BOLLINGER BANDS - The methods as explained by John Bollinger in his book , Bollinger on Bollinger Bands

INTRODUCTION

Trading bands, which are lines plotted in and around the price structure to form an envelope, are the action of prices near the edges of the envelope that we are interested in. They are one of the most powerful concepts available to the technically based investor, but they do not, as is commonly believed, give absolute buy and sell signals based on price touching the bands. What they do is answer the perennial question of whether prices are high or low on a relative basis. Armed with this information, an intelligent investor can make buy and sell decisions by using indicators to confirm price action.

But before we begin, we need a definition of what we are dealing with. Trading bands are lines plotted in and around the price structure to form an "envelope." It is the action of prices near the edges of the envelope that we are particularly interested in. The earliest reference to trading bands I have come across in technical literature is in *The Profit Magic of Stock Transaction Timing*; author J.M. Hurst's approach involved the drawing of smoothed envelopes around price to aid in cycle identification.

FIGURE 1
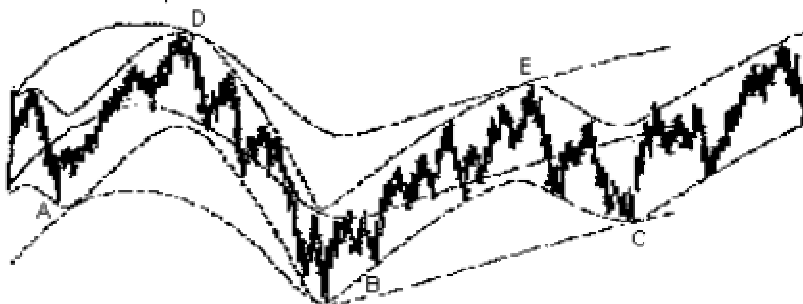Trading Bands or Envelopes

Figure 1 shows an example of this technique: Note in particular the use of different envelopes for cycles of differing lengths.

The next major development in the idea of trading bands came in the mid to late 1970s, as the concept of shifting a moving average up and down by a certain number of points or a fixed percentage to obtain an envelope around price gained popularity, an approach that is still employed by many. A good example appears in Figure 2, where an envelope has been constructed around the Dow Jones Industrial Average (DJIA). The average used is a 21-day simple moving average. The bands are shifted up and down by 4%.

FIGURE 2:
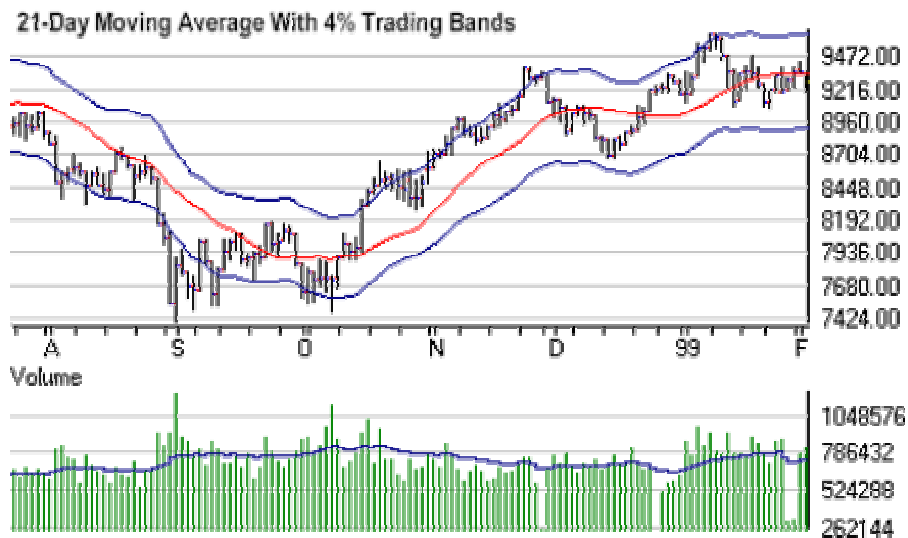
The procedure to create such a chart is straightforward. First, calculate and plot the desired average. Then calculate the upper band by multiplying the average by 1 plus the chosen percent (1 + 0.04 = 1.04). Next, calculate the lower band by multiplying the average by the difference between 1 and the chosen percent (1 - 0.04 = 0.96). Finally, plot the two bands. For the DJIA, the two most popular averages are the 20- and 21-day averages and the most popular percentages are in the 3.5 to 4.0 range.

The next major innovation came from Marc Chaikin of Bomar Securities who, in attempting to find some way to have the market set the band widths rather than the intuitive or random-choice approach used before, suggested that the bands be constructed to contain a fixed percentage of the data over the past year. Figure 3 depicts this powerful and still very useful approach. He stuck with the 21-day average and suggested that the bands ought to contain 85% of the data. Thus, the bands are shifted up 3% and down by 2%. Bomar bands were the result. The width of the bands is different for the upper and lower bands. In a sustained bull move, the upper band width will expand and the lower band width will contract. The opposite holds true in a bear market. Not only does the total band width change across time, the displacement around the average changes as well.

FIGURE 3:
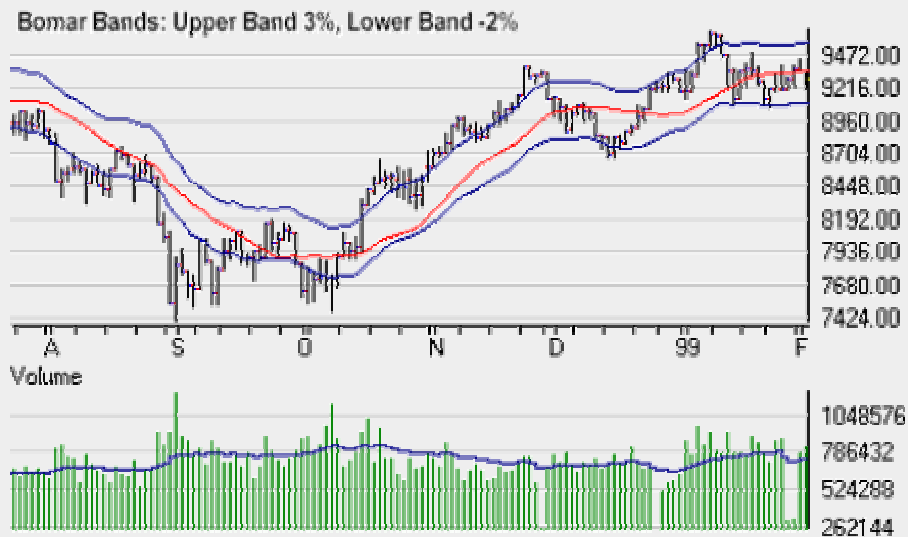
BOLLINGER'S BRAINSTORM

Asking the market what is happening is always a better approach than telling the market what to do. In the late 1970s, while trading warrants and options and in the early 1980s, when index option trading started, I focused on volatility as the key variable. To volatility, then, I turned again to create my own approach to trading bands. I tested any number of volatility measures before selecting standard deviation as the method by which to set band width. I became especially interested in standard deviation because of its sensitivity to extreme deviations. As a result, Bollinger Bands are extremely quick to react to large moves in the market.

FIGURE 4

Bollinger Bands Formulas

$$\sigma = \sqrt{\frac{\sum\limits_{j=1}^{N}\left(x_j - \overline{X}\right)^2}{N}}$$

$$\overline{X} = \frac{\sum\limits_{j=1}^{N} x_j}{N}$$

Upper Band = $\overline{X} + 2\sigma$
Middle Band = $\overline{X}$
Lower Band = $\overline{X} - 2\sigma$

In Figure 5, Bollinger Bands are plotted two standard deviations above and below a 20-day simple moving average. The data used to calculate the standard deviation are the same data as those used for the simple moving average. In essence, you are using moving standard deviations to plot bands around a moving average. The time frame for the calculations is such that it is descriptive of the intermediate-term trend.
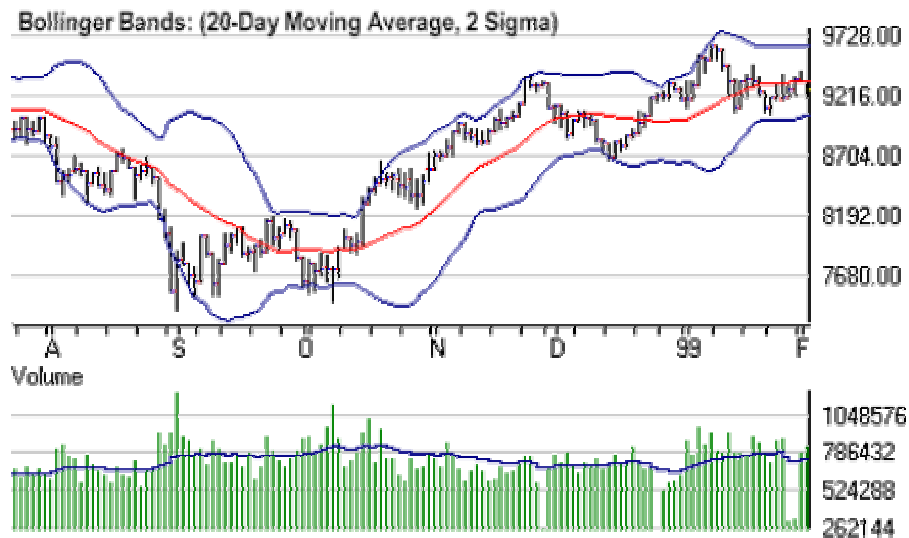

Note that many reversals occur near the bands and that the average provides support and resistance in many cases.

There is great value in considering different measures of price. The typical price, (high + low + close)/3, is one such measure that I have found to be useful. The weighted close, (high + low + close + close)/4, is another. To maintain clarity, I will confine my discussion of trading bands to the use of closing prices for the construction of bands. My primary focus is on the intermediate term, but short- and long-term applications work just as well. Focusing on the intermediate trend gives one recourse to the short- and long-term arenas for reference, an invaluable concept

For the stock market and individual stocks. a 20-day period is optimal for calculating Bollinger Bands. It is descriptive of the intermediate-term trend and has achieved wide acceptance. The short-term trend seems well served by the 10-day calculations and the long-term trend by 50-day calculations.

The average that is selected should be descriptive of the chosen time frame. This is almost always a different average length than the one that proves most useful for crossover buys and sells. The easiest way to identify the proper average is to choose one that provides support to the correction of the first move up off a bottom. If the average is penetrated by the correction, then the average is too short. If, in turn, the correction falls short of the average, then the average is too long. An average that is correctly chosen will provide support far more often than it is broken. (See Figure 6.)
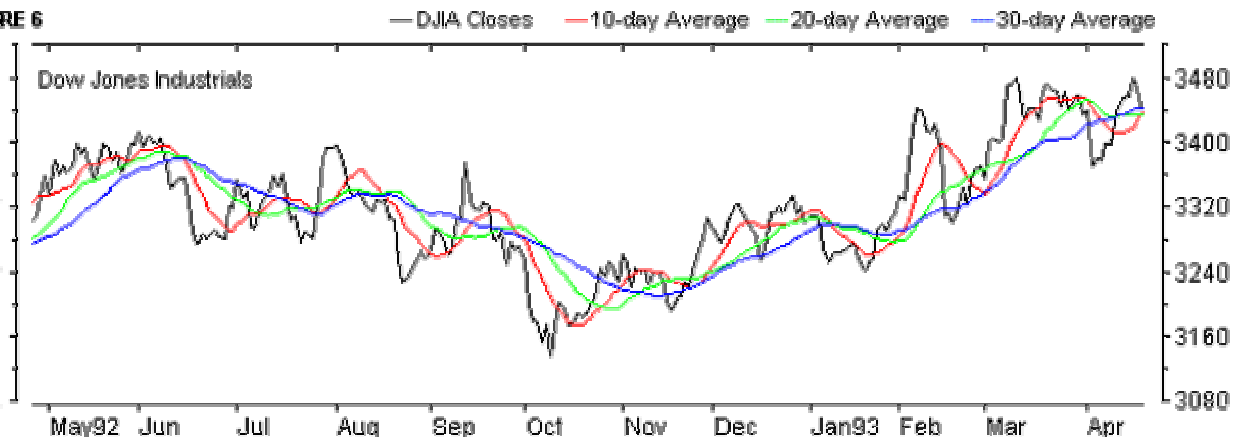
Bollinger Bands can be applied to virtually any market or security. For all markets and issues, I would use a 20-day calculation period as a starting point and only stray from it when the circumstances compel me to do so. As you lengthen the number of periods involved, you need to increase the number of standard deviations employed. At 50 periods, two and a half standard deviations are a good selection, while at 10 periods one and a half do the job quite well.

50 periods with 2.5 standard deviation	10 periods with 1.5 standard deviation
Upper Band = 50-day SMA + 2.5(s) Middle Band = 50-day SMA Lower Band = 50-day SMA - 2.5(s)	Upper Band = 10-day SMA + 1.5(s) Middle Band = 10-day SMA Lower Band = 10-day SMA - 1.5(s)

In most cases, the nature of the periods is immaterial; all seem to respond to correctly specified Bollinger Bands. I have used them on monthly and quarterly data, and I know many traders apply them on an intraday basis.

ANSWERING THE QUESTIONS

Trading bands answer the question whether prices are high or low on a relative basis. The matter actually centers on the phrase "a relative basis." Trading bands do not give absolute buy and sell signals simply by having been touched; rather, they provide a framework within which price may be related to indicators.

Some older work stated that deviation from a trend as measured by standard deviation from a moving average was used to determine extreme overbought and oversold states. But I recommend the use of trading bands as the generation of buy, sell and continuation signals through the comparison of an additional indicator to the action of price within the bands.

If price tags the upper band and indicator action confirms it, no sell signal is generated. On the other hand, if price tags the upper band and indicator action does not confirm (that is, it diverges). we have a sell signal. The first situation is not a sell signal; instead, it is a continuation signal if a buy signal was in effect.

It is also possible to generate signals from price action within the bands alone. A top (chart formation) formed outside the bands followed by a second top inside the bands constitutes a sell signal. There is no requirement for the second top's position relative to the first top, only relative to the bands. This often helps in spotting tops where the second push goes to a nominal new high. Of course, the converse is true for lows.

INTRODUCING %B AND BANDWIDTH

An indicator derived from Bollinger Bands that I call %b can be of great help, using the same formula that George Lane used for stochastics. The indicator %b tells us where we are within the bands. Unlike stochastics, which are bounded by 0 and 100, %b can assume negative values and values above 100 when prices are outside of the bands. At 100 we are at the upper band, at 0 we are at the lower band. Above 100 we are above the upper bands and below 0 we are below the lower band. See Figure 7 for the exact formula.

FIGURE 7   Band Width and %b

$$\%b = \frac{close - lower\ band}{upper\ band - lower\ band}$$

$$Band\ Width = \frac{upper\ band - lower\ band}{middle\ band}$$

Indicator %b lets us compare price action to indicator action. On a big push down, suppose we get to -20 for %b and 35 for relative strength index (RSI). On the next push down to slightly lower price levels (after a rally), %b only falls to 10, while RSI stops at 40. We get a buy signal caused by price action within the bands. (The first low came outside of the bands, while

the second low was made inside the bands.) The buy signal is confirmed by RSI, as it did not make a new low, thus giving us a confirmed buy signal.

Trading bands and indicators are both good tools, but when they are combined, the resultant approach to the markets becomes powerful. Band width, another indicator derived from Bollinger Bands, may also interest traders. It is the width of the bands expressed as a percent of the moving average. When the bands narrow drastically, a sharp expansion in volatility usually occurs in the very near future. For example, a drop in band width below 2% for the Standard & Poor's 500 has led to spectacular moves. The market most often starts off in the wrong direction after the bands tighten prior to really getting under way, of which January 1991 is a good example (Figure 9).

FIGURE 9:
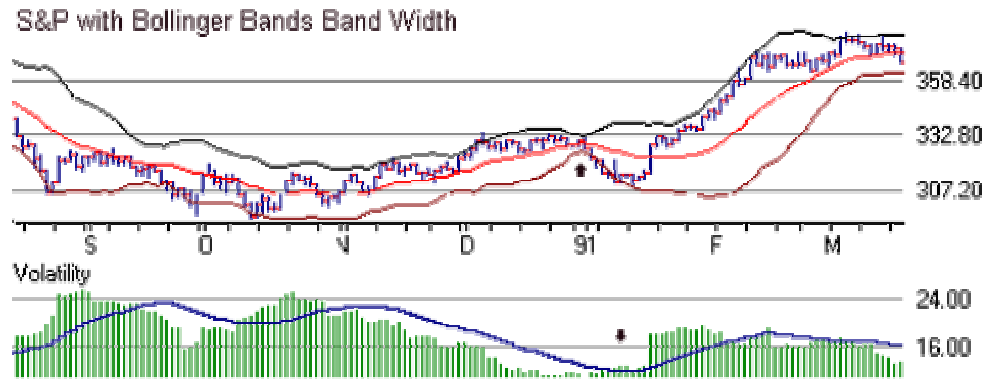
AVOIDING MULTIPLE COUNTING

A cardinal rule for the successful use of technical analysis requires avoiding multicolinearity amid indicators. Multicolinearity is simply the multiple counting of the same information. The use of four different indicators all derived from the same series of closing prices to confirm each other is a perfect example.

So one indicator derived from closing prices, another from volume and the last from price range would provide a useful group of indicators. But combining RSI, moving average convergence/divergence (MACD) and rate of change (assuming all were derived from closing prices and used similar time spans) would not. Here are, however, three indicators to use with bands to generate buys and sells without running into problems. Amid indicators derived from price alone, RSI is a good choice. Closing prices and volume combine to produce on-balance volume, another good choice. Finally, price range and volume combine to produce money flow, again a good choice. None is too highly colinear and thus together combine for a good grouping of technical tools. Many others could have been chosen as well: MACD could be substituted for RSI, for example.

The Commodity Channel Index (CCI) was an early choice to use with the bands, but as it turned out, it was a poor one, as it tends to be colinear with the bands themselves in certain time frames. The bottom line is to compare price action within the bands to the action of an indicator you know well. For confirmation of signals, you can then compare the action of another indicator, as long as it is not colinear with the first.

BASIC RULES

One of the great joys of having invented an analytical technique such as Bollinger Bands is seeing what other people do with it. While there are many ways to use Bollinger Bands, following are a few rules that serve as a good beginning point.

- Bollinger Bands provide a relative definition of high and low.
- That relative definition can be used to compare price action and indicator action to arrive at rigorous buy and sell decisions.
- Appropriate indicators can be derived from momentum, volume, sentiment, open interest, inter-market data, etc.
- Volatility and trend have already been deployed in the construction of Bollinger Bands, so their use for confirmation of price action is not recommended.
- The indicators used for confirmation should not be directly related to one another. Two indicators from the same category do not increase confirmation. Avoid colinearity.

- Bollinger Bands can also be used to clarify pure price patterns such as M-type; tops and W-type bottoms, momentum shifts, etc.
- Price can, and does, walk up the upper Bollinger Band and down the lower Bollinger Band.
- Closes outside the Bollinger Bands can be continuation signals, not reversal signals--as is demonstrated by the use of Bollinger Bands in some very successful volatility-breakout systems.
- The default parameters of 20 periods for the moving average and standard deviation calculations, and two standard deviations for the bandwidth are just that, defaults. The actual parameters needed for any given market/task may be different.
- The average deployed should not be the best one for crossovers. Rather, it should be descriptive of the intermediate-term trend.
- If the average is lengthened the number of standard deviations needs to be increased simultaneously; from 2 at 20 periods, to 2.1 at 50 periods. Likewise, if the average is shortened the number of standard deviations should be reduced; from 2 at 20 periods, to 1.9 at 10 periods.
- Bollinger Bands are based upon a simple moving average. This is because a simple moving average is used in the standard deviation calculation and we wish to be logically consistent.
- Be careful about making statistical assumptions based on the use of the standard deviation calculation in the construction of the bands. The sample size in most deployments of Bollinger Bands is too small for statistical significance and the distributions involved are rarely normal.
- Indicators can be normalized with %b, eliminating fixed thresholds in the process.
- Finally, tags of the bands are just that, tags not signals. A tag of the upper Bollinger Band is NOT in-and-of-itself a sell signal. A tag of the lower Bollinger Band is NOT in-and-of-itself a buy signal.

Method 1 — Volatility Breakout

Though these techniques were developed on daily charts--the primary time frame we operate in--short-term traders may deploy them on five-minute bar charts, swing traders may focus on hourly or daily charts, while investors may use them on weekly charts. There is really no material difference as long as each is tuned to fit the user's criteria for risk and reward and each tested on the universe of securities the user trades, in the way the user trades.

Why the repeated emphasis on customization and fitting of risk and reward parameters? Because, no system no matter how good it is will be used if the user isn't comfortable with it. If you do not suit yourself, you will find out quickly that these approaches will not suit you.

"If these methods work so well, why do you teach them?" This is a frequent question and the answers are always the same. First, I teach because I love to teach. Second, and perhaps most important, because I learn as I teach. In researching and preparing the material for this book I learned quite a bit and I learned even more in the process of writing it.

"Will these Methods still work after they are published?" The question of continued effectiveness seems troublesome to many, but it is not really; these techniques will remain useful until the market structure changes sufficiently to render them moot. The reason effectiveness is not destroyed--no matter how widely an approach is taught, is that we are all individuals. If an identical trading system was taught to 100 people, a month later not more than two or three, if that many, would be using it as it was taught. Each would have taken it and modified it to suit their tastes, and incorporated into their unique way to doing things. In short no matter how specific/declarative a book gets, every reader will walk away from reading it with unique ideas and approaches, and that, as they say, is a good thing.

The greatest myth about Bollinger Bands is that you are supposed to sell at the upper band and buy at the lower band; it can work that way, but it doesn't have to. In Method I we'll actually buy when the upper band is exceeded and short when the lower band is broken to the downside.1 In Method II we'll buy on strength as we approach the upper band only if an indicator confirms and sell on weakness as the lower band is approached, again only if confirmed by our indicator. In Method III we'll buy near the lower band, using a W pattern and an indicator to clarify the setup. Then we'll present a variation of Method III for sells.

Now, for Method I. Years ago the late Bruce Babcock of Commodity Traders Consumers Review interviewed me for that publication. After the interview we chatted for a while--the interviewing gradually reversed--and it came out that his favorite commodity trading approach was the volatility breakout. I could hardly believe my ears. Here is the fellow who had examined more trading systems--and done so rigorously--than anyone with the possible exception of John Hill of Futures Truth and he was saying that his approach of choice to trading was the volatility-breakout system? The very approach that I thought best for trading after a lot of investigation?

Perhaps the most elegant direct application of Bollinger Bands is a volatility breakout system. These systems have

been around a long time and exist in many varieties and forms. The earliest breakout systems used simple averages of the highs and lows, often shifted up or down a bit. As time went on average true range was frequently a factor.

There is no real way of knowing when volatility, as we use it now, was incorporated as a factor, but one would surmise that one day someone noticed that breakout signals worked better when the averages, bands, envelopes, etc., were closer together and the volatility breakout system was born. (Certainly the risk-reward parameters are better aligned when the bands are narrow, a major factor in any system.)

Our version of the venerable volatility breakout system utilizes BandWidth to set the precondition and then takes a position when a breakout occurs. There are two choices for a stop/exit for this approach. First, Welles Wilder's Parabolic3, a simple, but elegant, concept. In the case of a stop for a buy signal, the initial stop is set just below the range of the breakout formation and then incremented upward each day the trade is open. Just the opposite is true for a sell. For those willing to pursue larger profits than those afforded by the relatively conservative Parabolic approach, a tag of the opposite band is an excellent exit signal. This allows for corrections along the way and results in longer trades. So, in a buy use a tag of the lower band as an exit and in a sell use a tag of the upper band as an exit.

The major problem with successfully implementing Method I is something called a head fake--discussed in the prior chapter. The term came from hockey, but it is familiar in many other arenas as well. The idea is a player with the puck skates up the ice toward an opponent. As he skates he turns his head in preparation to pass the defender; as soon as the defenseman commits, he turns his body the other way and safely snaps his shot. Coming out of a Squeeze, stocks often do the same; they'll first feint in the wrong direction and then make the real move. Typically what you'll see is a Squeeze, followed by a band tag, followed in turn by the real move. Most often this will occur within the bands and you won't get a breakout signal until after the real move is under way. However, if the parameters for the bands have been tightened, as so many who use this approach do, you may find yourself with the occasional small whipsaw before the real trade appears.

Figure 16.1
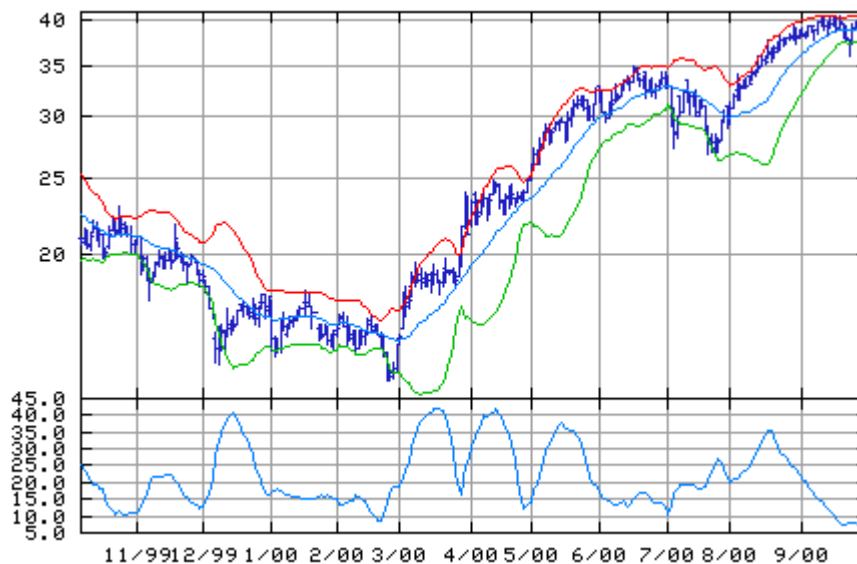
Some stocks, indices, etc are more prone to head fakes than others. Take a look at past Squeezes for the item you are considering and see if they involved head fakes. Once a faker…

For those who are willing to take a non-mechanical approach trading head fakes, the easiest strategy is to wait until a Squeeze occurs--the precondition is set--then look for the first move away from the trading range. Trade half a position the first strong day in the opposite direction of the head fake, adding to the position when the breakout occurs and using a parabolic or opposite band tag stop to keep from being hurt.

Where head fakes aren't a problem, or the band parameters aren't set tight enough for those that do occur to be a problem, you can trade Method I straight up. Just wait for a Squeeze and go with the first breakout.

Volume indicators can really add value. In the phase before the head fake look for a volume indicator such as

Intraday Intensity or Accumulation Distribution to give a hint regarding the ultimate resolution. MFI is another indicator that can be useful to improve success and confidence. These are all volume indicators and are taken up in Part IV.

The parameters for a volatility breakout system based on The Squeeze can be the standard parameters: 20-day average and +/- two standard deviation bands. This is true because in this phase of activity the bands are quite close together and thus the triggers are very close by. However, some short-term traders may want to shorten the average a bit, say to 15 periods and tighten the bands a bit, say to 1.5 standard deviations.

There is one other parameter that can be set, the look-back period for the Squeeze. The longer you set the look-back period--recall that the default is six months--the greater the compression you'll achieve and the more explosive the set ups will be. However, there will be fewer of them. There is always a price to pay it seems.

Method I first detects compression through The Squeeze and then looks for range expansion to occur and goes with it. An awareness of head fakes and volume indicator confirmation can add significantly to the record of this approach. Screening a reasonable size universe of stocks--at least several hundred--ought to find at least several candidates to evaluate on any given day.

Look for your Method I setups carefully and then follow them as they evolve. There is something about looking at a large number of these setups, especially with volume indicators, that instructs the eye and thus informs the future selection process as no hard and fast rules ever can. I present here five charts of this type to give you an idea of what to look for.
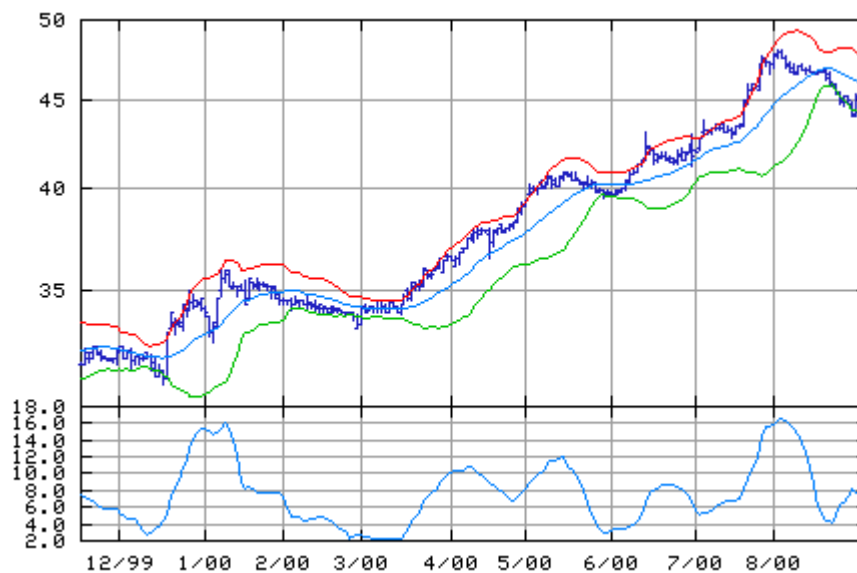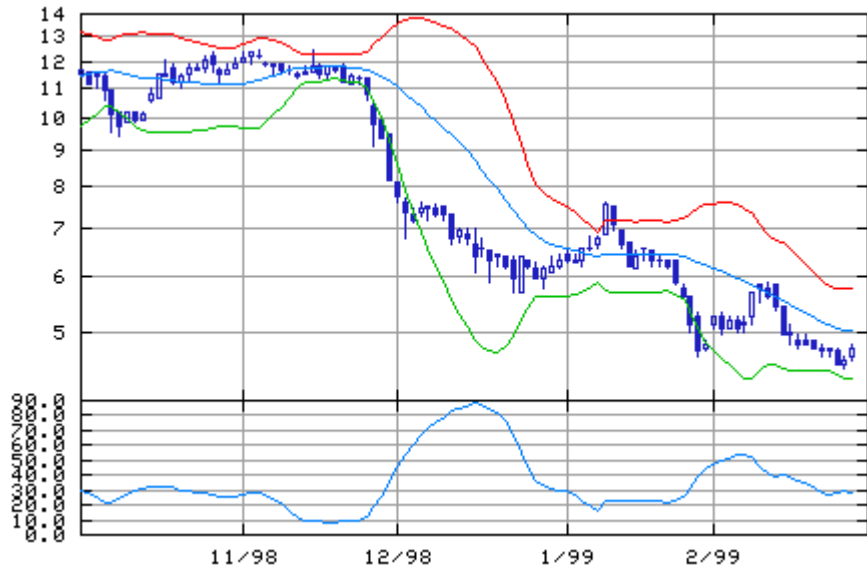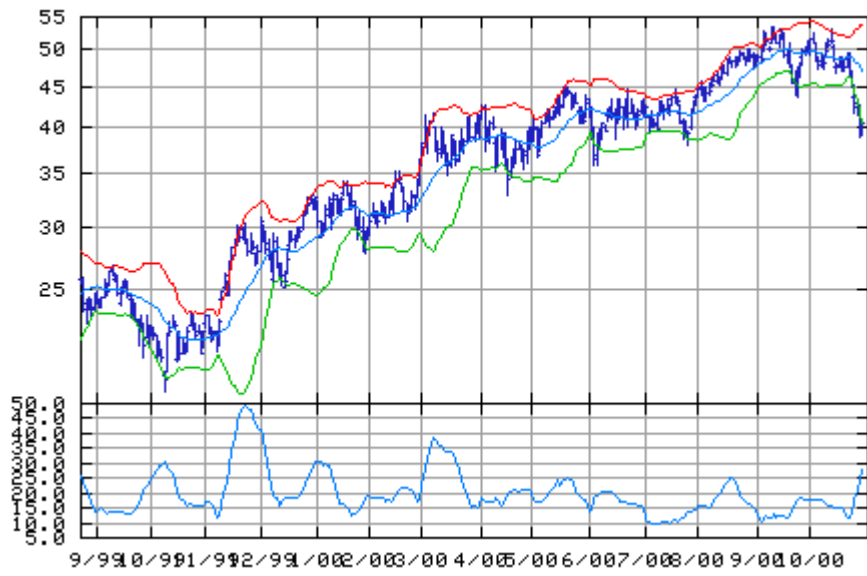
Figure 16.2

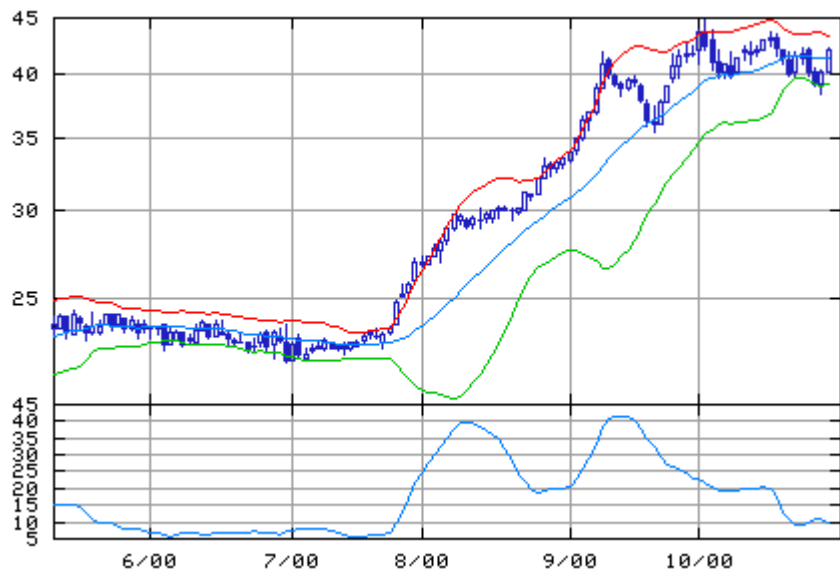Figure 16.3

Figure 16.4

Figure 16.5

Figure 16.6

- Use the Squeeze as a set up
- Then go with an expansion in volatility
- Beware the head fake
- Use volume indicators for direction clues
- Adjust the parameters to suit yourself

Method II — Trend Following

Our second Bollinger Band demonstration method relies upon the idea that strong price action accompanied by strong indicator action is a good thing. It is a confirmation approach that waits for these two conditions to be met before giving an entry signal. Of course, the opposite, weakness confirmed by weak indicators, generates a sell signal.

Figure 19.1

Figure 19.2

In essence this is a variation on Method I, with an indicator, MFI, being used for confirmation and no requirement for a Squeeze. This method may anticipate some Method I signals.

We'll use the same exit techniques, a modified version of Parabolic or a tag of the Bollinger Band on the opposite side of the trade. The idea is that both %b for price and MFI must rise above our threshold. The basic rule is: If %b is greater than 0.8 and MFI(10) is greater than 80, then buy.

Recall that %b shows us where we are within the bands; at 1 we are at the upper band and at 0 we are at the

lower band. So, at 0.8 %b is telling us that we are 80% of the way up from the lower band to the upper band. Another way of looking at that is that we are in the top 20% of the area between the bands. MFI is a bounded indicator running between 0 and 100. 80 is a very strong reading representing the upper trigger level, similar in significance to 70 for RSI.

So, Method II combines price strength with indicator strength to forecast higher prices, or price weakness with indicator weakness to forecast lower prices.

We'll use the basic Bollinger Band settings of 20 periods and +/- two standard deviations. To set the MFI parameters we'll employ an old rule; indicator length should be approximately half the length of the calculation period for the bands. Though the exact origin of this rule is unknown to me, it is likely an adaptation of a rule from cycle analysis that suggests using moving averages a quarter the length the dominant cycle. Experimentation showed that periods a quarter of the calculation period for the bands were generally too short, but that a half-length period for the indicators worked quite well. As with all things these are but starting values. This approach offers many variations you can explore. Also, any of the inputs could be varied as a function of the characteristics of the vehicle being traded to create a more adaptive system.

Table 19.1 - Method II Variations
Volume-Weighted MACD could be substituted for MFI.
The strength (threshold) required for both %b and the indicator can be varied.
The speed of the parabolic also can be varied.
The length parameter for the Bollinger Bands could be adjusted.

The main trap to avoid is late entry, since much of the potential may have been used up. A problem with Method II is that the risk/reward characteristics are harder to quantify, as the move may have been underway for a bit before the signal is issued. One approach to avoiding this trap is to wait for a pullback after the signal and then buy the first up day. This will miss some setups, but those remaining will have better risk /reward ratios

It would be best to test this approach on the types of stocks you actually trade or want to trade, and set the parameters according to the characteristics of those stocks and your own risk/reward criteria. For example, if you traded very volatile growth stocks you might look at higher levels for the %b (greater than one is a possibility), MFI and parabolic parameters. Higher levels of all three would pick stronger stocks and accelerate the stops more quickly. More risk adverse investors should focus on high parabolic parameters, while more patient investors anxious to give these trades more time to work out should focus on smaller parabolic constants which result in the stop-out level rising more slowly.

A very interesting adjustment is to start the parabolic not under the entry day as is common, but under the most recent significant low or turning point. For example, in buying a bottom the parabolic could be started under the low rather than on the entry day. This has the distinct advantage of capturing the character of the most recent trading. Using the opposite band as an exit allows these trades to develop the most, but may leave the stop uncomfortably far away for some.

This is worth reiterating: another variation of this approach is to use these signals as alerts and buy the first pullback after the alert is given. This approach will reduce the number of trades--some trades will be missed, but it will also reduce the number of whipsaws. In essence this is quite a robust method that should be adaptable to a wide variety of trading styles and temperaments.

Figure 19.3
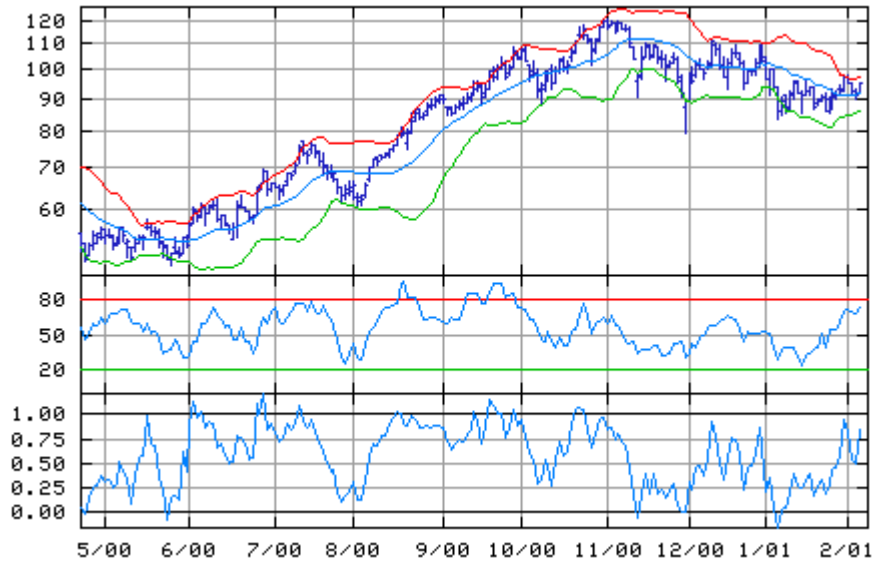
There is one other idea here that can be important: Rational Analysis. This Method buys confirmed strength and sells confirmed weakness. So wouldn't it be a good idea to presort our universe of candidates by fundamental criteria, creating buy lists and sell lists? Then take only buy signals for the stocks on the buy list and sell signals for the stocks on the sell list. Such filtering is beyond the scope of this book, but Rational Analysis, the juncture of the sets of fundamental and technical analysis, offers a robust approach to the problems most investors face. Prescreening for desirable fundamental candidates or problematic stocks is sure to improve your results.

Another approach to filtering signals is to look at the www.stoxtrend.com   (service available only for paid subscribers) **Performance Ratings** and take buys on stocks rated 1 or 2 and sell on stocks rated 4 or 5. These are front-weighted, risk-adjusted performance ratings, which can be thought of as relative strength compensated for downside volatility.

- The method buys strength
- Buy when %b is greater than 0.8 and MFI is greater than 80
- Use a parabolic stop
- May anticipate Method I
- Explore the variations
- Use Rational Analysis

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