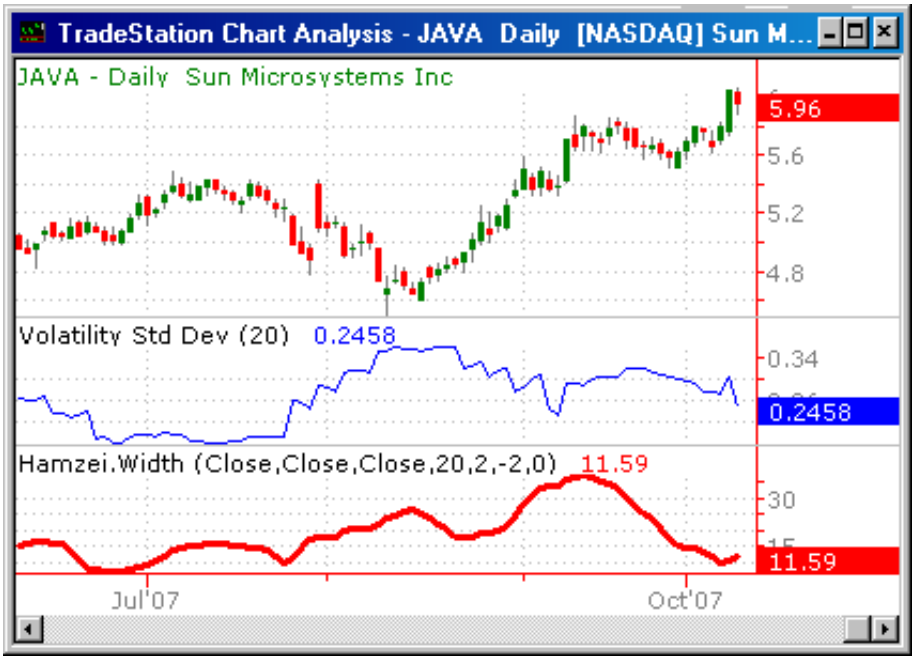
Oct'07

GLD

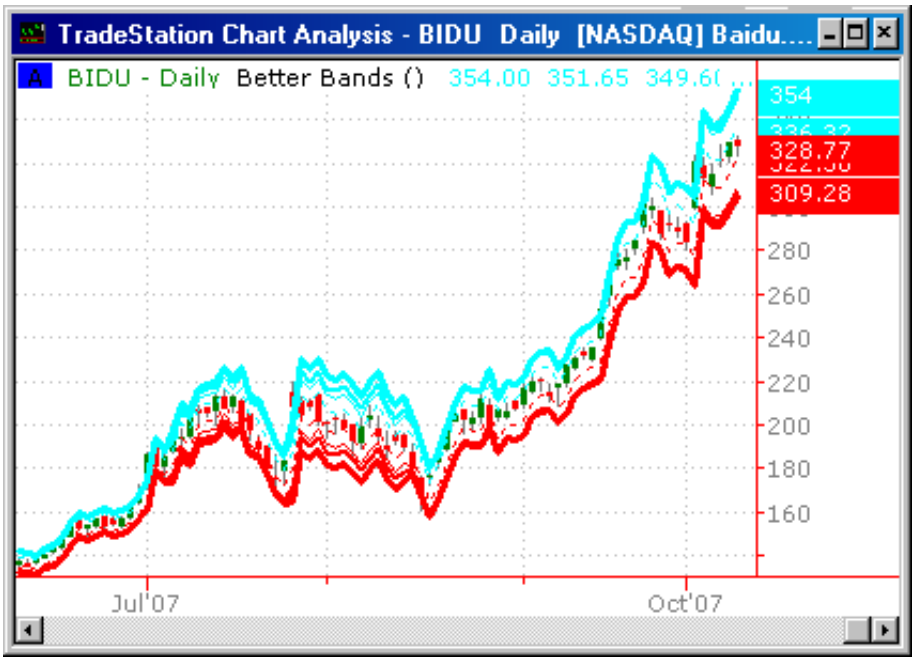


JAVA

The test that we devised and conducted provides no evidence that Bollinger Bands (and Hamzei Sigma Channels) can estimate volatility with any level of confidence.

MAKING BETTER BANDS

I re-engineered the bands according to standard statistical principles. While I have no doubt that Paul Wilmott would cringe at my handiwork, the fact is that with just a little bit of elbow grease, we got quite a bit closer to The Promised Land.



First, we play with the data in an appropriate manner. Next, we cut up the deviations with no assumption of normal distribution. Using BIDU as an example, we could say after the close on October 9 that we expect BIDU to trade within a band between $304.88 and $354.00 the next day.

$354.00 – $304.88 = $49.12/$328.77 (October 9 close) = 0.1494053 * 100 = 14.94053%. This is a noticeable improvement over an estimate that amounts to $182.65/$328.77 = 0.555555 * 100 = 55.55555% of the October 9 closing price produced by Bollinger Bands or Hamzei Sigma Channels. People can trade options with this information.

Next, we calculate the Better Band width and compare it historical volatility to see how the curves match up.

Next up is WYNN.

Then POT.

GLD

JAVA

That wasn't so bad, was it?

SUPER DUPER BANDS
Next, I created bands using the stops in my trading system and plotted the band width vs. historical volatility. Modeling volatility is critical because in doing so, we can mark out where we expect price to be on the next bar. This allows us to place stops in a strategic place.

BIDU

WYNN

POT

GLD

JAVA

My trading system's volatility estimator is very close to the actual historical volatility. This is my edge.

RANGE EXPANSION AND CONTRACTION
To top it off, I made an indicator based on Better Bands that should be useful in deciding when to day-trade and when to position-trade. Let's come back to the present day and look at some charts. A reading above zero indicates volatility expansion while a reading below zero indicates volatility contraction.

BIDU

WYNN

POT

GLD

JAVA

ES

ER2

NQ

This "expansion/contraction" indicator could be very useful as a first cut for a scanner. For example, contrary to what they say on TV, markets going straight up and straight down are typically not that volatile. A trending market is suitable for swing trades and gives the trader amazing opportunities to compound his money. Contrast this to a high-range, high-priced, volatile market where day-trading could be more appropriate, especially in terms of controlling risk.

> But as far as traders' practices are concerned, it still involves deformations of Black-Scholes, with possibly local volatility. In the end, in spite of the fact that all research teams have devoted a lot of effort to stochastic volatility and jumps, there is a striking divergence between the evolution of research groups and the non-

> evolution of traders as a whole. Probably because it is better to have a simple tool, and know the limits of its application, in order to adapt it to fit the market. — Bruno Dupire

If you wish to read more on modeling volatility, check out this interview with Bruno Dupire, the recipient of the 2006 "Cutting Edge Research" award from Wilmott magazine.