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Using Bollinger Band Width

Enhancing Trading Strategies With Volatility Compressions And Explosion

Sometimes there is a calm before the storm in the markets. You can use a popular tool in the Bollinger Band suite of tools as a trading filter to exploit the explosiveness of a market immediately after a period of price compression. Find out step-by-step how to tackle it.

by Andrea Unger

In this article, we'll look together at how you can take advantage of one of the most popular indicators in the trading world: Bollinger Bands; in particular, I'll focus on what's called the *Bollinger Band Width* (BBW). I'll review what the BBW is and how you can apply it to develop a profitable trading strategy.

What is BBW?

The BBW is an indicator that measures the distance between the two bands that form a Bollinger Band price channel. (See Figure 1.)

The BBW is based on the alternation between periods of compression and explosion of volatility and is, therefore, an excellent indicator of the evolution of market volatility.

Flat, calm phases in the market are usually followed by sudden price movements, implying an explosion of volatility.

How to take advantage of the BBW by creating a simple starting system

The chart in Figure 1 uses 30-minute bars, and we can see how the BBW can fluctuate significantly even in a short period, going from tiny to high values within a few hours.

The BBW can therefore be used as a filter for the market entries of a system, with a narrowing of the width

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between the two bands as a condition.

We want to test whether waiting for low values of the BBW before entering a position with trend-following entries (that is, entries that tend to follow the direction of prices) can be profitable.

To perform this test, we use the following trading system:

```
inputs:
SL(2), TP(4), P(1000);

vars:
okl(true), oks(true), slb(false),
longlevel(0), shortlevel(0),
BBW(0), percent(0);

slb = sessionlastbar[1];
if slb then begin
    okl = true;
    oks = true;
end;

longlevel = highS(1);
shortlevel = lowS(1);

BBW = BollingerBand(c,20,2) - BollingerBand(c,20,-2);
percent = averagetruerange(5)*P;

if BBW < percent then begin
    if okl then buy next bar at longlevel stop;
    if oks then sellshort next bar at shortlevel stop;
end;

if marketposition = 1 then okl = false;
if marketposition = -1 then oks = false;

setexitonclose;

if SL > 0 then
  setstoploss(SL*averagetruerange(5)*bigpointvalue);
if TP > 0 then
  setprofittarget(TP*averagetruerange(5)*bigpointvalue);
```

Let's break it down into small parts and analyze each single part to understand how it works.

A. First, we calculated the minimum and maximum levels that the prices reached on the previous day; to do this, we used the variables longlevel and shortlevel:

MULTICHARTS

FIGURE 1: BOLLINGER BANDS WIDTH (BBW). The BBW is an indicator that measures the distance between the two bands that form the Bollinger Bands price channel. The BBW is based on the alternation between periods of compression and explosion of volatility and is therefore a useful indicator of the evolution of market volatility.

```
vars: longlevel(0), shortlevel(0);
longlevel = highS(1);
shortlevel = lowS(1);
```

B. We then calculated the BBW value as the difference between the upper and lower Bollinger Bands by using the variable BBW.

In addition, the variable percent is calculated as a moving average of the ranges of the last five bars multiplied by a constant P:

```
input: P(1000);
vars: BBW(0), percent(0);
BBW = BollingerBand(c,20,2) - BollingerBand(c,20,-2);
percent = averagetruerange(5) * P;
```

C. The system will enter the market only when the price has risen/fallen above/below these levels, but only if the BBW is small enough. Each trade will be closed at the end of the session using the command setexitonclose.

```
if BBW < percent then begin
```

Flat, calm phases in the market are usually followed by sudden price movements, implying an explosion of volatility.

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```
    buy next bar at longlevel stop;
    sellshort next bar at shortlevel stop;
end;
setexitonclose;
```

- By setting P = 1.000, the value of percent will be so high that it will always be greater than BBW. In other words, the condition. BBW < percent will always be satisfied, regardless of the value of BBW. We will therefore use this value of P to analyze the results without the BBW-based filter;
- On the other hand, with a value of P between 1 and 10, we can analyze the results in the presence of the BBW-based filter.

D. We also limited the number of entries allowed per session to only one per side (one long and one short). We needed two new boolean variables (okl and oks), and a third new variable (slb), that will become *true* each time we start a new session. In addition, okl and oks become *true* each time we start a new session and *false* as soon as we open a long position or a short position, respectively.

```
vars: okl(true), oks(true), slb(false);
slb = sessionlastbar[1];
if slb then begin
    okl = true;
    oks = true;
end;
```

Avg. Trade	# of Trades	NetProfit	Max DD
$19	3,883	$72,740	–$37,460

FIGURE 2: STARTING SYSTEM RESULTS. Shown here are initial results from the sample trend-following trading system on crude oil futures (@CL). The sample trading system is used to test whether waiting for low values of the BBW before entering a position with trend-following entries might be profitable.

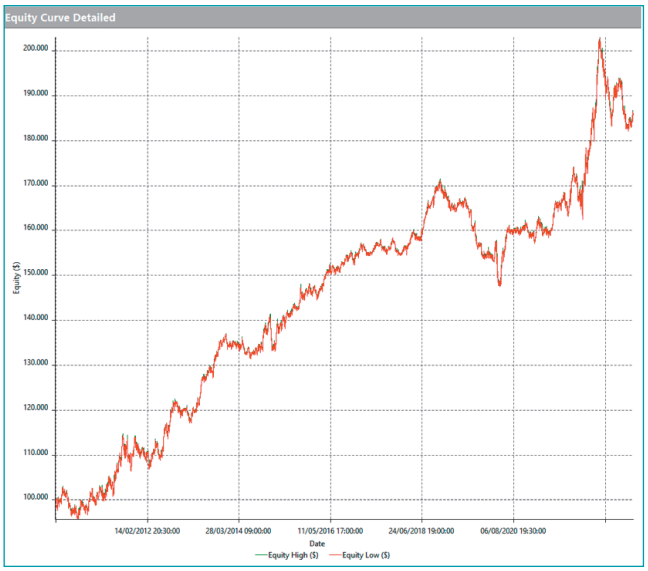

FIGURE 4A: EQUITY CURVE, STARTING VALUES FOR THE SYSTEM. Optimizing the starting values for the sample trading system as shown in Figure 3 increases NetProfit and lowers MaxDD, leading to the equity curve shown here.

Avg. Trade	# of Trades	NetProfit	Max DD
$17	5,128	$85,720	–$24,080

FIGURE 4B: METRICS, STARTING VALUES FOR THE SYSTEM. After optimizing the starting values for the sample trading system as shown in Figure 3, the net profit and maximum drawdown metrics improved as seen in Figure 4A; however, the new starting values also increased the number of trades and decreased the average trade of the system, a result that is less than ideal.

```
if marketposition = 1 then okl = false;
if marketposition = -1 then oks = false;
```

E. Finally, we inserted a stop-loss and a take-profit, using two inputs (SL and TP).

```
if SL > 0 then
    setstoploss(SL*averagetruerange(5)*bigpointvalue);
if TP > 0 then
    setprofittarget(TP*averagetruerange(5)*bigpointvalue);
```

We note that both the stop-loss and take-profit take on different monetary values depending on market volatility: the averagetruerange(5) function returns a value that is more extensive the wider the range of the last bars, while the bigpointvalue

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Strategy Info

Spreadsheet | 2D Graph | 3D Graph

	Net Profit	Avg Trade	Total Trades	Max Intraday Drawdown	SL (BBW_postAU)	TP (BBW_postAU)
1	91.980,00	25,35	3.628	-40.570,00	3,00	9
2	88.380,00	24,38	3.625	-40.490,00	3,00	10
3	86.300,00	16,95	5.091	-26.240,00	2,50	1
4	85.720,00	16,72	5.128	-24.080,00	2,25	1
5	84.950,00	23,36	3.637	-42.100,00	3,00	8
6	84.370,00	23,16	3.643	-45.060,00	3,00	7
7	84.040,00	21,15	3.973	-40.600,00	2,00	3
8	82.620,00	20,98	3.938	-43.060,00	2,25	3
9	79.740,00	21,29	3.745	-30.530,00	2,25	9
10	79.660,00	21,51	3.703	-32.360,00	2,50	9
11	79.280,00	21,21	3.738	-46.890,00	3,00	4
12	78.800,00	20,19	3.902	-42.230,00	2,50	3
13	77.080,00	20,90	3.688	-42.010,00	3,00	5
14	76.270,00	20,38	3.742	-32.880,00	2,25	10
15	76.230,00	20,61	3.699	-33.600,00	2,50	10

FIGURE 3: OPTIMIZING THE STARTING VALUES OF THE SYSTEM. Without the BBW-based filter, we can run an optimization of the SL and TP inputs to see if there are better values than the starting values. The results shown here are sorted by decreasing NetProfit.

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is a constant number and corresponds to the monetary value of a point on the price scale.

The Results of the System

Let's test the newly created system on crude oil futures (@CL) by loading the code on a chart of @CL with a 30-minute timeframe and data from 2010 to the present.

Figure 2 shows the metrics obtained with the starting inputs SL=2, TP=4, P=1000.

At P=1000 and thus without the BBW-based filter, we run an optimization of the SL and TP inputs to see if there are better values than the starting values: We change SL from 2 to 3 in steps of 0.25 and TP from 1 to 10 in steps of 1 and obtain the results shown in Figure 3, sorted by decreasing NetProfit.

The values SL=2.25 and TP=1 allow us to increase NetProfit and lower MaxDD, leading to the curve and metrics shown in Figures 4a and 4b.

We find that changing SL and TP also increased the number of trades and decreased the average trade of the system.

We can then test whether using fixed stop-loss and take-profit values instead of variable stop-loss and take-profit values—that is, monetary values independent of market volatility—might be more beneficial.

For the stop-loss, this change does not lead to improvements, while for the take-profit, the optimization shown in Figure 5 leads to an increase in the average trade and NetProfit, while the MaxDD remains almost unchanged.

We then decide to use a volatility-based stop-loss (with SL=2.25) and set a fixed take-profit to the value of $2,750 by changing the corresponding part of the code:

```
input: TP(2750);
if TP > 0 then setprofittarget(TP);
```

We then get the equity curve and metrics shown in Figures 6a and 6b.

How the Results of the System Change in the Presence of the BBW Filter

Now it's time to apply the BBW filter and examine its

MultiCharts64 - Optimization Report - @CL - 30 Minute - TradeStation

Strategy Info

Spreadsheet | 2D Graph

	Net Profit	Avg Trade	Total Trades	Max Intraday Drawdown	TPfix (BBW_postAU)
1	99.790,00	26,65	3.745	-25.300,00	2.750
2	89.200,00	23,82	3.744	-27.750,00	3.000
3	84.430,00	22,53	3.748	-26.860,00	2.500
4	80.970,00	21,56	3.755	-28.580,00	2.250
5	80.300,00	21,37	3.758	-30.570,00	2.000
6	68.790,00	18,24	3.771	-32.120,00	1.750
7	64.510,00	16,85	3.828	-30.220,00	1.250
8	57.300,00	15,10	3.795	-29.550,00	1.500
9	54.750,00	14,08	3.888	-31.180,00	1.000

FIGURE 5: OPTIMIZING FOR STOP-LOSS AND TAKE-PROFIT. Would using fixed instead of variable stop-loss and take-profit values benefit the sample system? For the stop-loss, this change does not lead to improvements. Meanwhile, for the take-profit, the optimization leads to an increase in the average trade and NetProfit while the MaxDD remains almost unchanged.

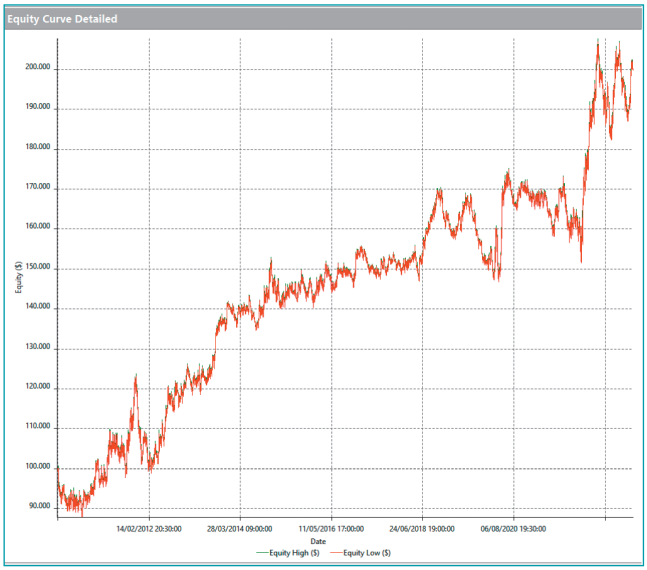

FIGURE 6A: EQUITY CURVE, VOLATILITY-BASED STOP-LOSS AND FIXED TAKE-PROFIT. When the take-profit is changed to a fixed amount rather than using a variable take-profit, which can be done from a simple change in the coding, the equity curve shown here is derived.

Avg. Trade	# of Trades	NetProfit	Max DD
$27	3,745	$99,790	–$25,300

FIGURE 6B: METRICS, VOLATILITY-BASED STOP-LOSS AND FIXED TAKE-PROFIT. Using a fixed take-profit in the system instead of a variable take-profit leads to the system results shown here.

The BBW is based on the alternation between periods of compression and explosion of volatility and is, therefore, an excellent indicator of the evolution of market volatility.

impact on the results.

Recall that we set the following condition to enter the market:

BBW < percent with percent = averagetruerange(5)*P

By optimizing the value of P from 1 to 10 in steps of 0.5, we can compare the results in the presence of this filter with those found without this filter (Figure 7).

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Strategy Info

Spreadsheet | 2D Graph

	Net Profit	Avg Trade	Total Trades	Max Intraday Drawdown	P (BBW_postAU)
1	151.140,00	58,58	2.580	-15.760,00	5,0
2	143.870,00	53,90	2.669	-21.960,00	5,5
3	139.270,00	49,85	2.794	-24.410,00	6,5
4	136.990,00	50,11	2.734	-26.160,00	6,0
5	136.090,00	44,72	3.043	-26.050,00	8,5
6	131.670,00	46,10	2.856	-26.970,00	7,0
7	126.680,00	40,93	3.095	-28.080,00	9,0
8	123.350,00	41,27	2.989	-26.990,00	8,0
9	121.050,00	41,31	2.930	-23.620,00	7,5
10	118.130,00	37,54	3.147	-27.610,00	9,5
11	108.520,00	43,46	2.497	-20.490,00	4,5
12	100.170,00	31,29	3.201	-29.130,00	10,0
13	99.930,00	41,46	2.410	-24.990,00	4,0
14	86.050,00	37,86	2.273	-20.310,00	3,5
15	74.660,00	68,00	1.098	-21.040,00	2,0
16	59.030,00	29,34	2.012	-27.890,00	3,0
17	47.550,00	28,15	1.689	-32.380,00	2,5
18	16.970,00	47,54	357	-27.520,00	1,5
19	7.030,00	334,76	21	-2.810,00	1,0

FIGURE 7: OPTIMIZATION REPORT FOR BBW FILTER. By optimizing the value of P from 1 to 10 in steps of 0.5, you can compare results in the presence of the BBW filter versus without. A value of P=5.5 improves all metrics, so this value is chosen. The new resulting equity curve is shown in Figure 8A.

A value of P=5.5 improves all metrics, and very similar P values still give excellent results. This reassures us because the chosen value is very stable in its neighborhood.

Thus, we choose this value and get the new results shown in Figures 8a and 8b.

To better appreciate the differences, we can compare the metrics of the two systems with and without the BBW filter. See Figure 9 for the metrics.

We can see that the introduction of the BBW filter decreased the number of total trades by about 30%, NetProfit increased by 44%, MaxDD decreased by 13%, and average trade more than doubled.

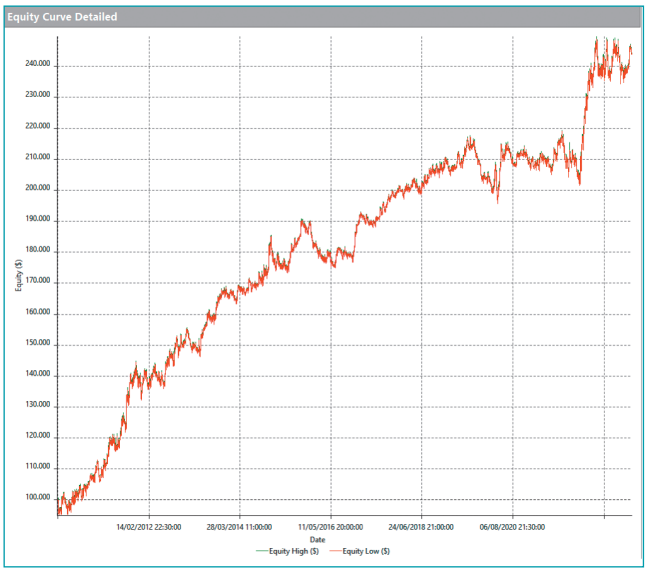

FIGURE 8A: EQUITY CURVE, SYSTEM WITH OPTIMIZED BBW FILTER. This shows the new equity curve for the system when the optimized value from Figure 7 for the BBW filter is used in the trading system.

Avg. Trade	# of Trades	NetProfit	Max DD
$54	2,669	$143,870	–$21,960

FIGURE 8B: METRICS, SYSTEM WITH OPTIMIZED BBW FILTER. When the BBW value of P=5.5 was used to filter trades, all system metrics were improved.

Conclusion and Further Applications of BBW

In this article, we looked at what BBW is and how we can use it to create a simple starting system. We also measured the impact BBW can have on a trend-following strategy by using it as a trading filter to exploit the explosiveness of a market immediately after a period of price compression.

The system presented here is intended only as a starting point, and we leave it to the reader to continue the developments to create a valid trend-following strategy that exploits the potential of BBW.

The system will enter the market only when the price has risen/fallen above/below these levels, but only if the BBW is small enough.

	Avg. Trade	# of Trades	NetProfit	Max DD
w/o BBW filter	$27	3,745	$99,790	–$25,300
w/ BBW filter	$54	2,669	$143,870	–$21,960
Change	102%	–29%	44%	–13%

FIGURE 9: COMPARISON OF RESULTS WITH AND WITHOUT BBW FILTER. The metrics of the two systems—with and without the BBW filter—can be compared side by side.

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Andrea Unger is a full-time professional trader, president of The Unger Academy, and author of The Unger Method. He is a four-time World Trading Champion (2008, 2009, 2010, and 2012), an honorary member of SIAT (Italian Society of Technical Analysis, a branch of IFTA), and speaks throughout Europe, America, Australia, and Asia. He may be reached at Andrea@ UngerAcademy.com. The Unger Academy provides services to traders, including individuals, to help them improve their approach to trading (more information can be found at https://autc.pro/tasc7).

FURTHER READING

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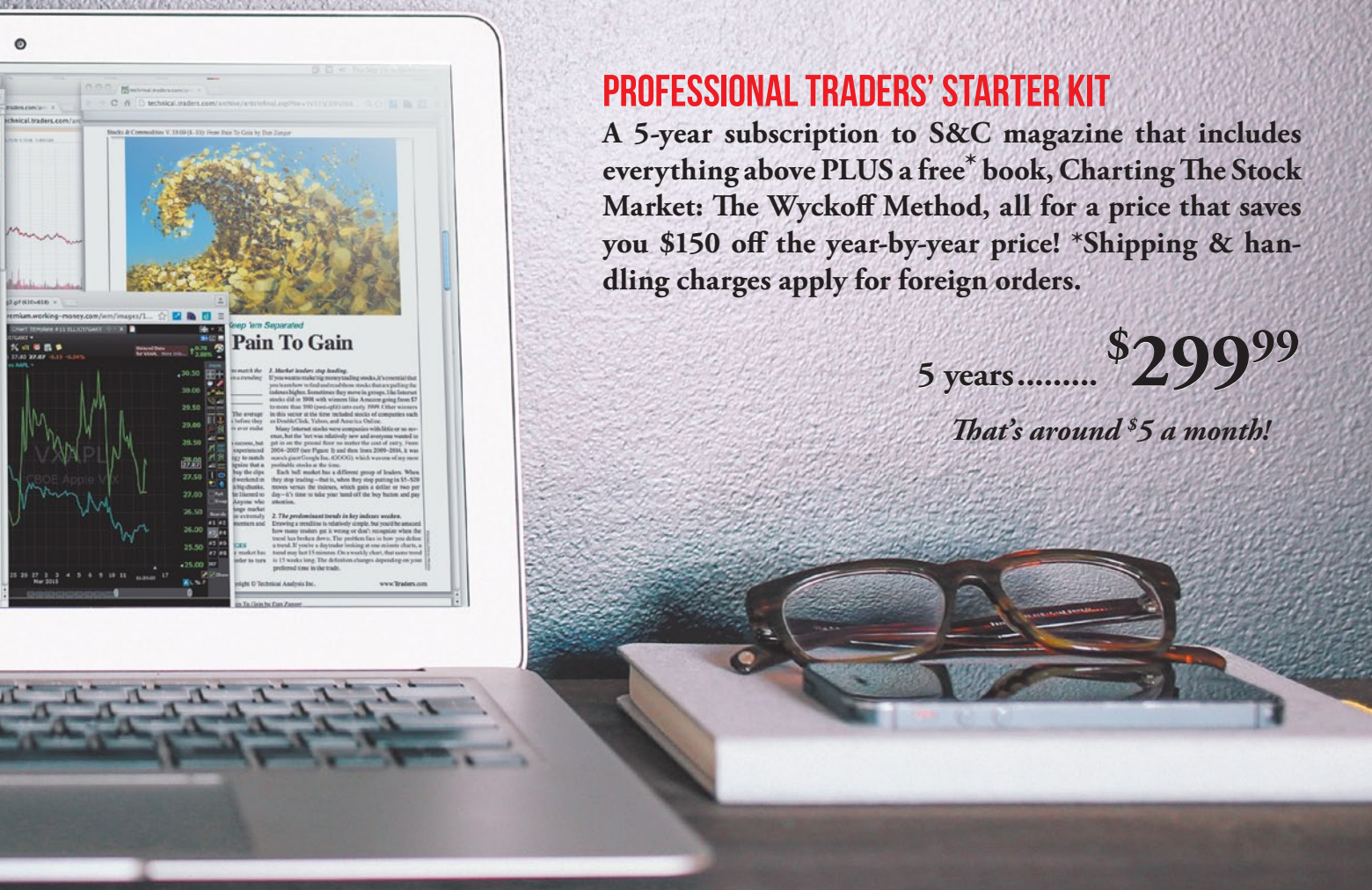

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