

TECHNICAL ANALYSIS OF STOCKS & COMMODITIES™

TAMING THE EFFECTS OF WHIPSAW

Use the effects of volatility to further improve effectiveness of whipsaw filtering

8

USING AN AI-BASED VOLATILITY PREDICTOR

To enhance an example gold futures trading strategy

16

TRADING VOLATILITY DERIVATIVES

An overview of instruments derived from volatility for the more adventurous trader

26

WHAT IS THE REAL MEANING OF THE EMA ALPHA?

How is alpha found, and why is this significant?

32



JULY 2024

\$6.99



0 71486 01384 6

TAKE CONTROL OF YOUR TRADING WITH THE PROFESSIONAL TRADERS' STARTER KIT™

STOCKS & COMMODITIES MAGAZINE

DIGITAL
EDITION

ARTICLE CODE

OPTIMIZED
TRADING



WORKING
MONEY

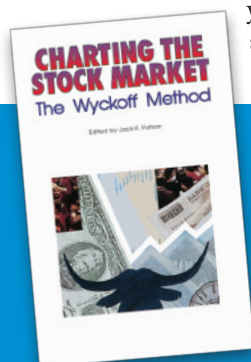
DIGITAL
ARCHIVE

TRADERS.COM ADVANTAGE

THE FOREMOST COLLECTION FOR TRADERS

This massive collection packages the best tools for trading and investing in *any* market!

1. *Technical Analysis of STOCKS & COMMODITIES*, the Traders' Magazine™. The premier magazine for technical analysis. You'll get **five years** — 65 issues — including our annual Bonus Issues with our Readers' Choice Awards.
2. *S&C Digital Edition*. Recent complete issues available in their entirety as PDFs for you to either download or read directly in your browser. No more waiting for the mail to deliver your magazine! You will still receive the printed magazine unless you opt for a digital-only subscription.
3. *Complete Digital Archive*. The complete archives as PDFs — more than 17,000 pages — from *Technical Analysis of STOCKS & COMMODITIES* from 1982 through the present. The articles can be read in your browser or download to your computer (or any device with Internet access and the ability to read a PDF)!
4. *Traders.com Advantage*, premium website content delivering real-world technical analysis to you! You'll get **five years** of charts, indicators, and “how-to” advice for specific markets, currencies, stocks, and commodities; near-term opportunities; price movement; new techniques. Posted in real-time with an archive of thousands of articles.
5. *Working Money*, the Investors' Magazine online. You'll get **five years** of market observations; explanations of charts, markets, and market sectors; money management; and interviews with money people that will help you trade and invest wisely.
6. *Article Code*. Download or copy & paste code presented in past issues of *STOCKS & COMMODITIES* — no need to type it out manually.
7. *Optimized Trading*. The optimized indicator values can be used as starting points when trying to decide what values to input into your charting software. Search for a certain symbol or company or build your own portfolio.



ALSO RECEIVE A FREE[†] BOOK WITH YOUR PTSK ORDER!

Charting The Stock Market: The Wyckoff Method, edited by Jack K. Hutson, is yours free[†] with your order for the Professional Traders' Starter Kit.

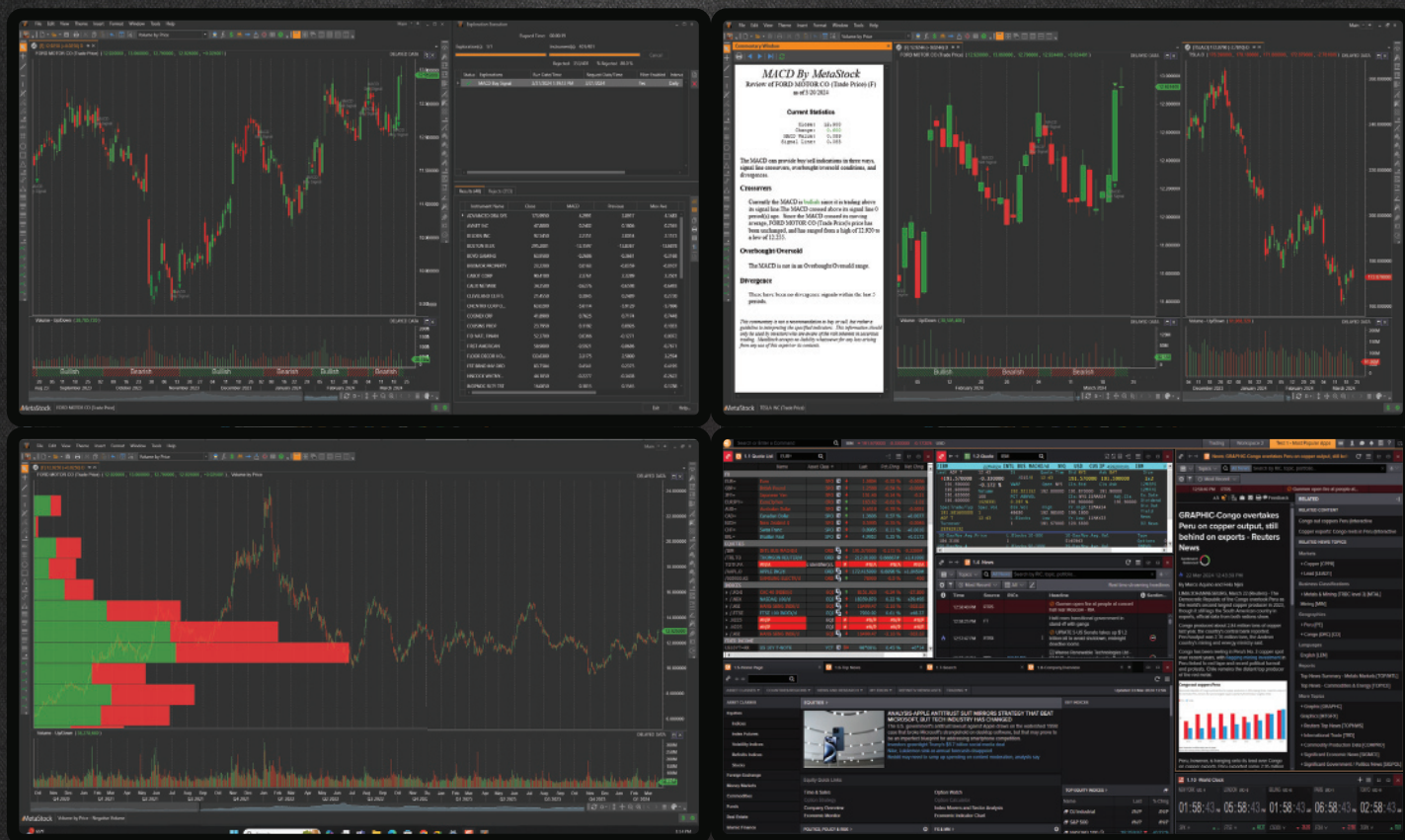
[†]Shipping and handling charges apply for foreign orders.



TECHNICAL
ANALYSIS OF **STOCKS &
COMMODITIES**

www.Traders.com

*Based on the 5-year subscription rate of \$299.99. Shipping extra for foreign addresses.



“Whoa. This is amazing.”

-pretty much anyone who has tried MetaStock 19

Watch a demo and get an extended trial of the **All-New MetaStock 19** featuring **Improved Workflows** and **Next-Gen Flexible Layouts**
[MetaStock.com/P424](https://www.metastock.com/P424)

This is neither a solicitation to buy or sell any type of financial instruments, nor intended as investment recommendations. All investment trading involves multiple substantial risks of monetary loss. Don't trade with money you can't afford to lose. Trading is not suitable for everyone. Past performance, whether indicated by actual or hypothetical results or testimonials are no guarantee of future performance or success. NO REPRESENTATION IS BEING MADE THAT ANY ACCOUNT WILL OR IS LIKELY TO ACHIEVE PROFITS OR LOSSES SIMILAR TO THOSE SHOWN. IN FACT, THERE ARE FREQUENTLY SHARP DIFFERENCES BETWEEN HYPOTHETICAL PERFORMANCE RESULTS OR TESTIMONIALS AND THE ACTUAL RESULTS SUBSEQUENTLY ACHIEVED BY ANY PARTICULAR TRADING PROGRAM. Furthermore, all internal and external computer and software systems are not fail-safe. Have contingency plans in place for such occasions. MetaStock assumes no responsibility for errors, inaccuracies, or omissions in these materials, nor shall it be liable for any special, indirect, incidental, or consequential damages, including without limitation losses, lost revenue, or lost profits, that may result from reliance upon the information presented.

EDITORIAL

editor@traders.com

Editor in Chief Jack K. Hutson

Production Manager Karen E. Wasserman

Graphic Designer Wayne Shaw

Webmaster Han J. Kim

Contributing Editors John Ehlers,
Anthony W. Warren, PhD.

Contributing Writers Thomas Bulkowski, Martin
Pring, Barbara Star, Markos Katsanos, Leslie N.
Masonson

OFFICE OF THE PUBLISHER

Publisher Jack K. Hutson

Industrial Engineer Jason K. Hutson

Project Engineer Sean M. Moore

ADVERTISING SALES

4757 California Ave. S.W.

Seattle, WA 98116-4499

206 660-8577 Fax 206 938-1307

advert@traders.com

National Sales Manager Edward W. Schramm
ESchramm@traders.com

CIRCULATION

Subscription & Order Service 1 800 832-4642

1 206 938-0570 Fax 1 206 938-1307

circ@traders.com

Subscription Manager Sean M. Moore

WEBSITE

http://www.traders.com

Staff members may be emailed using first initial
plus last name plus @traders.com

Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients, is granted by Technical Analysis, Inc. for users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that the base fee of \$1.00 per copy, plus 50¢ per page is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923. Online: <http://www.copyright.com>. For those organizations that have been granted a photocopy license by CCC, a separate system of payment has been arranged. The fee code for users of the Transactional Reporting Service is: 0738-3355/2024 \$1.00 + 0.50.

Subscriptions: USA: one year (13 issues) \$89.99; Magazines shipped outside the US require additional postage as follows: Canada, US\$15 per year; Europe, US\$25.50 per year; all other countries US\$39 per year. Single copies of most past issues from the current year are available prepaid at \$8 per copy. Prior years are available in book format (without ads) or digitally from www.traders.com. USA funds only. Washington state residents add sales tax for their locale. VISA, MasterCard, AmEx, and Discover accepted. Subscription orders: 1 800 832-4642 or 1 206 938-0570.

Technical Analysis of Stocks & Commodities™, The Traders' Magazine™, is prepared from information believed to be reliable but not guaranteed by us without further verification, and does not purport to be complete. Opinions expressed are subject to revision without notification. We are not offering to buy or sell securities or commodities discussed. Technical Analysis Inc., one or more of its officers, and authors may have a position in the securities discussed herein.

The names of products and services presented in this magazine are used only in an editorial fashion, and to the benefit of the trademark owner, with no intention of infringing on trademark rights.

CONTENTS

JULY 2024, VOLUME 42 NUMBER 8

6 Explore Your Options

by Jay Kaepfel

Got a question about options? This month: Iron condors for income.

FEATURE ARTICLE

8 Taming The Effects Of Whipsaw Part 2

by Richard Poster, PhD

In part 1, we presented a filter to help protect your trend-following strategy against whipsaws. This time, we show how to include the effects of volatility to further improve filtering effectiveness and trading performance.



the smoothing factor, also known as a weighted multiplier or alpha, is the parameter that determines how values in the lookback period are weighted. Weights decline exponentially as the data points get older. How is alpha found, and why is this significant? Here are some analytical and practical insights.

34 Market Rap

by Emilio Tomasini

“Unserious” thoughts on serious topics in finance. This month: Is your trading a business that you can pass along?

35 Algo Q&A

by Kevin J. Davey

Got a question about system or algo trading? This month: Smooth rollovers.

36 Futures For You

by Carley Garner

Here's how the futures market really works. This month: Complacency kills.

38 The Savvy Technician

by Stella Osoba, CMT, Esq.

Recognizing and applying technical chart patterns to trading. This month: How many eggs can one basket hold?



16 How To Enhance A Trading Strategy On Gold Futures By Using An AI-Based Volatility Predictor

by Domenico D'Errico and Giovanni Trombetta

Here's how you can apply the benefits of machine learning to a traditional trading system with the help of some Python libraries.



26 Trading Volatility Derivatives

by James Leahy

Volatility is eminently tradable, though not directly as an instrument itself. However, the trader can access instruments that are derived from volatility. Here is a look at some of the choices for the adventurous trader.

32 What Is The Real Meaning Of The EMA Alpha?

by John F. Ehlers

In an exponential moving average,

DEPARTMENTS

40 Traders' Tips

52 Advertisers' Index

52 Editorial Resource Index

53 Futures Liquidity

54 Classified Advertising

54 Traders' Resource



■ Cover: Black Creator 24/Shutterstock



Find the Best Bonds¹

Search our vast universe of
bonds with the free Bond
Search Tool to find the best
bond prices with no mark-ups

Rated Best
Online Broker 2023
for Bonds
by Benzinga¹



Interactive Brokers
Rated #1 ... Again
Best Online Broker
2023 by Barron's²

The best-informed
investors choose Interactive Brokers



ibkr.com/find-bonds



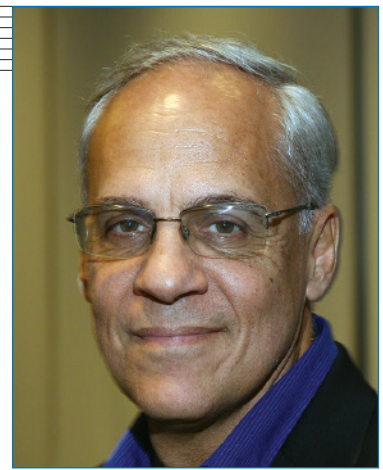
Member - NYSE, FINRA, SIPC – Supporting documentation for any claims and statistical information will be provided upon request. [1] Rated best online broker for bond brokers according to Benzinga - Best Online Brokers for Bonds, February 22, 2023. [2] Interactive Brokers rated #1, Best Online Broker according to Barron's Best Online Brokers Survey of 2023: June 9, 2023. For more information see, ibkr.com/info - Barron's is a registered trademark of Dow Jones & Co. Inc.

07-IB23-1621CH1599

Explore Your Options

GOT A QUESTION ABOUT OPTIONS?

Jay Kaepfel has over three decades of experience in the options markets. He was a head trader for a CTA firm, an options trading software developer, and was a portfolio manager for an investment management firm. He is presently Senior Research Analyst for Sentimentrader.com. He is the author of several books, including *The Four Biggest Mistakes In Option Trading*; *The Option Trader's Guide To Probability, Volatility, And Timing*; and *Seasonal Stock Market Trends*. Send your questions or topic suggestions to Jay Kaepfel at jay@sentimentrader.com. Selected questions will appear in a future issue of S&C.



Jay Kaepfel

IRON CONDORS FOR INCOME

I've read that selling iron condors is a good strategy for generating income. Is this accurate?

Like most things related to options trading, the most accurate answer is probably "it depends."

An iron condor typically involves selling an out-of-the-money call and put and simultaneously buying an even further out-of-the-money call and put to limit overall risk. It is equivalent to selling an out-of-the-money bear call spread and an out-of-the-money bull put spread. The maximum profit potential equals the premium received when the trade is entered. The goal is for the underlying security to remain between the upper and lower breakeven points and for the options to expire worthless.

Which securities to trade against, expiration months to use, and specific strike prices to trade are primarily matters of opinion. Likewise, the answers to these questions could easily fill a book. Another question an iron condor trader must ponder is, "What to do if things go wrong?" For now, let's illustrate the strategy and a few of these considerations with an example.

IRON CONDORS ON STOCK INDEXES

For our test, we will use a small list of stock index ETFs that have active options volume:

- SPDR S&P 500 (SPY)
- Invesco QQQ Trust (QQQ)
- iShares Russell 2000 ETF (IWM)

Figure 1 shows the relevant strikes for evaluating an iron condor.

For our test (using www.Options-Analysis.com), we will apply the parameters found in Figure 2 on the Friday after the latest monthly expiration. Potential trades will be sorted by the calculated probability that the

An iron condor typically involves selling an out-of-the-money call and put and simultaneously buying an even further out-of-the-money call and put to limit overall risk.

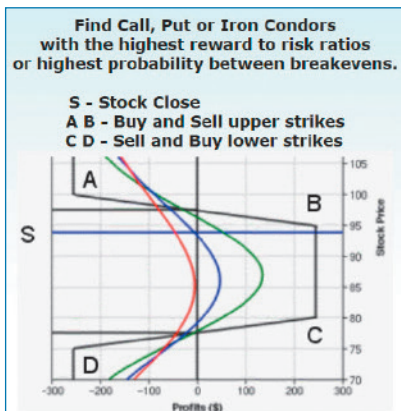


FIGURE 1: STRIKES. Relevant strikes can be evaluated for a potential iron condor position.

underlying security will be between the upper and lower breakeven points at option expiration.

Figure 3 displays the list of top calculated trades. The trade at the top of the list involves selling an iron condor with just seven days remaining until option expiration using options on ticker QQQ.

Figure 4 shows the particulars for this position, and Figure 5 shows the risk curves (that is, the expected P/L for the position based on the

FIGURE 2: SCANNING CRITERIA. A list of stock index ETFs is screened and sorted.

Explore Your Options

underlying price of ticker QQQ as of different dates leading up to option expiration).

Key things to note:

- The maximum profit potential on a 1-lot position is \$9, and the maximum risk is \$91. This type of reward-to-risk ratio is common when selling an OTM condor.
- With QQQ trading at \$408.38 a share, the breakeven prices for the OTM condor are \$419.09 and \$397.91. If QQQ is between those two prices at option expiration, all options in the position will expire worthless, and the trader will keep the full \$9 credit taken in when the trade was entered.
- The maximum loss could be recognized if the trade was held until expiration and the price of QQQ shares was above the short call strike price of \$419 a share or below the short put strike price of \$398.

THE CRITICAL QUESTION TO ANSWER

As long as the price of QQQ shares remains between the breakeven points, all is well. Traders need to be concerned about whether the price moves outside that range. There is no best way to manage an iron condor, but many traders will consider adjusting or closing all or part of the position if the underlying price gets close to or exceeds one of the breakeven prices.

For our example trade, QQQ closed at \$409.50 on 12/29, and all options in the position expired worthless. Thus, the trader holding the short

Another question an iron condor trader must ponder is, "What to do if things go wrong?"

Rank	Stock	Close	Strikes	Expire	Prices ask/bid bid/ask	Volume	Open Interest	Days to Expire	Max Profit	Max Loss	Max Profit/Max Loss (%)	Probability Between Breakevens	Max Profit/Max Loss + Probability
1	QQQ Chart pic News	408.380	420.00 419.00 398.00	2023 Dec 29	0.20 0.24 0.39 0.34	1834 444 4180 2434	3839 437 4180 8630	7: -	0.09	-0.91	10	86.6	96.6
2	QQQ Chart pic News	408.380	421.00 420.00 399.00 398.00	2023 Dec 29	0.16 0.19 0.46 0.40	648 1834 1256 4416	1478 3839 3385 4180	7: -	0.09	-0.91	10	86.2	96.2
3	QQQ Chart pic News	408.380	420.00 410.00 390.00 398.00	2023 Dec 29	0.20 0.24 0.46 0.40	1834 444 4180 4416	3839 437 4180 8630	7: -	0.10	-0.90	11	84.6	95.6
4	QQQ Chart pic News	408.380	421.00 420.00 400.00 399.00	2023 Dec 29	0.16 0.19 0.55 0.48	648 1834 12200 1256	1478 3839 15434 3385	7: -	0.10	-0.90	11	83.7	94.7
5	QQQ Chart pic News	408.380	420.00 419.00 399.00 398.00	2023 Dec 28	0.09 0.11 0.26 0.23	85 109 489 290	1163 188 2007 1029	6: -	0.05	-0.95	5	82.6	87.6
6	SPY Chart pic News	473.650	485.00 484.00 463.00 402.00	2024 Jan 02	0.22 0.28 0.46 0.41	958 444 457 393	628 2125 934 836	11: -	0.11	-0.89	12	81.6	93.6
7	SPY Chart pic News	473.650	485.00 484.00 463.00 462.00	2023 Dec 29	0.10 0.14 0.30 0.26	8104 29347 3850 6572	15528 36886 7946 14456	7: -	0.08	-0.92	9	81.4	90.4
8	QQQ Chart pic News	408.380	420.00 398.00 397.00	2024 Jan 02	0.34 0.40 0.60 0.53	238 87 169 312	283 116 813 354	11: -	0.13	-0.87	15	81.4	96.4
9	SPY Chart pic News	473.650	485.00 484.00 404.00 403.00	2024 Jan 02	0.16 0.21 0.34 0.48	243 938 3032 457	358 828 891 934	11: -	0.11	-0.89	12	81.3	93.3
10	QQQ Chart pic News	408.380	421.00 420.00 399.00 398.00	2024 Jan 02	0.28 0.33 0.70 0.62	88 228 1124 169	183 283 241 813	11: -	0.13	-0.87	15	81.0	96

FIGURE 3: SCAN RESULTS. Potential trades are sorted by the calculated probability that the underlying security will be between the upper and lower breakeven points at option expiration. The trade at the top involves selling an iron condor on QQQ with just seven days remaining until option expiration.

Stock: **QQQ** [Stock News](#)

Name: POWERSHARES QQQ

Sector: Investment Offices

Dividend:

0.69

%

 (2023-12-27)

100 Day SW: 16.09%

Trader: QQQ 23Dec29 2023-12-22 Call Put

Quote Type

Entry Credit

Profit

Rate of Return

Max Profit

Max Risk

Delta (Shares)

Gamma

Vega

Theta

Natural

\$9.00

\$-4.00

-4.4%

\$9.00

\$-91.00

-0.08

-0.640

\$-2.59

\$2.33

Downside Breakeven

Upside Breakeven

Max Profit/Max Risk

Max Profit/Cost

397.91

419.09

9.89%

100.00%

Leg Date	Position	Num	Option Symbol	Expire	Type	Entry	Bid/Ask	Leg Profit	IV %	Vol	OI	Days	Delta %	Gamma %	Vega %	Theta %
2023-12-22	Bought	1	QQQ231229C420	2023 Dec 29	420 Call	0.20	0.190.20	\$-1.00	12.83	1834	3839	7	6.17	1.70	6.9	-6.5
2023-12-22	Sold	1	QQQ231229C419	2023 Dec 29	419 Call	0.24	0.240.25	\$-1.00	12.46	444	437	7	-7.84	-2.06	-8.3	7.8
2023-12-22	Sold	1	QQQ231229P398	2023 Dec 29	398 Put	0.39	0.390.40	\$-1.00	14.93	4416	4180	7	9.88	-2.05	-9.8	10.1
2023-12-22	Bought	1	QQQ231229P397	2023 Dec 29	397 Put	0.34	0.330.34	\$-1.00	15.41	2434	8630	7	-8.29	1.77	8.6	-9.0

FIGURE 4: TRADE DETAILS, IRON CONDOR. In the example iron condor trade, one OTM call and one OTM put are sold while one further out-of-the-money call and put are bought.

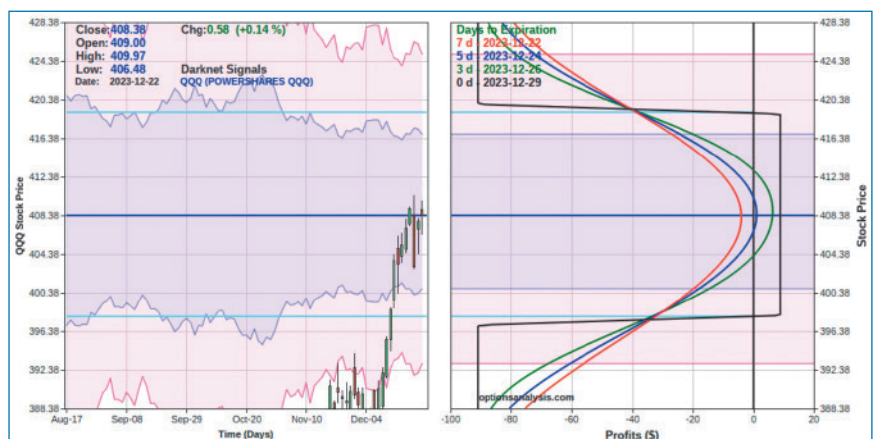


FIGURE 5: RISK CURVES, IRON CONDOR. The risk curves are shown for the trade depicted in Figure 4. Risk curves show the expected dollar gain or loss based on the price of the underlying (in this case, QQQ) as of different dates leading up to option expiration. The black line is option expiration.

OTM condor would keep the entire premium received when the trade was entered.

Find similar articles online at [Traders.com](https://www.Traders.com)



Improve Trading Performance With A Whipsaw Filter

Taming The Effects Of Whipsaw

Part 2

Last time in part 1, we presented a filter to help protect your trend-following strategy against whipsaws. This time, we show how to include the effects of volatility to further improve filtering effectiveness and trading performance.

RECAP: MULTI-SEGMENT WHIPSAWS

Market whipsaw can be a single strong movement in one direction followed by an equally strong reversal. This is often seen during a breakout from a low volatility period. However, during volatile market conditions and especially for smaller timeframes, whipsaw patterns, containing multiple up and down price swings, may occur. As a result, trend-following strategies can be fooled and produce a string of losing trades. A whipsaw filter is needed to reduce false entry signals from multiple whipsaw price swings.

RECAP: EXAMPLE WHIPSAW PATTERN

First, let's look at a typical whipsaw pattern, one containing multiple price swings. Figure 1 shows a price chart for one-hour EURUSD FX data. An upward trend of magnitude 90 pips and six-hour duration is followed by a whipsaw region of 40-hour duration. The total variation in the whipsaw region is approximately 45 pips. A zigzag pattern, with a threshold of 15 pips, is overlaid on the price data. The threshold parameter controls the zigzag movement and determines when to create a new zigzag segment in the opposite direction. For an uptrend zigzag segment, when the closing price drops below the highest close

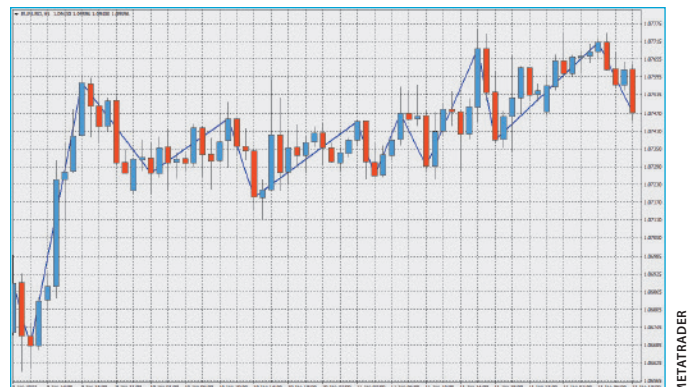


FIGURE 1: EURUSD H1 WHIPSAW EXAMPLE. A short uptrend is followed by a longer whipsaw region. A zigzag pattern is overlaid on the data.

In my article in the March 2024 issue of this magazine, I explored the behavior of whipsaw data and showed how a whipsaw filter can be developed that reduces false entry signals. In particular, multi-swing whipsaw behavior was analyzed through the use of a zigzag pattern fitted to price data. In this article, I will examine the impact of volatility on the size and rate of up-down price swings. This information can be used to further improve the basic whipsaw filter, which was described in the previous article.

WHAT'S AHEAD

In the following sections, I will first present a recap of my previous article, which described whipsaw and trend characteristics. In that article, a rate of directional change (RODC) indicator was described along with a basic whipsaw filter, which used the RODC indicator to reduce the effects of whipsaw.

Following the recap, I define a volatility indicator and examine its properties. Then I will show how zigzag segment rate (RODC) and zigzag segment size vary with volatility. Using this information, I will describe how the basic whipsaw filter is modified to include the effects of volatility on RODC and zigzag segment size.

Finally, using a MetaTrader expert advisor with a whipsaw filter and rudimentary trading strategy, the FX trading performance for five currency pairs is measured and the effectiveness of an enhanced whipsaw filter is shown.

by Richard Poster, PhD

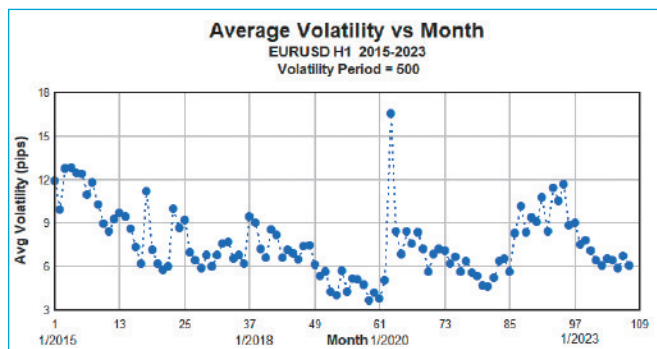


FIGURE 2: VOLATILITY VS. MONTH. The hourly volatility data is averaged over a period of 500 hours for each month.

minus the threshold, the upward segment is ended and a new downward segment is formed.

RECAP: RATE OF DIRECTIONAL CHANGE (RODC) INDICATOR

A whipsaw pattern has alternating up and down zigzag segments within a specific window size. The number of up and down zigzag segments in a window is equivalent to a rate of directional change (RODC).

$$\text{RODC} = 100 * \# \text{ Segments} / \text{Window size (bars)}$$

$$0 \leq \text{RODC} < 100$$

Eq. 1

The RODC indicator uses equation 1 and measures the number of directional changes per 100 bars of a zigzag pattern. Larger values of the RODC indicate whipsaw regions while smaller values indicate trending regions.

References to detailed studies of the properties of zigzag price data can be found in the articles listed at the end of this article in the “Further reading” section.

RECAP: IMPLEMENTING A WHIPSAW FILTER

The basic whipsaw filter is based on the RODC indicator. It uses two inputs from the RODC indicator:

- Zigzag threshold (pips)
- Zigzag window (bars)

The whipsaw filter utilizes two properties of the zigzag price data:

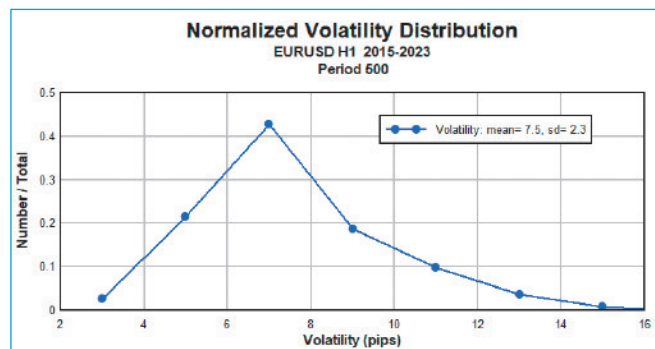


FIGURE 3: NORMALIZED DISTRIBUTION OF VOLATILITY DATA. The mean volatility is 7.5 pips and the distribution has a high side tail.

- Number of up and down segments in the window (RODC)
- Total return from first bar to last bar in the window (pips)

$$\text{Return size} = (\text{CLOSE}_{\text{LAST}} - \text{OPEN}_{\text{FIRST}}) \quad \text{Eq. 2}$$

In a specific window, a small return size and large RODC value characterize whipsaw price movement. An effective filter will use a lower limit for the return size and an upper limit for the RODC to remove whipsaw data.

VOLATILITY INDICATOR

Several indicators are available to measure volatility. Some examples are: average true range (ATR), standard deviation, and Bollinger Band (width). For this analysis, I use the average of the absolute value of the (close–open) price of the bars in a defined period. Volatility is measured in pips.

Two properties of volatility are of interest:

1. Variation of volatility with time
2. Distribution of volatility values

Figure 2 shows the average monthly volatility for one-hour EURUSD data. The volatility varies substantially over a nine-year period and peaks during unstable times.

Figure 3 shows the normalized distribution of the volatility data from a nine-year period. The spread of the distribution is large, as would be expected from examination of Figure 2.

Because the distribution of volatility values shows a significant spread and variation with time, key features of zigzag price data should be examined for dependence on volatility. In fact, several studies on the topic of scaling have shown that both the average return and average duration of legs of a zigzag pattern have a precise relationship with volatility. The average duration of zigzag segments

A whipsaw filter is needed to reduce false entry signals from multiple whipsaw price swings.

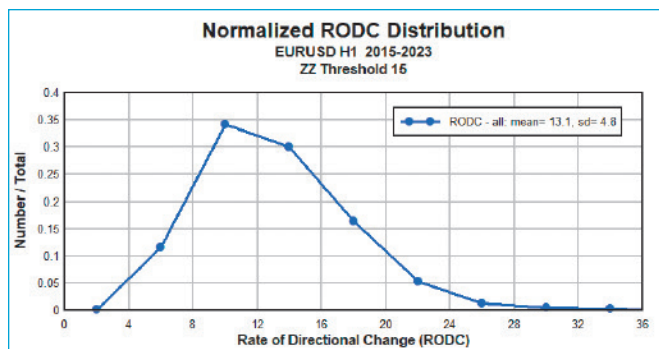


FIGURE 4: DISTRIBUTION OF RATE OF DIRECTIONAL CHANGE. The RODC distribution for all data has a substantial spread.

is just the normalized inverse of RODC. References for these studies and a description of scaling properties can be found in my February 2020 article in this magazine listed in the “Further reading” section at the end of this article.

MODELING AND ANALYZING WHIPSAW AND TREND DATA

The basic model of whipsaw and trend price data is described in the recap in the sidebar, “Recap Of Modeling Trend And Whipsaw Data.” In this section, I describe an enhancement to this model from the incorporation of the predicted values of RODC and average segment size using scaling laws for volatility.

First, some key terms used throughout the analysis are defined.

Terms

- **Zigzag threshold**—For an upward segment, the amount (pips) of downward change from the highest point of the segment before a new downward segment is declared. Vice versa for a downward segment.
- **Return size**—The price change (pips) of a bar, zigzag segment or whipsaw group.
- **Segment**—A leg of a zigzag pattern. Represents an upward or downward price swing. It is described by the return size (pips) and duration (bars).
- **Trend**—A single segment of a zigzag pattern. It is described by the total return size and duration of the segment. Note: Average segment return size and duration vary with zigzag threshold.
- **Whipsaw group (WSG)**—Contains two or more consecutive zigzag segments. The maximum segment size within the group is limited by a WSG threshold. It is described by the total return size of the group (pips), duration (bars) of the group and the average segment size (pips) within the group.

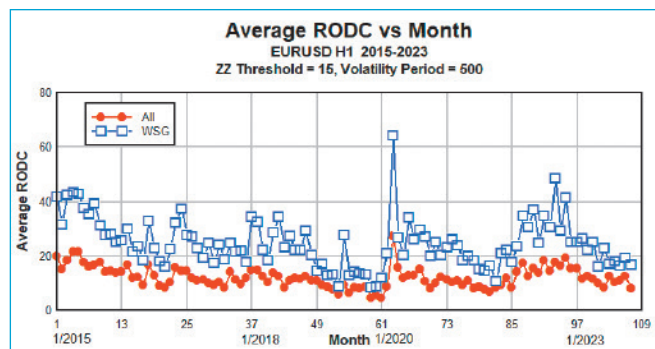


FIGURE 5: MONTHLY RATE OF DIRECTIONAL CHANGE. The WSG RODC segments and all RODC segments behave similarly as a function of time.

This analysis uses price data from the one-hour EURUSD chart.

As shown in Figures 2 and 3, volatility data has significant variation. Therefore, an analysis is undertaken to study the dependencies, if any, of properties of zigzag price data on volatility. This analysis addresses two topics:

1. The dependence on volatility of RODC for WSGs, trend segments and all zigzag segments.
2. The dependence on volatility of the average segment size (pips) for WSGs, trend segments and all zigzag segments.

Analysis for RODC and segment size

1. Rate of directional change (RODC)

In the first part of this section, the general behavior of RODC is described. Following this, I examine the dependence of RODC on volatility. This dependence will be incorporated into the enhanced whipsaw filter.

Figure 4 shows the normalized distribution of the number of zigzag segments per 100 bars for all data. The RODC distribution has a substantial spread.

The calculation for RODC for all data is:

$$\text{RODC All} = 100 * \text{Total segments} / \text{Total bars}$$

Figure 5 shows the monthly behavior of RODC for WSG and all data. The WSG RODC and all RODC data behave similarly as a function of time and mirror the behavior of the monthly volatility.

Figure 6 shows the average number of zigzag segments per 100 bars (RODC) for whipsaw group segments and all

Volatility data has significant variation.



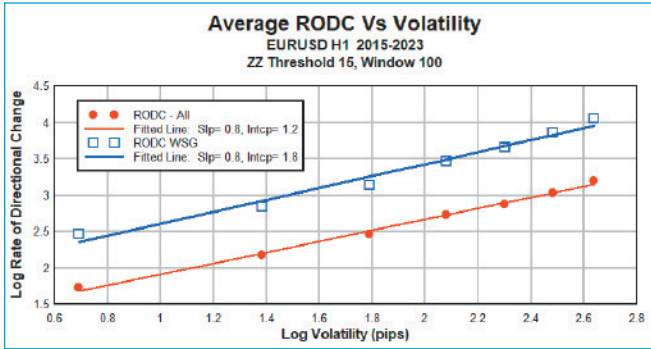


FIGURE 6: RODC SCALING WITH VOLATILITY. RODC scales with volatility for all segments and for WSG segments.

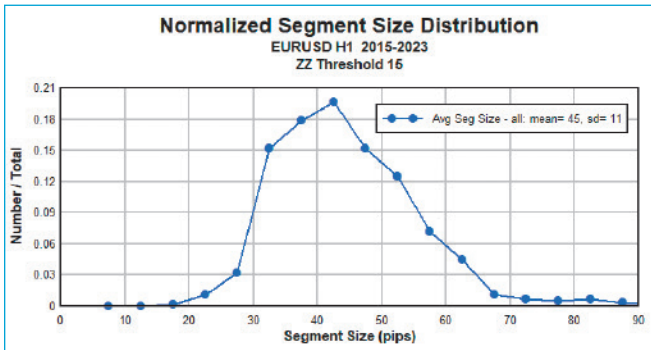


FIGURE 7: DISTRIBUTION OF SEGMENT SIZE. The distribution of the average segment size peaks at 45 pips.

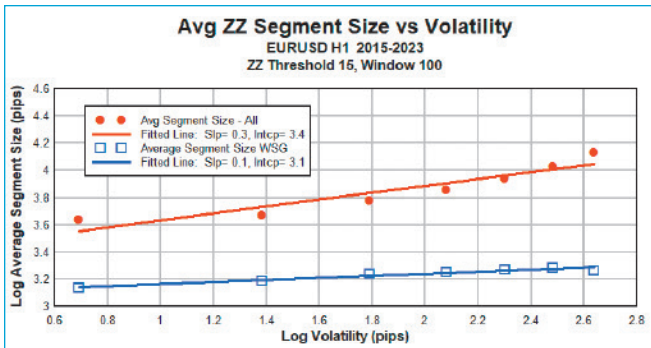


FIGURE 8: SEGMENT SIZE SCALING WITH VOLATILITY. The average segment size has a weak scaling behavior with volatility for all segments and strong scaling behavior for WSG segments.

segments as a function of volatility. A log-log plot is used to highlight scaling behavior of RODC with volatility.

The RODC calculations are:

$$\text{RODC WSG} = 100 * \frac{\sum [\text{WSG segments}]}{\sum [\text{WSG duration (bars)}]}$$

$$\text{RODC All} = 100 * \frac{\text{Total segments}}{\text{Total bars}}$$

A WSG segment threshold (maximum) of 50 pips and a WSG return threshold (maximum) of 30 pips are used in the model. Trend segment size must exceed 50 pips.

Figure 6 shows that the average RODC satisfies a scal-

ing relationship with volatility. The scaling relationship is defined by the following equation:

$$\langle \text{RODC}(V) \rangle = \left(\frac{V}{G} \right)^H$$

where V is the volatility and H and G are constants.

The scaling equation can be rewritten as:

$$\text{Log}(\langle \text{RODC} \rangle) = H * \text{Log}(V) + K \quad \text{Eq. 3}$$

where H is the slope ($=0.8$) and K ($=1.2$) is the intercept on the log-log plot in Figure 6, for all segment data. Both all segment data and WSG segment data scale with volatility and also have the same slope, H .

In the previous analysis, a fixed upper limit of RODC was used in the whipsaw filter to reduce the effects of whipsaw. Now, an enhanced whipsaw filter can use equation 3 to provide a dynamic upper limit that varies with volatility.

2. Average segment size

In the first part of this section, the general behavior of zigzag segment size is described. Following this, I examine the dependence of average segment size on volatility. This dependence will also be incorporated into the enhanced whipsaw filter.

Figure 7 shows the normalized distribution of average segment size. Similar to the RODC distribution, the average segment size has a significant variation and has an asymmetric distribution.

Figure 8 shows the average segment size (pips) for whipsaw groups and for all zigzag segments as a function of volatility. A log-log plot is used to highlight scaling behavior of average segment size with volatility.

The scaling behavior is not strong for all segment data, but adequate for including the effects of volatility on average segment size in a whipsaw filter. The scaling equation is:

$$\text{Log}(\langle \text{SegSize} \rangle) = H * \text{Log}(V) + K \quad \text{Eq. 4}$$

where $H=0.3$ and $K=3.4$ are constants for all segment data.

With increasing volatility, the average segment size for all segment data increases more rapidly than the average segment size within a whipsaw group. The WSG segment size behavior is relatively flat as a function of volatility. This suggests that the whipsaw filter, using an average segment size test, will be more effective in periods of higher volatility.

Equation 4 can be used to calculate a dynamic lower limit, dependent on volatility, of the average segment size for the whipsaw filter. A volatility-dependent lower limit on average segment size can be included in the enhanced whipsaw filter to reduce the effects of whipsaw.

AN ENHANCED WHIPSAW FILTER

To filter whipsaw data, an enhanced whipsaw filter uses the following tests:

- $RODC_Measured < RODC_Predicted(Volatility)$
- $AverageSegmentSize_Measured > AverageSegmentSize_Predicted(Volatility)$

where predicted values are determined from equations 3 and 4 using the observed volatility. Measured values are computed from the zigzag pattern over a specific window size. Constants from equations 3 and 4 are found from optimization of trading performance, with starting values based on the fitted results for slope and intercept shown in Figures 6 and 8.

TRADING PERFORMANCE WITH THE ENHANCED WHIPSAW FILTER

As in the previous study, a simple, trend-following strategy is used to estimate profit performance. This strategy, on its own, would not support a profitable trading system but is useful to demonstrate the performance of whipsaw filters.

The strategy for long trades requires a fast moving average to be above a slow moving average by a specified threshold amount (pips). Similarly, the strategy for short trades requires a fast moving average to be below a slow moving average by the same threshold amount. The fast

ABLETREND Trusted Reliable Signals for Volatile Markets Since 1994



Extensive Chart Library Available Online
Free Access for Featured Trade Signal Examples



Updated Daily
Intraday & Swing Trading

*Access the New Resource from the Link Below



Traders Rave Over AbleTrend

1997-2024 Award Winning Trading Systems for Stocks, Futures and Options



ABLETREND 7.0 COLLECTED BY



- "32 years in the market. This is the best I've seen yet." - Anthony
- "Those times that I lose money are usually because I haven't followed the signals being generated by Ablesys. It's a very dependable system." - Peter
- "Best ever helper for my stock Entry and Exit executions." - Neil
- "This system is absolutely amazing. I have been trading for over twenty years and nothing can come to the accuracy of this awesome system." - Customer
- "Great tool without bias. Extremely easy to use." - Steve
- "I am extremely happy with AbleTrend software. It has changed my trading in the best possible way." - Francesco

- "I have used it for 10+ years and have tried many other trading software systems. This is by far the very best system that can adjust to any market condition...I am exceptional pleased with its results." - Joe S
- "I have been using AbleTrend for 13 years! Primarily for day trading stocks...I could not do without it!" - Ricardo DaSilva
- "Have been using Able Trend for 20 years and it is just as effective and accurate as it was in 1999. I have used it profitably for day trading for futures, just as I have for position trading stocks...Use every day whether trading that day or not." - Dan Sayyer
- "I never make a trade without checking with Ablesys. The program is my important guiding light and has been for over 10 years." - Harvey Saff

TEST DRIVE THE LATEST SIGNALS
www.ablesys.com/SCM

Risk FREE AbleTrend 30-Day Trial
50% Discount code: SCA50

©2024 Ablesys Corp. • 35111F Newark Blvd. Suite 506, Newark, CA 94560 • 510-495-0976 • sales@ablesys.com

THESE RESULTS ARE BASED ON SIMULATED OR HYPOTHETICAL PERFORMANCE RESULTS THAT HAVE CERTAIN INHERENT LIMITATIONS. UNLIKE THE RESULTS SHOWN IN AN ACTUAL PERFORMANCE RECORD, THESE RESULTS DO NOT REPRESENT ACTUAL TRADING. ALSO, BECAUSE THESE TRADES HAVE NOT ACTUALLY BEEN EXECUTED, THESE RESULTS MAY HAVE UNDER-OR OVER-COMPENSATED FOR THE IMPACT, IF ANY, OF CERTAIN MARKET FACTORS, SUCH AS LACK OF LIQUIDITY. SIMULATED OR HYPOTHETICAL TRADING PROGRAMS IN GENERAL ARE ALSO SUBJECT TO THE FACT THAT THEY ARE DESIGNED WITH THE BENEFIT OF HINDSIGHT. NO REPRESENTATION IS BEING MADE THAT ANY ACCOUNT WILL OR IS LIKELY TO ACHIEVE PROFITS OR LOSSES SIMILAR TO THESE BEING SHOWN. THE TESTIMONIAL MAY NOT BE REPRESENTATIVE OF THE EXPERIENCE OF OTHER CLIENTS AND THE TESTIMONIAL IS NO GUARANTEE OF FUTURE PERFORMANCE OR SUCCESS. TECHNICAL ANALYSIS OF STOCKS & COMMODITIES LOGO AND AWARD ARE TRADEMARKS OF TECHNICAL ANALYSIS, INC.

RECAP OF MODELING TREND AND WHIPSAW DATA

The model uses four input parameters.

Model input parameters

1. WSG segment threshold—Maximum return size allowed for any segment within the WSG
2. WSG return threshold—Maximum return size allowed for the WSG
3. Zigzag threshold—Defines the minimum amount of change required to reverse direction in the zigzag pattern
4. Zigzag window—Number of bars being examined

The criteria used in the model for designating a collection of closing price data as a whipsaw group or as a trend segment is defined.

Criteria for identifying a whipsaw group

- A WSG has two or more consecutive segments.
- The WSG return size is small and has an absolute value less than the WSG return threshold.
- All WSG segments have an absolute value less than the WSG segment threshold.

Criteria for identifying a trend

- The total return size has an absolute value greater than the WSG segment threshold. A trend is always defined as one zigzag segment.

moving average period is 1–4 bars. Other rules for entry or exit signals are:

- Only one trade can be open at a time.
- Bollinger Band separation is within lower and upper bounds.
- Take-profit, stop-loss and trailing stops are used to exit trades.
- The maximum lifetime (bars) of an open trade is fixed.
- New buy signals cause open short positions to be closed and vice versa.

After a trade signal is generated, zigzag pattern properties are used to filter the data. The zigzag pattern has a specific window size and threshold. The enhanced filter logic is:

- Place an upper limit on the allowed number of up and down zigzag segments (RODC).

Currency Pair	# Trades	Profit (0.1 Lot)	Profit Factor	Payoff
EURUSD—No filter	1938	\$6800	1.24	3.51
EURUSD—WS filter #1	521	\$4845	1.73	9.30
EURUSD—WS filter #2	400	\$4813	1.96	12.03
GBPUSD—No filter	566	\$1836	1.31	3.25
GBPUSD—WS filter #1	394	\$2671	1.89	6.78
GBPUSD—WS filter #2	364	\$2818	2.07	7.74
USDCAD—No filter	365	\$1609	1.78	4.41
USDCAD—WS filter #1	324	\$1725	2.04	5.17
USDCAD—WS filter #2	305	\$1852	2.32	6.07
USDCHF—No filter	401	\$5466	2.00	13.63
USDCHF—WS filter #1	329	\$5127	2.27	15.59
USDCHF—WS filter #2	309	\$5070	2.41	16.41
USDJPY—No filter	1098	\$5652	1.32	5.15
USDJPY—WS filter #1	775	\$6121	1.56	7.90
USDJPY—WS filter #2	769	\$7022	1.65	9.13

FIGURE 9: PROFIT PERFORMANCE SUMMARY. Test results are shown for no filter, basic filter (#1), and enhanced filter (#2).

- Place a lower limit on the total return size for the zigzag window.
- Place a lower limit on the average segment size.

For the enhanced filter, the upper limit on RODC and the lower limit on average segment size are based on scaling equations 3 and 4, using observed volatility.

Five currency pairs have been evaluated over a period of 2015–2022 with one hour charts. Figure 9 shows the test results for currency pairs without the filter; with the basic filter (#1); and with the enhanced (volatility) filter (#2). Performance results are measured by the profit factor (profit/loss) and payoff (average profit per trade). In every case, the basic filter improves the profitability of the trend-following strategy and the enhanced filter always improves the effectiveness of the basic filter.

CONCLUSIONS

- Using RODC and average segment size, the effects of whipsaw are reduced and trading performance is improved.

Continued on page 51

This suggests that the whipsaw filter, using an average segment size test, will be more effective in periods of higher volatility.



TRADE BRILLIANTLY



thinkorswim desktop
Candlestick Chart
with Ribbon Study

thinkorswim® is now at Schwab.

Our award-winning thinkorswim trading platforms are loaded with powerful features that let you dive deeper into the market.

- Pull from 400+ technical studies* on thinkorswim desktop, including basic support, resistance, profile, and candlestick pattern charts. Plus, support your more advanced strategies with sophisticated charts, like Monkey Bars and Renko charts and up to 20 drawings with eight Fibonacci tools.
- Uncover new opportunities with up-to-the-minute market news and insights.
- Tailor the platforms to your trading style with an array of customization options – from interfaces to charts to orders.

Built by the trading-obsessed, so you can trade brilliantly.



Investing involves risks, including loss of principal.

*Schwab does not recommend the use of technical analysis as a sole means of investment research.

© 2024 Charles Schwab & Co., Inc. All rights reserved. Member SIPC. (0324-31FY) ADP123106-00

[Schwab.com/Trading](https://www.schwab.com/trading)



Traditional Tools Get A Boost With Artificial Intelligence

How To Enhance A Trading Strategy On Gold Futures By Using An AI-Based Volatility Predictor

Here's how you can apply the benefits of machine learning to a traditional trading system with the help of some Python libraries.

by Domenico D'Errico and Giovanni Trombetta



In this article, our aim is to explore the symbiotic relationship between machine learning techniques and traditional trading systems, while also discussing the integration of Python programming with TradeStation. We will begin by presenting a traditional breakout system for gold futures, programmed in EasyLanguage. Following this, we will utilize a machine learning model in Python

to enhance the system by substituting a “traditional” quantitative filter with a volatility forecaster and then we will compare the results.

Why use an intraday breakout strategy for this approach? Intraday breakout strategies are designed to capitalize on sudden price movements within a single trading session. The rationale behind such strategies stems from the belief that significant price movements often occur when an asset breaks through key support or resistance levels, signaling a shift in market sentiment or momentum.

And why choose the gold market for this exercise? Trading gold futures intraday presents unique opportunities due to the metal's inherent volatility and sensitivity to geopolitical and economic events.

AN INTRADAY BREAKOUT STRATEGY FOR GOLD FUTURES

The first question is: How do we algorithmically identify a break in resistance? Within the realm of technical analysis, numerous methodologies exist to accomplish this task, ranging from pivot points, to volume profile, to Fibonacci retracements. To maintain simplicity, our approach revolves around selecting the highest price within the last n bars. We are going to start with a 23-hour high, which is roughly a daily rolling high.

The following is a simplified intraday breakout strategy tailored specifically for 60-minute futures charts:

Long entry/exit rules

- Buy 1 gold futures contract at the highest 23-hour high breakout
- Start trading after 8 am
- Hold the position until 2 am
- Historical period: January 2007 to date, 60-minute

In Figure 1, you can see some entry/exit examples from the intraday breakout strategy on a 60-minute chart of gold futures. In Figure 2, you see a performance summary for the strategy in TradeStation. In Figure 3, you see an equity curve for the strategy.

As you can see in Figure 2, there are around 2,000 trades in 17 years with an average trade around \$100 (no slippage/commissions) and a percent profitable of 52%—a good start. The next question is: Can we filter entries to increase the probability of successful trades and reduce false signals?

According to technical analysis literature, there are many ways to filter trades. So we proceed in one of two ways:

1. We could follow a traditional approach by selecting a trade filter among the many available, programming it in EasyLanguage, relaunch the backtesting, and compare results.
2. Or, we could use a machine learning-based approach.

A TRADITIONAL APPROACH TO FILTERING TRADES

Among the many ways to filter trades in an intraday breakout system, let's focus on a

simple daily compression on the day before the entry.

Let's define a daily compression indicator as:

$$\text{Daily compression indicator} = \frac{\text{AbsValue}(\text{Close} - \text{Open})}{\text{Range}} \quad \text{Eq. 1}$$

Let's add some additional information on how the filter works: If the daily compression indicator equals 1, it indicates that the previous day's session opened at the bottom (or top) of the range and closed at the top (or bottom), meaning that the session has been quite volatile with no shadows.

A daily compression indicator value below 0.5 indicates

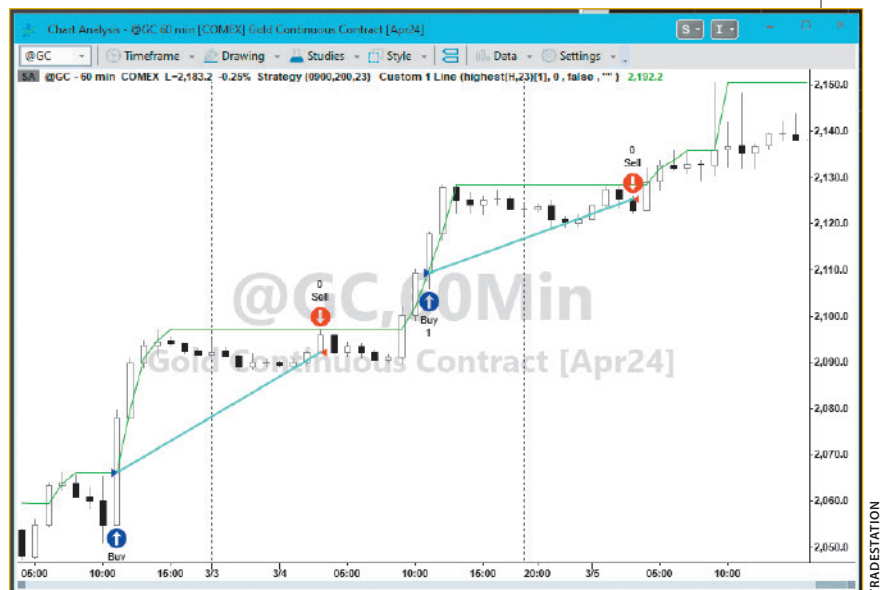


FIGURE 1: SIMPLE INTRADAY BREAKOUT STRATEGY. This demonstrates some example trading signals produced by a simplified intraday breakout strategy on 60-minute gold continuous futures. A performance report for the strategy is shown in Figure 2.

Total Net Profit	\$198,040.00	Profit Factor	1.41
Gross Profit	\$684,920.00	Gross Loss	(\$486,880.00)
Total Number of Trades	1,908	Percent Profitable	51.89%
Winning Trades	990	Losing Trades	906
Even Trades	12		
Avg. Trade Net Profit	\$103.79	Ratio Avg. Win/Avg. Loss	1.29
Avg. Winning Trade	\$691.84	Avg. Losing Trade	(\$537.40)
Largest Winning Trade	\$7,200.00	Largest Losing Trade	(\$4,430.00)
Max. Consecutive Winning Trades	11	Max. Consecutive Losing Trades	13
Avg. Bars in Winning Trades	13.63	Avg. Bars in Losing Trades	13.56
Avg. Bars in Total Trades	13.68		
Max. Shares/Contracts Held	1	Account Size Required	\$13,960.00
Return on Initial Capital	198.04%	Annual Rate of Return	6.35%
Return Retracement Ratio	4.44	RINA Index	663.05
Trading Period	17 Years, 2 ...	Percent of Time in the Market	28.21%
Max. Equity Run-up	\$202,760.00		
Max. Drawdown(Intra-Day Peak to V...		Max. Drawdown(Trade Close to Tra...	
Value	(\$17,560.00)	Value	(\$13,960.00)
Net Profit as % of Drawdown	1,127.79%	Net Profit as % of Drawdown	1,418.62%
Max. Trade Drawdown	(\$6,140.00)		

FIGURE 2: TRADESTATION PERFORMANCE REPORT. Here is a TradeStation performance summary for the simplified intraday breakout strategy on 60-minute gold continuous futures shown in Figure 1.

that the previous day's price movement has been less than half of the range, suggesting significant compression in price, which could potentially lead to acceleration.

So the new entry/exit rules will be:

If the previous daily compression is below a trigger of 0.5

- Buy the highest 23-hour high breakout
- Start trading after 8 am
- Hold the position until 2 am

To evaluate the benefits of the daily compression filter, we conduct a sensitivity analysis, varying the volatility filter from 0.1 to 1. The results are shown in Figure 4. From the sensitivity analysis, we can see that:

- The number of trades increases as the trigger increases
- The highest profit corresponds to a filter of 1 (meaning no filter applied) with 2,146 trades
- The highest average trade corresponds to a filter of 0.1 with 276 trades
- The highest % profitable corresponds to a filter of 0.2 with 527 trades
- The highest return on account corresponds to a filter of 0.6 with 1,585 trades

In conclusion, we can assert that the traditional approach of applying a compression filter on the previous day generally improves results from a financial perspective. However, let's venture beyond the confines of "traditional" technical analysis and address two questions:

1. Why select the day compression filter among the many available in the literature?
2. What about the model's predictability? In other words, will this filter continue to be effective in the future?

This is where traditional tools fall short. For example, in addressing the first question, we chose this filter because, over years of chart analysis, many traders and analysts observed that after a price compression, the price is more likely to experience a significant movement. However, what we programmed in EasyLanguage is just one of the

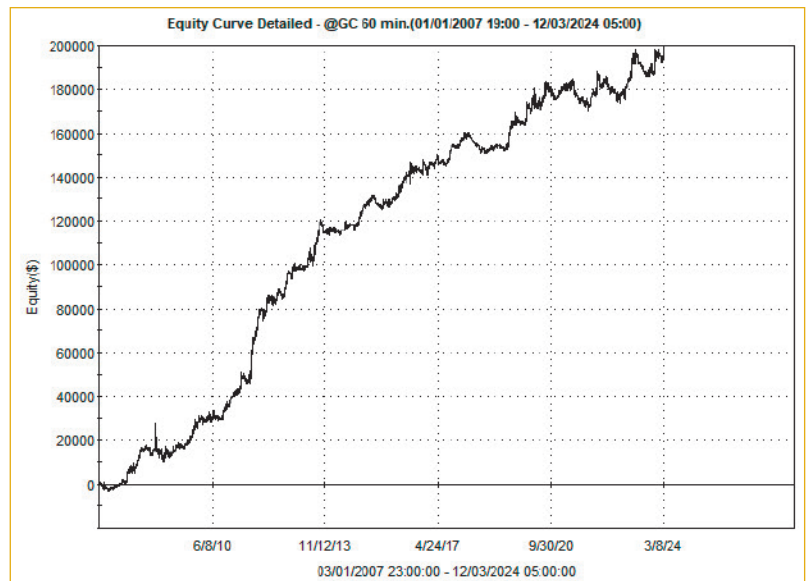


FIGURE 3: EQUITY CURVE. Here you see profits and losses for the example simplified intraday breakout strategy on 60-minute gold continuous futures plotted as an equity line using the TradeStation platform.

TradeStation Strategy Optimization Report - @GC 60 min (COMEX) Gold Continuous Contract (Apr24)											
	GoBreak00 VoltyComp	Alt: Net Profit	All Total Trades	Alt: % Profitable	All Winning Trades	All Losing Trades	Alt: Win/Loss Ratio	Alt: Avg Trade	Alt: Max Intraday Drawdown	Alt: ProfitFactor	Alt: Return on Account
1	0.1	44,790.00	276	50.00	157	116	1.23	162.26	-6,820.00	1.67	659.74
2	0.2	84,810.00	527	57.12	301	222	1.22	160.93	-10,320.00	1.65	821.89
3	0.3	75,890.00	790	53.92	426	359	1.13	57.33	-12,170.00	1.34	631.89
4	0.4	118,590.00	1,059	54.01	572	481	1.18	111.58	-14,770.00	1.40	802.91
5	0.5	145,470.00	1,320	53.88	711	603	1.18	110.96	-13,760.00	1.40	1,062.15
6	0.6	191,720.00	1,585	53.03	850	727	1.24	120.96	-13,760.00	1.45	1,393.31
7	0.7	201,960.00	1,823	53.04	967	847	1.23	110.78	-19,270.00	1.40	1,048.05
8	0.8	208,730.00	2,009	52.68	1,058	940	1.22	103.90	-18,430.00	1.37	1,132.56
9	0.9	200,750.00	2,112	52.32	1,105	993	1.21	97.69	-19,490.00	1.34	1,060.00
10	1.0	211,730.00	2,146	52.52	1,127	1,005	1.20	98.66	-19,490.00	1.35	1,098.35

FIGURE 4: FILTERING TRADING SIGNALS, SENSITIVITY ANALYSIS. To evaluate the potential benefits of applying a traditional price filter to the trading signals for the example intraday breakout strategy, a sensitivity analysis is conducted, varying the volatility filter from 0.1 to 1.

many ways to detect a price compression.

Furthermore, in response to the second question, we must acknowledge that:

- We cannot predict with certainty whether this filter will continue to be effective in the future.
- We lack a method to measure predictability.

In other words, while traditional backtesting provides us with profitability measures, it offers little insight into predictability, which often relies on traders' instinct and

Let's venture beyond the confines of "traditional" technical analysis.



date_time	feature_0	feature_1	feature_2	feature_3	feature_4	feature_5	feature_6	feature_7	feature_8	feature_9	...	feature_486	feature_487	feature_488	feature_489	feature_490	feature_491	feature_492	feature_493	volatility	volatility_5classes
2007-01-24	0.009568	0.000795	0.004024	0.001063	0.107858	0.003846	0.002400	0.005295	0.010731	-0.001590	...	0.003689	0.008535	0.007044	0.006843	0.007245	-0.002022	-0.002222	-0.001822	0.009820	0.5
2007-01-25	0.002126	0.005119	0.004364	-0.001681	0.531041	0.002481	0.004743	0.000221	-0.000531	-0.004060	...	0.009818	0.025207	0.018173	0.015824	0.006423	0.006289	0.006022	0.006516	0.006558	0.25
2007-01-26	-0.002210	-0.006059	-0.002838	0.000886	-0.081840	-0.002563	-0.004456	-0.000664	-0.001768	-0.008254	...	0.015107	0.023233	0.018331	0.018858	0.017804	0.011673	0.012197	0.011150	0.001682	0
2007-01-28	0.000531	-0.000530	0.004357	0.000620	-0.866681	0.001240	0.001906	0.000576	0.001063	-0.001590	...	0.028212	0.040850	0.028478	0.029109	0.027847	0.026751	0.027381	0.026121	0.006460	0.25
2007-01-29	0.000531	0.000177	-0.004604	-0.003682	13.210959	-0.001969	-0.002212	-0.001728	-0.003453	-0.005038	...	0.033518	0.035888	0.034822	0.034845	0.034798	0.028146	0.028169	0.028122	0.005864	0.25
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2024-02-28	-0.001420	-0.000830	-0.002208	0.002451	-0.091717	-0.000502	-0.001517	0.000514	0.001028	-0.002098	...	-0.002567	0.004218	0.000660	0.000171	0.001149	-0.006183	-0.006668	-0.005697	0.011444	0.75
2024-02-29	0.002451	0.005861	0.001279	0.004988	0.704729	0.003650	0.003578	0.003721	0.007452	0.003712	...	-0.002220	0.006353	0.003802	0.002702	0.004904	-0.007804	-0.008691	-0.006514	0.024380	1
2024-03-01	0.004688	0.018306	0.005403	0.017810	0.226282	0.011653	0.011891	0.011415	0.022887	0.015636	...	0.003295	0.030719	0.024025	0.026004	0.023850	0.000440	0.001492	-0.000610	0.003347	0
2024-03-03	0.017810	-0.000954	0.020078	-0.000765	-0.895176	0.008938	0.009435	0.008441	0.017032	-0.003386	...	0.023513	0.029887	0.025339	0.025452	0.025226	0.021913	0.022025	0.021800	0.018900	1
2024-03-04	-0.000765	0.015894	0.000383	0.014785	8.837972	0.007579	0.008152	0.007007	0.014008	0.012314	...	0.025817	0.045537	0.044398	0.044127	0.044685	0.025013	0.024749	0.025277	0.014098	0.75

FIGURE 5: TRAINING DATASET. The percentage change between a varying number of bars for the lag or lookback is calculated.

experience.

So, let's switch from TradeStation to Python for a moment.

AN AI-BASED APPROACH TO FILTERING TRADES

The idea is to use a machine learning algorithm to attempt to predict the future volatility of the instrument by effectively replacing the previous volatility filter. The questions we aim to address are related to the ability to make this prediction dynamic, surpassing a more traditional static approach.

In this case, we will focus on daily volatility, characterizing our system as a multi-timeframe trading system (daily filter and operation on the 60-minute timeframe).

We will refer to an ensemble model called XGBoost ("Extreme Gradient Boosting"), invented by Tianqi Chen in 2014. It has quickly become one of the most popular and powerful machine learning algorithms, particularly used in data science and machine learning competitions due to its efficiency and accuracy.

XGBoost is a machine learning algorithm belonging to the boosting models category, a technique for building predictive models. Here is a simplified explanation of its operation in extreme brevity:

- *It starts with a simple model:* XGBoost begins with a simple predictive model, often called a "decision tree" (a series of questions that can be answered yes or no to arrive at a prediction).
- *It finds errors:* It focuses on where the model fails to make accurate predictions. For example, it might look at cases where it has predicted an incorrect level of volatility.
- *It creates a new model to correct the errors:* It creates another model (another decision tree) that specifically focuses on the errors made by the first model.

This new model tries to correct those errors.

- *It combines the models:* XGBoost combines the two models (the first and the new model) intelligently. It adds the second model to the first so that the combination is better than the first model alone.
- *It repeats the process:* XGBoost iterates this process, adding new models and combining them together until the overall prediction improves enough.

Essentially, XGBoost creates a team of models that work together to make better predictions than they could individually. This "boosting" process makes XGBoost very powerful and flexible for countless machine learning problems.

Since we are referring to a supervised machine learning model (that is, learning from examples), we must first provide an appropriate dataset, which may contain the highest number of independent elements or at least with lower mutual correlation. The key is to input heterogeneous information that can be processed and synthesized directly by the machine to solve the problem we pose each time.

If originally we used the four canonical prices on a daily basis (open, high, low, close) to compose the volatility filter, we will start from these elements, adding some others: open, high, low, close, volume, range, avgprice,

Utilizing AI-based models not only uncovers unseen market behaviors and patterns but also provides a critical means to validate systems and enhance their robustness.

```

XGBClassifier
XGBClassifier(base_score=0.5, booster='gbtree', callbacks=None,
               colsample_bylevel=1, colsample_bynode=1, colsample_bytree=1,
               early_stopping_rounds=None, enable_categorical=False,
               eval_metric=None, gamma=0, gpu_id=-1, grow_policy='depthwise',
               importance_type=None, interaction_constraints='',
               learning_rate=0.1, max_bin=256, max_cat_to_onehot=4,
               max_delta_step=0, max_depth=6, max_leaves=0, min_child_weight=1,
               missing=nan, monotone_constraints='()', n_estimators=600,
               n_jobs=0, num_parallel_tree=1, objective='multi:softprob',
               predictor='auto', random_state=0, reg_alpha=0, ...)

```

FIGURE 6: XGBCLASSIFIER ALGORITHM. This shows the summary table of attributes of the XGBClassifier algorithm in Python using the XGBoost library.

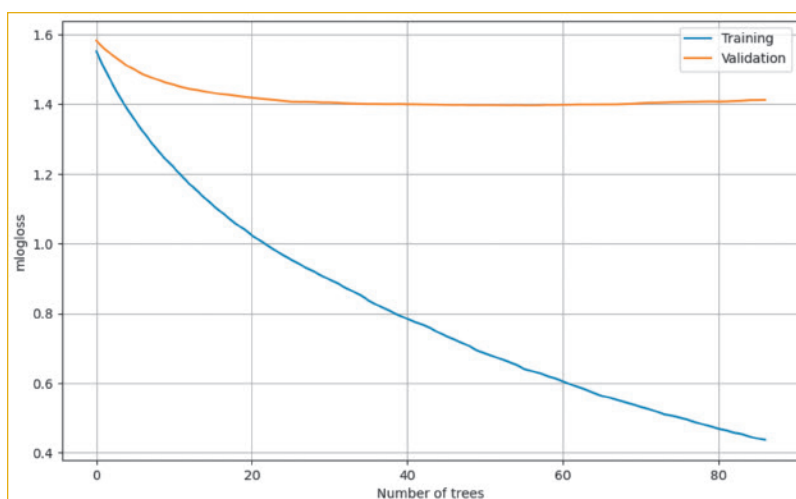


FIGURE 7: LEARNING CURVE OF THE XGBOOST ALGORITHM. The “learning curves” are mapped for both the “training” period (the period of machine training, in blue) and “validation” period (the data period following the training period, unknown to the machine and used to measure the model’s generalization power, in orange). On the horizontal axis is the number of decision trees (elementary models) characterizing the XGBoost algorithm (similar to a time axis). The vertical axis shows the model evaluation metric (in this case, “mlogloss”).

medprice, medbodyprice. (For more explanation and background on these price indicators, you can review our earlier article in S&C, “System Development Using Artificial Intelligence,” listed at the end of this article). Price indicator formulas:

$$\begin{aligned} \text{avgprice} &= (\text{open} + \text{high} + \text{low} + \text{close}) / 4 \\ \text{medprice} &= (\text{open} + \text{close}) / 2 \\ \text{medbodyprice} &= (\text{high} + \text{low}) / 2 \end{aligned}$$

We can consider these prices as the elementary building blocks of a more complex formula that could potentially encompass all or part of them. To this end, we also introduce a “lag” (for example, from 0 to 20 bars) that allows us to construct the percentage changes between each of these elements and their past counterparts. In the end, we will obtain a dataset like the one shown in Figure 5.

Each row represents a daily session of gold futures, and each column represents the percentage change of

a single price element. Finally, the target column contains the element to be predicted, namely the level of volatility associated with the next session. In jargon, we transform a numerical problem like this (a “regression” problem) into one of “classification” by constructing the following five classes (column “target_5classes”):

- class 0: percentile0 < volatility <= percentile20
- class 1: percentile20 < volatility <= percentile40
- class 2: percentile40 < volatility <= percentile60
- class 3: percentile60 < volatility <= percentile80
- class 4: percentile80 < volatility <= percentile100

In essence, we aim to teach the machine how to distinguish between different volatility regimes based on percentile position: class 0 will indicate a prediction of very low volatility compared to past occurrences, while class 4 will indicate a prediction of high volatility regimes.

The period under consideration spans from January 2007 to March 2024, and we will take the first 70% to train the machine to correctly recognize volatility classes (from January 2007 to July 2018).

The remaining 30%, more recent, will serve as our test set with data unknown to the machine (from July 2018 to March 2024).

Figure 6 shows a summary table of attributes of the XGBClassifier algorithm in Python using the “XGBoost” library.

In Figure 7, we have mapped the “learning curves” both for “training” (the period of machine training, in blue) and “validation” (data period following the training

While traditional backtesting provides us with profitability measures, it offers little insight into predictability.



	precision	recall	f1-score	support
0	0.96	0.95	0.95	730
1	0.93	0.98	0.95	726
2	0.94	0.96	0.95	718
3	0.98	0.97	0.97	698
4	0.99	0.93	0.96	706
accuracy			0.96	3578
macro avg	0.96	0.96	0.96	3578
weighted avg	0.96	0.96	0.96	3578

FIGURE 8: TRAINING PERIOD REPORT. This shows the “classification report” of the XGBoost algorithm for the training period (that is, for the portion of the data used to train the model).

	precision	recall	f1-score	support
0	0.64	0.60	0.62	338
1	0.27	0.30	0.28	342
2	0.24	0.26	0.25	351
3	0.28	0.23	0.25	370
4	0.42	0.44	0.43	362
accuracy			0.36	1763
macro avg	0.37	0.37	0.37	1763
weighted avg	0.37	0.36	0.36	1763

FIGURE 9: VALIDATION PERIOD REPORT. This shows the “classification report” of the XGBoost algorithm for the validation period (that is, for the portion of the data used to validate the model).

period, unknown to the machine and used to measure the model’s generalization power, in orange). On the horizontal axis, you have the number of decision trees (elementary models) characterizing the XGBoost algorithm. You can interpret this axis as an equivalent time axis. On the vertical axis, we can appreciate the model evaluation metric (in this case, we used “mlogloss”).

What is clearly evident is that the training curve (in blue) continues to improve until the end of the simulation (the prediction error for volatility decreases), while the validation curve does not exceed 1.4 mlogloss, already around 30 trees. This behavior is quite normal in this

type of training, and if we were to push further, we would even notice a deterioration of performance in validation from a certain point onwards; this is the phenomenon of overfitting, which betrays the fact that the machine has started to model the noise of the series and its application on new data

	prediction
date_time	
2024-02-23	0
2024-02-25	1
2024-02-26	1
2024-02-27	2
2024-02-28	1
2024-02-29	2
2024-03-01	0
2024-03-03	2
2024-03-04	4
2024-03-05	4

FIGURE 10: EXAMPLE OF DAILY VOLATILITY PREDICTIONS FOR THE VALIDATION PERIOD. Volatility predictions from the validation period are passed to TradeStation to replace the previous static volatility filter. The aim is to make the predictions dynamic, rather than using a more traditional static approach.

becomes inconsistent.

Moving to a purely quantitative analysis, we can analyze a performance report, specific for classification problems, called “classification report” (using the ScikitLearn Python library). The purpose of this report is to enhance the quality of our predictors by unpacking the results class by class.

To delve into the details within the context of a multiclass problem:

- **True positive (TP):** A true positive occurs when the model correctly predicts an instance belonging to a specific class. It means that the actual class is the specified class, and the model also predicts it as that class.
- **False positive (FP):** A false positive occurs when the model incorrectly predicts an instance as belonging to a specific class when it actually belongs to another class. It means that the actual class is not the specified class, but the model predicts it as that class.
- **True negative (TN):** For multiclass problems, the concept of true negatives is not applicable, as it refers to instances that are correctly predicted as not belonging to a specific class. In multiclass problems, we typically focus on the positive predictions rather than negative ones.
- **False negative (FN):** A false negative occurs when the model incorrectly predicts an instance as not belonging to a specific class when it actually belongs to that class. It means that the actual class is the specified class, but the model predicts it as another class.

For each of the classes present in the sequence, in fact, we can observe four distinct columns of metrics:

- **Precision:** The ratio of correctly predicted positive observations to the total predicted positives. It is a measure of the accuracy of the positive predictions made by the model. It is calculated as:

$$\text{Precision} = \frac{\text{True Positives}}{\text{True Positives} + \text{False Positives}}$$

- **Recall (also called sensitivity):** The ratio of correctly predicted positive observations to the all observations in actual class. It is a measure of the model’s ability to correctly identify positive instances. It is calculated as:

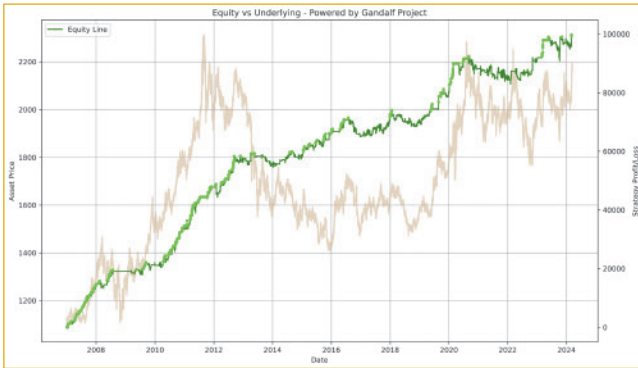


FIGURE 11A: PYTHON MODEL, VOLATILITY REGIME, CLASS 0. This shows the P&L of the revised trading system using a class 0 volatility prediction in the formula to filter trade signals. “Class 0” indicates a prediction of very low volatility compared to past occurrences.

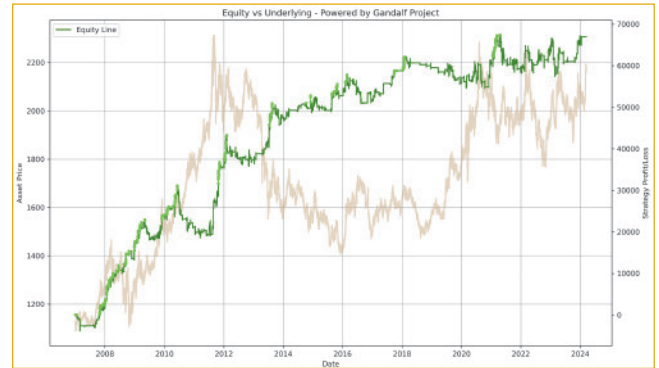


FIGURE 11D: PYTHON MODEL, VOLATILITY REGIME, CLASS 3. This shows the P&L of the revised trading system using a class 3 volatility prediction in the formula to filter trade signals.

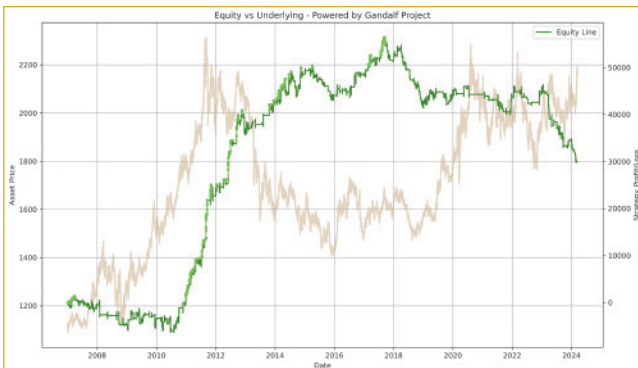


FIGURE 11B: PYTHON MODEL, VOLATILITY REGIME, CLASS 1. This shows the P&L of the revised trading system using a class 1 volatility prediction in the formula to filter trade signals.



FIGURE 11E: PYTHON MODEL, VOLATILITY REGIME, CLASS 4. This shows the P&L of the revised trading system using a class 4 volatility prediction in the formula to filter trade signals. “Class 4” indicates a prediction of high-volatility regimes.

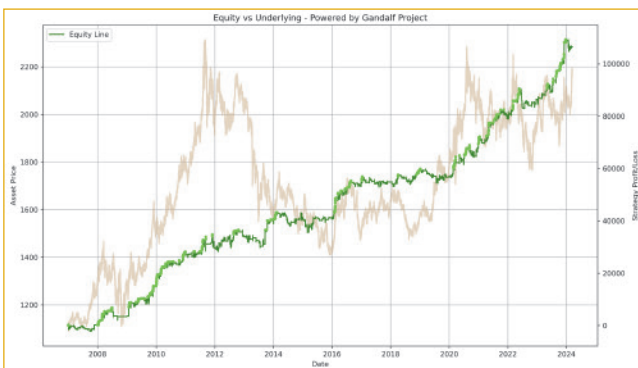


FIGURE 11C: PYTHON MODEL, VOLATILITY REGIME, CLASS 2. This shows the P&L of the revised trading system using a class 2 volatility prediction in the formula to filter trade signals.

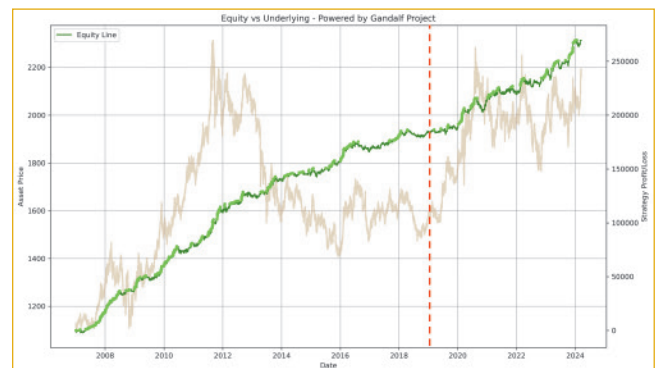


FIGURE 11F: PYTHON MODEL, VOLATILITY REGIME, CLASSES 0, 2, 3. After analyzing the results in Figures 11a through 11e, it is decided to use volatility classes 0, 2, and 3 in the formula to filter trade signals. Different volatility regimes are distinguished algorithmically based on percentile position: class 0 indicates a prediction of very low volatility compared to past occurrences, while class 4 indicates a prediction of high-volatility regimes. The training period is to the left of the red dotted line; the validation period is to the right of the line. Shown here is the aggregated equity curve (P&L) of the strategy applied to the entire observation period.

$$\text{Recall} = \frac{\text{True Positives}}{\text{True Positives} + \text{False Negatives}}$$

- **F1-score:** The harmonic mean of precision and recall. It provides a single metric that combines both precision and recall. F1-score is particularly useful when the class distribution is imbalanced. It is calculated as:

$$\text{F1_score} = \frac{2 \times (\text{Precision} \times \text{Recall})}{\text{Precision} + \text{Recall}}$$

FIGURE 12: PYTHON MODEL PERFORMANCE REPORT.

This shows the performance report from Python for the example trading system with the filter of class 0, 2, 3 (validation period from July 2018 to March 2024).

- **Support:** The number of actual occurrences of the class in the specified dataset. It's the number of samples of the true response that lie in that class.

Figure 8 shows the “classification report” of the XGBoost algorithm for the training period. Figure 9 shows the “classification report” of the XGBoost algorithm for the validation period.

We can observe the decline in performance (recognition of volatility patterns) that occurs between the training period (“weighted avg” of 96% accuracy) and the validation period (37% accuracy).

It is, however, worth noting that this type of decay was to be expected, although it still remains above a random prediction level. Assuming we predict the five volatility classes completely randomly (for example, using a five-sided die with equal probability of occurrence), we would find an average accuracy of about one-fifth per class, which is 20%. Our XGBoost algorithm manages to identify individual classes with an average accuracy above this (specifically 37%), with different precision for each class. For instance, it appears that the machine is more adept at correctly determining classes 0 and 4, compared to the others (still superior to the 20% we would get with random prediction). However, it's important to consider that such fluctuations may also depend on the number of occurrences for each class (“support”).

The hope is that we can ground some of this value acquired by the model.

```

*****
*** Performance Report - by Gandalf Project R&D - Version Wintermute 20231114 - License 2024 ***
*****

CAGR:                26.78 (capital: 20000)
Annual Return:       60.94 (capital: 20000)

Sharpe Ratio:        2.12 (initial capital: 20000, risk free rate: 0.0, days per year: 252)
Sortino Ratio:       4.24 (initial capital: 20000, risk free rate: 0.0, days per year: 252)
Calmar Ratio:        7.04 (days per year: 252)
Calmar Ratio Mean:   1.41 (mean on yearly contributes)
Omega Ratio:         1.13 (threshold: 100)
Kestner Ratio:       0.57
Treynor Ratio:       -0.02 (initial capital: 20000, risk free rate: 0.0, days per year: 252)
Information Ratio:    2.12 (initial capital: 20000, days per year: 252)
Beta:               -7.26

Operations:          582

Profit:              85310.0
Average Trade:       146.58

Profit Factor:        1.46
Gross Profit:        269710.0
Gross Loss:          -184400.0

Percent Winning Trades: 53.26 (Percent Losing Trades: 46.74)
Reward Risk Ratio:    1.28
Sustainability:      31.66

Trading Fees:        0.0

Average Gain:        870.03
Max Gain:            6990.0 (2023-12-03 20:00:00)
Average Loss:        -690.64
Max Loss:            -4250.0 (2023-02-03 01:00:00)

Avg Win Trades Length: 2.15
Max Win Trades Length: 10
Avg Losing Trades Length: 1.64
Max Losing Trades Length: 8

Avg Delay Between Peaks: 169.14
Max Delay Between Peaks: 3614

Avg Time in Trade:    14
Max Time in Trade:    23.0
Min Time in Trade:    1.0

Trades Standard Dev:  1098.93
Equity Standard Dev:  24445.17

Z-Score:              1.64 (above 2: alternate sign, below -2: continuous sign)
Correlation:          4.42% (on daily basis)

Avg Open Draw Down:  -2902.82
Avg Open Draw Down %: -6.45%
Max Open Draw Down:  -13260.0 (2020-11-06 10:00:00)
Max Open Draw Down %: -25.69% (2020-11-06 10:00:00)

Avg Closed Draw Down: -2895.29
Avg Closed Draw Down %: -6.5%
Max Closed Draw Down: -12190.0 (2020-11-01 20:00:00)
Max Closed Draw Down %: -23.61% (2020-11-01 20:00:00)

```

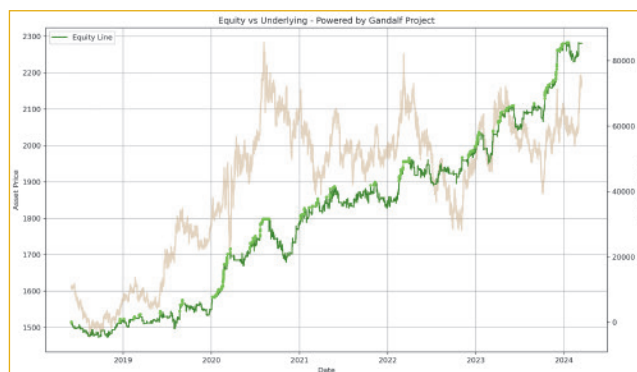


FIGURE 13: PYTHON MODEL EQUITY CURVE. Here you see profits and losses plotted as an equity line for the example intraday trading system on gold continuous futures (validation period from July 2018 to March 2024) with the filter of class 0, 2, 3.

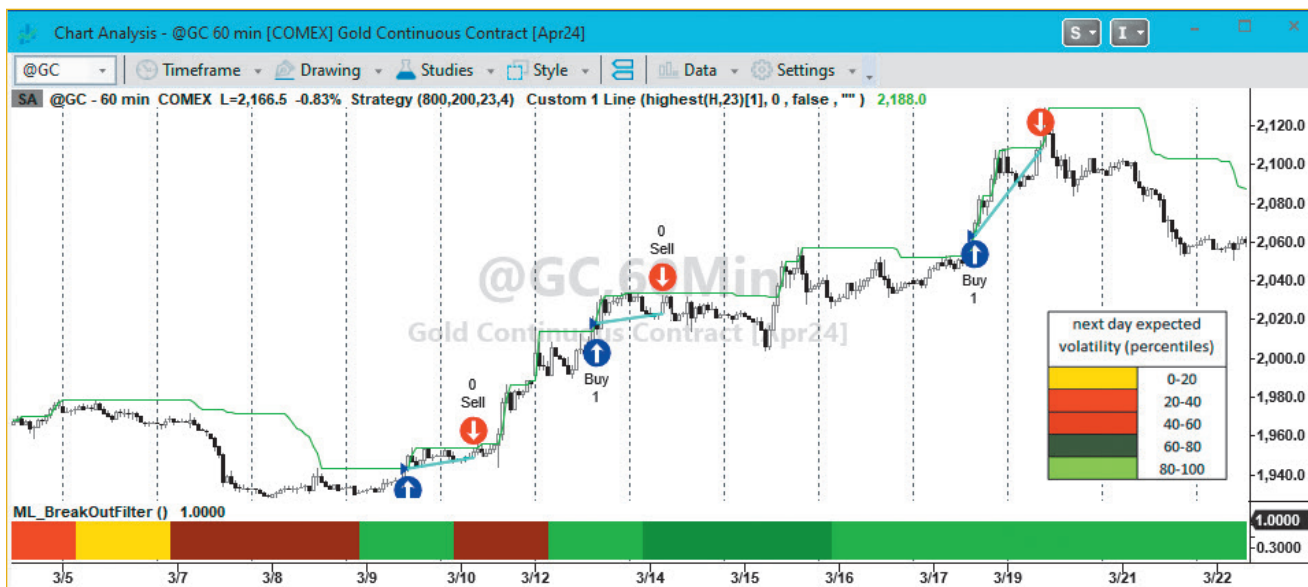


FIGURE 14: TRADESTATION AND PYTHON WORKING TOGETHER. Volatility predictions from the Python model based on machine learning are integrated into EasyLanguage to filter trades in the gold futures intraday breakout system. The revised system is plotted here on a TradeStation chart.

To this end, we generate volatility predictions for the validation period and subsequently pass them to TradeStation to replace the previous static volatility filter.

We proceed to test this filter with individual classes on the training period and make a decision on which class or classes to use—it is not guaranteed that classes 3 and 4 will produce the best results (for example, they could occur in areas of previous volatility explosions and not describe a previous compression).

Figure 10 shows an example of daily volatility predictions for the validation period.

In Figures 11a–e, we present the equity line of the strategy, using respectively a filter of class 0, 1, 2, 3, and 4.

Following a careful metric analysis conducted from January 2007 to July 2018 (the training period to the left of the red dotted line), we decide to use classes 0, 2, and 3. Figure 11f shows the aggregated equity curve of the strategy applied to the entire observation period (you can see the validation period to the right of the red

dotted line).

At this point, let's review the performance report of the final system solely for the validation period, during which the machine must demonstrate good generalization capability by working on unknown data.

Figure 12 shows a performance report of the trading system with the filter of class 0, 2, 3 (validation period from July 2018 to March 2024).

Figure 13 shows equity lines for the trading system with the filter of class 0, 2, 3 and gold futures continuous (validation period from July 2018 to March 2024).

What we can notice is a general improvement in performance metrics, especially those weighing risk on return such as the Sharpe ratio and the Sortino ratio, and regularity such as the Kestner ratio.

	TradeStation Traditional Gold BreakOut	Tradestation Python - ML Based Filters Applied
Profit	\$ 53,360	\$ 85,310
Trades	454	582
% Profit	52.42%	53.26%
AvgTrade	117.53 €	146.58 €
Profit Fator	1.34	1.46

FIGURE 15: TRADITIONAL TRADING SYSTEM VS. AI-ENHANCED TRADING SYSTEM. How does the original breakout strategy compare to the same strategy enhanced using machine learning with the aid of Python programming and Python libraries? Out-of-sample results demonstrate improvement for the AI-enhanced system across all metrics.



We generate volatility predictions for the validation period and pass them to TradeStation to replace the previous static volatility filter.

TRADESTATION AND PYTHON COMBINE TO CREATE A UNIQUE TRADING TOOL

Let's now let Python and TradeStation communicate with each other: In Figure 14 you can see how TradeStation can be used to get the volatility predictions from the Python model and plot them in a chart.

In Figure 14, you can observe how volatility predictions from the Python ML model can be integrated into EasyLanguage to filter trades within the gold breakout trading system.

In Figure 15, you can observe a comparison between the traditional gold breakout trading system programmed in EasyLanguage and the ML-based model strategy programmed in Python, which demonstrates improvement across all financial metrics.

CONCLUSION

Whenever we evaluate an algorithmic strategy, we need to address two key questions:

1. Can the strategy perform well on historical data?
2. Will the strategy perform well on future data?

As many of you may have experienced in your trading careers, effectively answering only the first question, although a straightforward task, is often insufficient for profitability. Something more is required: insight into whether the system will perform in the future.

Utilizing AI-based models not only uncovers unseen market behaviors and patterns but also provides a critical means to validate systems and enhance their robustness.

The integration of artificial intelligence and algorithmic trading logic, such as by using TradeStation with Python, offers a vast field for research and development. The example presented in this article represents just one of the numerous ways in which these two disciplines can synergistically interact. The possibilities for research and application are indeed limitless and continually evolving, and we will do our best to stay ahead of the curve.

Domenico D'Errico is a quant developer for professional investors and small hedge funds. He is an EasyLanguage specialist and a two-time winner of the TradeStation developers contest. D'Errico launched TradingAlgo.it, an algorithmic trading school project that aims to equip participants with the knowledge, skills, and practical experience necessary to understand, develop, and implement algorithmic trading strategies in financial markets with the help of machine learning techniques.

The machine must demonstrate good generalization capability by working on unknown data.

He can be reached at domderrico@gmail.com or through TradingAlgo.it.

Giovanni Trombetta is an electronic engineer, trading system developer, quantitative designer, trainer, and author. He specializes in the application of artificial intelligence to quantitative finance. He serves as the president of the Scientific Committee of S.I.A.T. (Italian branch of the IFTA) and is one of the organizers and instructors of the data science module of the SIAT Master. He is the founder and head of R&D at Gandalf Project and is also one of the founders and CIO of Rocket Capital Investment, a fintech company based in Singapore. His 2020 book is Trading Strategies With Python. Giovanni Trombetta can be reached at giovanni.trombetta@gandalfproject.com.

D'Errico and Trombetta have been collaborating on a joint research and development project focused on integrating AI models with traditional technical analysis and algorithmic trading across equities, forex, and futures markets. In addition, they are working on an API project to facilitate communication between EasyLanguage/PowerLanguage and Python.

To receive updates on their project, please email the authors at the above email addresses.

FURTHER READING

D'Errico, Domenico [2024]. "Artificial Intelligence Applied To Technical Trading," *Technical Analysis of STOCKS & COMMODITIES*, Volume 42: January.

____ [2024]. "Enhanced Technical Indicator Analysis Using Machine Learning," *Technical Analysis of STOCKS & COMMODITIES*, Volume 42: Bonus Issue.

Trombetta, Giovanni [2020]. *Strategie di Trading con Python*, Hoepli

D'Errico, Domenico, and Giovanni Trombetta [2017]. "System Development Using Artificial Intelligence," *Technical Analysis of STOCKS & COMMODITIES*, Volume 35: August.

‡TradeStation

‡See Editorial Resource Index



An Overview

Trading Volatility Derivatives

Volatility is eminently tradable, though not directly as an instrument itself. However, the trader can access instruments that are derived from volatility. Here is a look at some of the choices for the adventurous trader.

by James Leahy

The Cboe Volatility Index (VIX) is a popular and widely followed measure of future market volatility, but VIX is an index and can't be directly traded. To trade volatility, you have to use one of many derivatives. However, trading these derivatives successfully is not as simple as trading stocks. In this article, I will shed some light and insight into this topic.

I won't go into details here about VIX itself or how it's calculated since there are many articles on this subject, some of which I list at the end of this article. Instead, I want to focus here on trading some of the derivatives that are available to the trader.

Trading market volatility is different from trading stocks or equity exchange-traded funds. Market volatility is generally inversely correlated with market direction,

that is, when markets go down, volatility usually goes up, and it tends to move much faster (see Figure 1). The correlation coefficient over the year from February 2023 to February 2024 was about -0.84 . Volatility can also increase ahead of known events, such as elections and Federal Reserve meetings, but it's the unexpected market moves that can result in large, sudden losses with these products.

Trading volatility derivatives is not suited for novice traders or traders that don't have the financial resources to endure the added risks associated with these products.

VIX OPTIONS

Options are probably the easiest of the derivatives to understand, but there are a few differences compared to regular equity options that a trader should be aware of. First, the option prices and strikes are listed under the VIX ticker on most brokerage platforms, however, the underlying used for the option prices are the VIX futures (VX). You can easily see this by looking at option matrix prices. With at-the-money (ATM) options, strike premium for puts and calls should be nearly equal, as determined by the put-call parity equation (see sidebar,

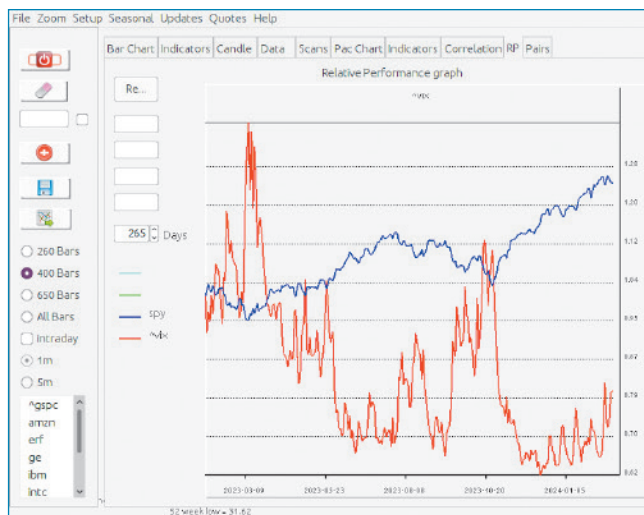


FIGURE 1: MARKET VOLATILITY. This shows the relative performance between SPY and VIX from February 2023 to February 2024. Note they are generally negatively correlated.

Open	High	Low	Close	52 Week Price	IV Rank	Current IV	IV Change	52 Week IV	52 Week
14.22	14.58	13.97	14.44	11.81 - 30.81	36%	82.16%	62.00%	-46.96% - 143.56%	40.43%
Mar-13-24 (✓) Mar-24 (AM) Mar-27-24 (✓) Apr-03-24 (✓) Apr-10-24 (✓) Apr-24 (AM) ✓ May-24 (AM) Jun-24 (✓)									
Bid	Ask	Volume	Open Interest	Strikes	Bid	Ask	Volume	Open Interest	
Call May24 (AM) (75 days) Put									
3.70	3.85	0	6.3k	12.5	0.13	0.17	5	4.1k	
3.35	3.45	251	8.0k	13	0.25	0.29	0	21.1k	
3.00	3.15	34	1.8k	13.5	0.41	0.45	0	26.5k	
2.76	2.83	41	2.8k	14	0.62	0.66	51	31.3k	
2.51	2.58	15	4.4k	14.5	0.86	0.91	0	44.2k	
2.30	2.36	31	4.8k	15	1.14	1.19	4	72.5k	
2.12	2.18	0	8.8k	15.5	1.45	1.50	35	10.0k	
1.96	2.01	11	28.6k	16	1.79	1.84	149	30.4k	
1.69	1.75	5	63.4k	17	2.51	2.56	0	45.9k	
1.49	1.54	91	132.6k	18	3.25	3.35	0	50.0k	
1.32	1.37	39	36.2k	19	4.10	4.15	0	22.9k	
1.18	1.22	62	144.5k	20	4.90	5.00	1	7.4k	

FIGURE 2: VIX OPTION MATRIX. This shows a VIX option matrix for May 2024 expiration. The matrix indicates 14.5 as at-the-money, but the 16 strike is closer to the underlying futures price of 16.3.

PUT/CALL PARITY EQUATION

The formula for put-call parity is shown here:

$$C + X/(1+r)^t = S + P$$

where:

C = call price, X = strike, S = initial stock price,
P = put price, t = time in years, r = the risk-free rate

In its simplest form, ignoring the present-value term:

$$C + X = S + P$$

If X (strike) = S (stock price), that is, at-the-money, then the above equation becomes:

$$C = P$$

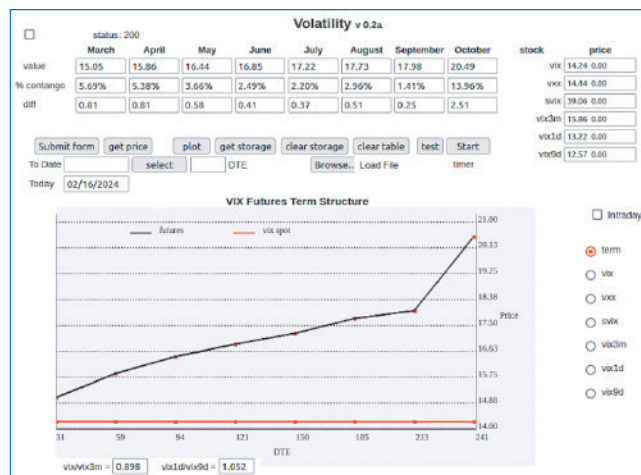


FIGURE 3: IN CONTANGO. This shows the VIX futures term structure in contango, that is, the further expiration futures are trading at a higher volatility than near-term expiration futures. This is considered a normal condition.

“Put/Call Parity Equation”).

Figure 2 shows option prices for the May 2024 expiration with the VIX at 14.4. The 14.5 strike is indicated at-the-money by the platform, but the actual at-the-money strike is 16. You can see in the option price matrix that with the May 2024 futures price at 16.3, the put and call prices for the 16 strike are nearly equal. Also, each monthly expiration can have a different at-the-money strike.

Another big difference between VIX options and stock options is the VIX options expire on Wednesdays instead of Fridays, and have a morning settlement, similar to other index options. The monthly Wednesday settlement date is 30 days before the third Friday of the following month. This results in most months expiring the Wednesday before the regular monthly options third Friday settlement, and the rest expiring on the Wednesday following the third Friday. Since the VIX is an index, the options are European style, so there’s no risk of early assignment. The options also settle to cash, based on a special calculation of opening prices of SPX options, and can be different from the closing VIX price due to overnight trading.

VIX futures usually trade at a higher volatility than the spot VIX index, and with further-out-in-time expirations trading at a higher volatility than near-term expirations.

Trading market volatility is different from trading stocks or equity ETFs.



This pricing structure is called *contango* (Figure 3), and is considered a normal condition. When the markets are experiencing uncertainty or decreasing, the near-term expiration futures will be elevated with a higher volatility than further expirations. This is called *backwardation* and also means option prices on near-term expirations will rise (Figure 4).

VIX is a measure of the expected volatility of SPX options 30 days to expiration, and has varied within a range of values over time. Over the last five years, the VIX has ranged from closing at a low of about 12, before the COVID-19 pandemic started, to a high of 82 near the beginning of the pandemic (see Figure 5). The past year, from February 2023 to February 2024, it has ranged from 12 to 26. The five-year average is about 21, and the past-year average is about 16. VIX levels below 14 are generally considered low and levels above 30 are considered high. The VIX has been as low as the low 9s in 2017 and 2018. The VIX can be characterized generally as volatility oscillating around a mean range, interrupted by rapid spikes higher, then followed by slowly decreasing volatility back to the mean. These spikes higher are what make shorting volatility derivatives so risky.

Many traders use VIX options as a hedge against a long stock portfolio, buying calls when the VIX reaches very low values. Another popular option trade is buying VIX puts after the VIX reaches short-term peaks. If you use option analysis software to model a VIX option trade, be sure it uses the correct underlying price, otherwise, the risk graph and the option greeks will be incorrect.

VOLATILITY ETF/ETNs

A number of ETF/ETN products are available to trade volatility, either long or short, with some adding leverage to enhance returns (and also losses). These come with warnings about their risk and some brokerages require you to sign a separate agreement that you're a sophisticated investor and these are suitable for you to trade them. Before anyone trades any of these exchange-traded products, you should be aware of what happened to them in February 2018.

At the time, shorting volatility was a very popular and crowded trade. The SPX index peaked on January 29, 2018 and had fallen to 2762 by February 2. On Monday, February 5, the SPX fell about 4%, but by the next day, the short volatility products fell over 80% (Figures 6 and 7). One of the products, XIV, was retired after that.

There were warning signs ahead of this event that were apparently ignored by traders. The VIX futures term structure had moved into backwardation, a clear sign of increased uncertainty and elevated volatility in the front

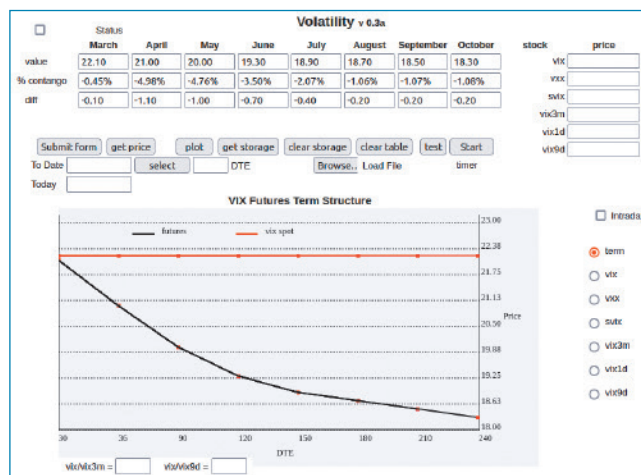


FIGURE 4: IN BACKWARDATION. This shows the VIX term structure in backwardation, that is, the near-term expiration futures are trading at a higher volatility than further expiration futures. This implies option prices on near-term expirations will rise.

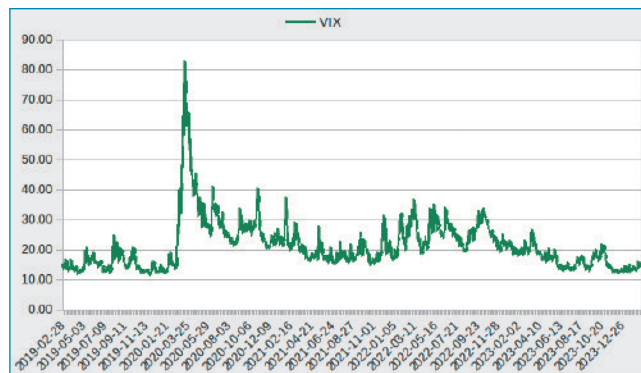


FIGURE 5: VIX. This plots closing prices of VIX over a five-year span. Over the last five years, the VIX has ranged from closing at a low of about 12 before the COVID-19 pandemic started to a high of 82 near the beginning of the pandemic.



FIGURE 6: FEBRUARY 2018 VOLATILITY SURGE. This shows the VIX term structure from February 2, 2018 from vixcentral.com. Volatility for the front-month futures expiration was clearly indicating a lot of uncertainty in the markets right before the February 5th surge in volatility of the VIX. It led to large losses in short volatility products.

expiration months. Figure 6, from VIX Central (www.vixcentral.com), shows the front-month futures volatility higher than the next further-out month. Although in this case there was an advance warning, that's not always going to happen. Many articles were written to theorize what caused this huge loss, but there's no getting around the fact that volatility can spike unexpectedly, and if you're trading these volatility products and are on the wrong side, you can lose a lot of money. The lesson learned from this situation is that if your account can't withstand substantial losses, you shouldn't trade these products.

After this huge loss, some of the volatility exchange-traded products made changes to try to minimize the chance of a future occurrence of that type of loss. However, these types of products can still lose a lot on volatility spikes.

That being said, let's take a look at how a few of these have performed over the past year.

For the past year, we essentially have been in a bull market, with generally decreasing volatility (see Figure 1). This has created a favorable environment for shorting volatility, so in general we should expect short volatility products to perform better than long volatility ones. Still, there were some volatility spikes that would benefit long volatility products.

VOLATILITY INDEX DAILY OPERATION

The volatility ETF and ETN products for the most part operate similarly, some with exposure to long volatility, some with short volatility exposure. They're linked to the same underlying: VIX futures. The normal contango term structure shows that the volatility of further out-in-time expiration futures require a higher volatility, and you can see that from the curve in Figure 3, taken from an early February 2024 sample of VIX futures values.

The CBOE maintains two indexes, Short VIX Futures Index (SHORTVOL), and Long VIX Futures Index (LONGVOL), that are used by a few of the exchange-traded products as their benchmark.

The long index maintains exposure to a constant 30-day volatility by using a combination of front- and second-month expirations. They maintain this constant exposure through a daily rebalancing by, in the case of LONGVOL, selling some of their futures in the front month and rolling them to the next month. In doing so, they sell lower volatility futures and buy higher volatility futures. This process results in daily losses when the term structure is in contango. When the term structure goes into backwardation, they make a profit on the roll. Since at expiration, the VIX futures will approach the value of the cash VIX index, if the VIX index declines,

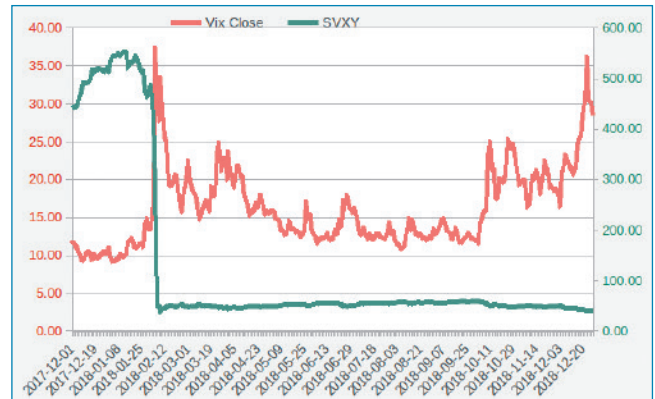


FIGURE 7: FEBRUARY 2018 VOLATILITY SURGE. This shows a plot of SVXY (right scale) and VIX (left scale) closing prices surrounding the February 2018 surge in volatility. Short volatility products fell over 80% after the February 5th surge in volatility of the VIX.

the near-term futures will also decline. Since near-term futures generally move farther and faster than longer-term futures, the daily roll becomes more costly. The short index, SHORTVOL, would use the inverse process and increases in value from the rolls when the term structure is in contango.

When equity markets are going up or are relatively unchanged, the LONGVOL index will generally be decaying, while the SHORTVOL index will be showing gains. Both indexes are subject to sharp reversals as volatility increases. Over the year from February 2023 to February 2024, the LONGVOL index lost about 67% of its value, while the SHORTVOL index gained about 135%.

VXX

VXX (iPath Series B S&P 500 VIX Short Term Futures ETN) has been around since January 2009 and was one of the first VIX products to be introduced. Barclays Bank PLC is the issuer of this ETN. The following description is taken from the Barclays overview section of the VXX web page (see reference listed at end of article).

“The Index is designed to provide access to equity market volatility through CBOE Volatility Index (the ‘VIX Index’) futures. The Index offers exposure to a daily rolling long position in the first and second month VIX futures contracts and reflects market participants’

VIX levels below 14 are generally considered low and levels above 30 are considered high.



views of the future direction of the VIX index at the time of expiration of the VIX futures contracts comprising the Index.”

VXX is a 1× long volatility ETN. As an ETN, it’s an unsecured debt obligation by the issuer, and is subject to the ability of the issuer to pay its obligations. The ETN is very liquid, with average daily volume around 10 million shares. The bid/ask spreads are usually 3 to 5 cents wide. There are weekly and monthly options but only the near-term weekly and monthly options are semi-liquid. Further-out months have lower volume and open interest and the spreads can be wide.

VXX is linked to the S&P 500 VIX Short-Term Futures Index TR, which is an older index similar to LONGVOL. VXX has done a good job of tracking the performance of the LONGVOL index, as can be seen in Figure 8. Since VXX needs volatility to increase to be profitable, it’s not surprising it has lost a lot of money over the past year. Like all of the volatility exchange-traded products, it’s not designed for long-term holding. There were periods during the year where VXX had substantial gains but they didn’t last long.

VXX has had seven 1-for-4 reverse splits over its lifetime, with the last split occurring on March 07, 2023.

SVIX

SVIX (–1× Short VIX Futures ETF) is a relatively new ETF, issued by Volatility Shares in March 2022. The following text is taken from its website, <https://www.volatilityshares.com/svix>:

“The –1× Short VIX Futures ETF (SVIX) seeks to provide daily investment results, before fees and expenses, that correspond generally to the Short VIX Futures Index (SHORTVOL).

The Short VIX Futures Index expresses the daily inverse performance of a theoretical portfolio of first- and second-month VIX futures contracts that are rolled daily. The Index determines its daily settlement price from the time-weighted average price (TWAP) of its theoretical portfolio over the last 15 minutes of the regular equity trading session.”

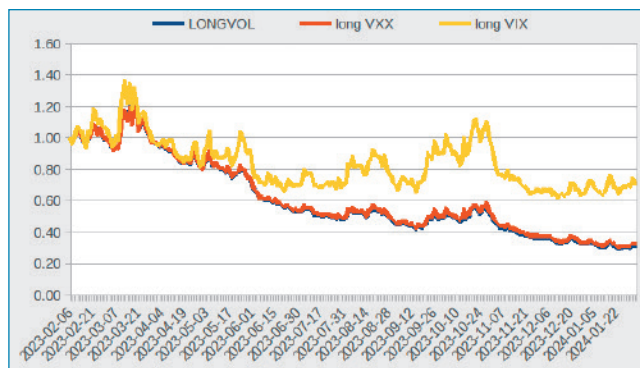


FIGURE 8: VXX. This shows the relative performance of VXX (iPath Series B S&P 500 VIX Short Term Futures ETN) versus the LONGVOL index from February 2023 to February 2024.

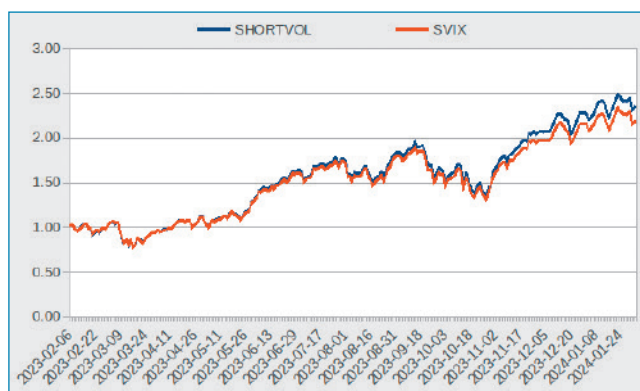


FIGURE 9: SVIX. This shows the relative performance of SVIX (–1× Short VIX Futures ETF) versus the SHORTVOL index from February 2023 to February 2024. The deviation is likely the accumulation of fees and expenses.

The ETF is not highly liquid (less than a million shares are traded daily), but it has enough liquidity to achieve bid/ask spreads of around 5 cents. Both weekly and monthly options are available, but weekly option volume and open interest are low, resulting in very wide bid/ask spreads. Monthly volume and open interest is better, but still not what I would call liquid. Spreads for at-the-money strikes range around 40 to 60 cents. At times, the spreads can narrow to 20 cents, but getting fills near mid-prices is rare.

SVIX does a good job of tracking the performance of the SHORTVOL index, as shown in Figure 9. The deviation over this one-year chart, ending February 2024, is likely due to the accumulation of fees and expenses.

SVXY

SVXY (ProShares Short VIX Short-Term Futures ETF) is similar to SVIX, but in 2018, its performance metric was reduced from –1.0× to –0.5× relative to its benchmark index. SVXY uses an older legacy index, SPVXSPID (SVXY provides inverse performance), which is nearly identical to LONGVOL and both indexes have nearly

The underlying used for the option prices are the VIX futures (/VX).

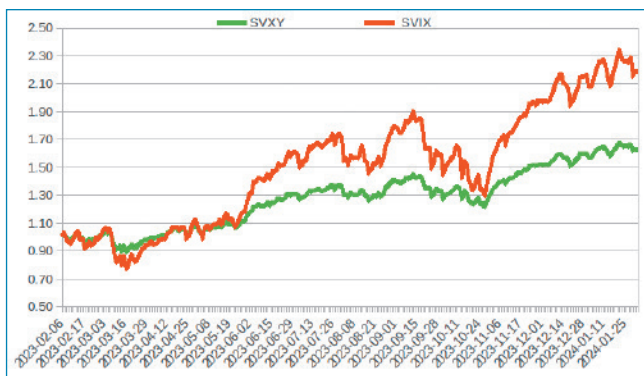


FIGURE 10: SVXY. This shows the relative performance of SVXY (ProShares Short VIX Short-Term Futures ETF) versus SVIX from February 2023 to February 2024.

identical performance. This ETF is a more tame version of SVIX and will have half the returns of SVIX but also half the losses (see Figure 10).

The ETF is somewhat liquid, trading about 1.3 million shares a day with bid/ask spreads 2–3 cents wide. Option volume is low and open interest in the first few weekly and front-month expirations is moderate with bid/ask spreads about 10–15 cents wide. Further-out-in-time expirations have bid/ask spreads for near-the-money strikes in a range about 20–25 cents wide.

SUMMARY

This is by no means a comprehensive look at these volatility products, but this should give you a good start in understanding how they work and perform.

- Trading volatility derivatives has a high level of risk and is not suited for novice or uninformed traders. Unlike equity asset classes that have traditionally increased in value over time, volatility has mostly been constrained to a somewhat narrow range and tends to mean-revert to its longer term average. Unpredictable volatility spikes can cause large losses for traders who short volatility products.
- Long volatility products have trended towards zero over long periods of time due to the cost of rolling futures contracts daily.
- Volatility derivatives are not intended to be traded as “buy and hold” investments. Traders need to closely monitor their volatility trades so they can take appropriate action when volatility starts to move.

The spikes higher are what make shorting volatility derivatives so risky.



- Volatility traders need to be sure they understand the details of the products they trade. Read the prospectus and other information published by the issuer.

James Leahy is a former computer industry professional who develops trading tools and trades options full-time.

READING AND RESOURCES

SVIX information and prospectus:

<https://www.volatilityshares.com/svix>

VXX information and prospectus:

<https://ipathetn.barclays/details.app;instrumentId=341408>

SVXY information:

<https://www.proshares.com/our-etfs/strategic/svxy>

VIX information:

<https://www.cboe.com/us/indices/dashboard/vix>

CBOE:

https://www.cboe.com/tradable_products/vix/faqs

VIX methodology:

https://cdn.cboe.com/api/global/us_indices/governance/Cboe_Volatility_Index_Mathematics_Methodology.pdf

Futures data, historical futures data, VIX data:

https://www.cboe.com/tradable_products/vix/vix_futures

“Selling VIX Futures and Options for Portfolio Return Enhancement”:

https://cdn.cboe.com/resources/education/research_publications/Szabo_Selling_VIX_Fut_&_Opt_for_Enhancement_June_15_2020.pdf

VIX Central: www.vixcentral.com

‡Cboe Exchange, ‡vixcentral.com

‡See Editorial Resource Index

Find similar articles online at Traders.com





A Critical Value

What Is The Real Meaning Of The EMA Alpha?

In an exponential moving average, the smoothing factor, also known as a weighted multiplier or alpha, is the parameter that determines how values in the lookback period are weighted. Weights decline exponentially as the data points get older. How is alpha found, and why is this significant? Here are some analytical and practical insights.

by John F. Ehlers



exponential moving average (EMA) is a first-order smoothing filter. That is, it only uses one previous result in computing the current value. It is expressed by the equation:

$$\text{Output} = \alpha * \text{Input} + (1 - \alpha) * \text{Output}[1]$$

where output[1] is the EMA computed value one bar ago.

The equation is dominated by the value of alpha (α), so alpha is important. But what does it mean when applied to trading data?

In his May 1984 article “Moving Averages Versus Exponential Moving Averages” in this magazine, Jack Hutson related alpha to the length of a simple moving average (SMA) on the basis of equivalent lag. He showed the relationship as:

$$\alpha = 2 / (N + 1)$$

where N is the length of the equivalent SMA.

The EMA is a smoothing filter, and therefore is a lowpass filter. That is, it passes the low-frequency (long wavelength) components in the data spectrum and attenuates the high-frequency components. The distinction between the low-frequency components and high-frequency components is a bit fuzzy, but the critical period is generally defined as the *period*, where the amplitude of the filter output has an amplitude of -3 dB

relative to the filter input. So the real meaning of alpha lies in its relationship to the critical period.

The derivation of alpha in terms of the critical period of the filter gets a bit mathy because the use of complex variables is required. So, if you are not familiar with Z transforms and complex variables, just skip the following explanation.

We can rearrange the original EMA equation to be:

$$\text{Output} - (1 - \alpha) * \text{Output}[1] = \alpha * \text{Input}$$

The transfer response of a filter is defined as the ratio of its input to its output. So, the transfer response of an EMA in terms of Z transforms becomes:

$$\text{Transfer} = \alpha / (1 - (1 - \alpha) * Z^{-1})$$

To find the frequency response of the filter, we can substitute $e^{-j(\omega t)}$ for Z^{-1} . And:

$$e^{-j(\omega t)} = \cos(\theta) - j\sin(\theta)$$

where $\theta = \omega t$

Making these substitutions, the EMA transfer response is:

$$\text{Transfer} = \alpha / (1 - (1 - \alpha) * \cos(\theta) - j(1 - \alpha) * \sin(\theta))$$

We multiply the numerator and denominator by the complex conjugate of the denominator to place the real and imaginary components solely in the numerator. The -3 dB point of the transfer response occurs when the real and imaginary components are equal, giving a 45-degree phase shift. Equating the real and imaginary components, and ignoring the constants, we get:

$$1 - (1 - \alpha) * \cos(\theta) = (1 - \alpha) * \sin(\theta)$$

The final result is obtained by rearranging the equation to isolate alpha, to get:

$$\alpha = (\cos(\theta) + \sin(\theta) - 1) / (\cos(\theta) + \sin(\theta))$$

where $\theta = 360 / \text{Period}$ in degrees or

$$\theta = 2 * \pi / \text{Period in radians.}$$

The relationship between the critical period of the filter and the EMA alpha is reasonably complex. An approximation that's easier to remember is:

$$\alpha = 4 * \pi / (2 * \pi + \text{Period})$$

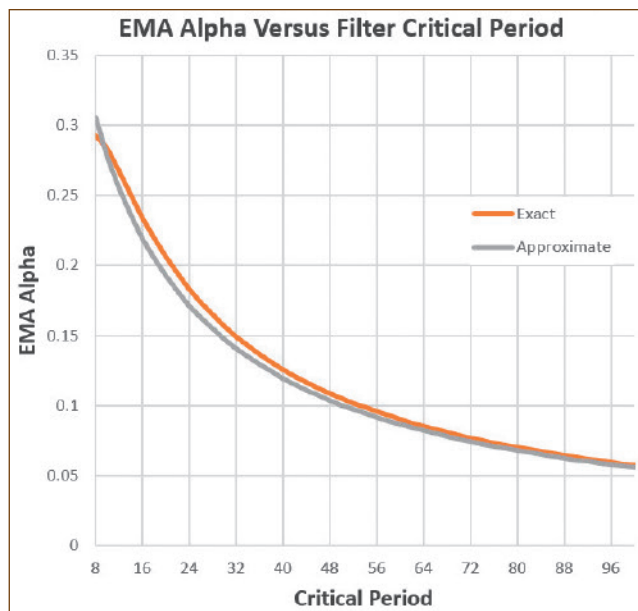


FIGURE 1: EMA ALPHA AND FILTER CRITICAL PERIOD. The relationship between EMA alpha and filter critical period is nonlinear.

The exact relation between alpha and period is shown in orange and the approximation is shown in blue in Figure 1.

Note that the critical period stops at 8 in Figure 1. An eight-bar period is about the shortest period you want to use in technical analysis because of aliasing. The data has a statistically pink spectrum, where the cycle component doubles for each doubling of the cycle period. Since the sampling rate is once per bar, the shortest possible period to use is the Nyquist rate of a two-bar cycle. Shorter cycle components are not observable, but are folded back into the observable spectrum.

The pink spectrum shape holds for cycle periods shorter than Nyquist. Therefore, the data for a one-bar cycle component folds back with an amplitude of 0.5, a half-bar cycle component folds back with an amplitude of 0.25, etc. The generalized expression for the alias amplitude as a function of the observable cycle period is $1 / (2 * \text{Period})$. Therefore, the aliasing error does not become sufficiently small enough to be ignored until the

Continued on page 37

Alpha is important. But what does it mean when applied to trading data?



THE WORLD OF RETAIL TRADING

Emilio Tomasini is an adjunct professor of corporate finance at the University of Bologna in Italy and is a professional trader. He has audited over 5,000 accounts of traders during 13 years of a real-money trading competition, giving him unique insights into what helps a retail trader to succeed. He has expertise in technical analysis and trading system design. In this column, he shares his sometimes “unserious” thoughts on serious topics in finance. In his writings, he hopes to help the retail trader better understand the leap from unprofitable to profitable trader, firmly believing that the right answers can come only if the right questions are asked. At his website at www.emiliotomasini.com, he offers some of his expertise in a free video course.



Emilio Tomasini

IS YOUR TRADING A BUSINESS THAT YOU CAN PASS ALONG?

How many of us would rather bequeath a trading station to our children than a thriving business? This is a question that requires a deep dive into whether trading, particularly retail trading, is genuinely an asset. Drawing from the small business landscape can offer some insights.

“I don’t want my child to take up my trade”: this sentiment has been voiced often, whether by a hairstylist, who despite the hardships of constant standing and interaction with the public, knows the true grit required, or by a construction worker, who speaks to the physical and mental toll of his job coupled with the financial risks of securing prompt-paying clients while facing immediate demands from suppliers. Lawyers, accountants, and business owners echo similar sentiments, citing bureaucracy, heavy taxes, challenging customer and supplier relationships, fierce competition, and even the encroaching complexities introduced by artificial intelligence.

I often recount to my children what my father, a ceramic industry businessman, used to say: “If you enjoy your work, it ceases to be work and becomes pleasure.” He never wanted to be an industrialist; his heart lay in craftsmanship, finding the suit of a business owner too constrictive. In his era, a lathe machinist was akin to an artist, as electronic lathes did

not exist yet, and for him, art and beauty always preceded money. But that was in the post-war period, when an industrialist could afford such luxurious reflections during an economic boom.

Today’s obstacles include not only the traditional free-hand of the market and a fluctuating macroeconomic environment but also the complexities of the modern world. Change has

Owning a business in retail trading means having procedures, processes, and customized software that automatically captures market inefficiencies without human intervention.

always been a part of human history, but the current speed of change leaves many of us bewildered.

However, it is crucial to address a touchy subject that every parent feels deeply: the relationship with their child and the anxiety of determining what legacy, not just moral but also economic, they will leave behind. From my own observations, including at online trading fairs and technical analysis seminars, I have yet to see a child follow in the footsteps of a parent in the trading sector with equal success—a rather

bitter observation.

As finance professor Aswath Damodaran of New York University points out, one of his sons takes each stair step-by-step, holding tightly to the railing—perfect bond trader material—while the other slides down the railing, risking a broken neck—a likely candidate for derivative trading. Risk is deeply personal. We can pass on a trading strategy, but not an inclination for risk.

Explaining the effects of macroeconomic data on stock prices or some peculiar technical analysis pattern is not the right way to introduce a child to the fascinating world of trading and financial investment. This observation draws from my entrepreneurial experience, suggesting that trading is indeed a business like any other.

The maturity of an entrepreneur hopes that his business can operate independently of his “labor,” measured by a product’s time to manufacture. Time and physical energy are easily acquired in the labor market, while managerial and entrepreneurial skills are scarce commodities. The success of an entrepreneur lies in distancing himself from the labor needed to run his business. If we view a business as an asset generating income based on various inputs, including labor and managerial skills, then it follows that our children should not necessarily

Continued on page 37

ALGORITHMIC TRADING

Have a question about system or algo trading? Kevin J. Davey has over 30 years of system trading experience. Davey is a full-time trader, and also teaches and consults via his Strategy Factory online workshop (<https://kjtradingsystems.com>), which was the winner of the 2024 Readers' Choice Award in this magazine for the category of "Trading Schools." Davey is also the author of five books on trading. Send your questions or topic suggestions to Kevin Davey at kdavey@kjtradingsystems.com. Selected questions will appear in a future issue of S&C.



Kevin J. Davey

SMOOTH ROLLOVERS

I am trading an automated long position. The issue I am having is I may still be holding long when the contract is expiring. I have been selling the contracts I have and closing out the position at expiration. But this is messing up my strategy, as I am potentially holding the position for longer timeframes. Is there a workaround? How can I flip to the new-month contract and keep the strategy active?

These are questions many futures traders have regarding rollovers. The crucial point to remember is that the strategy itself does not know you performed a rollover. So it does not include that in any calculations. Here is an example—pretend this is an automated strategy:

Without rollover: Let's say you go long on day 1, on day 5 you have an open profit of \$500 (but you remain in the trade) and on day 10 you exit when your \$1,000 stop-loss is hit. You will lose \$1,000, not including transaction costs.

With rollover: You still go long on day 1, on day 5 you roll the contract. You sell the front month, pocketing \$500, and are now long the second month (which becomes the front month). On day 10 you exit when your \$1,000 stop-loss based on the original trade (and that is a key point) is hit. You will lose \$1,500 on that second trade, not including transaction costs. So all together, you

had $+\$500 - \$1,500 = -\$1,000$, same as the non-rollover case.

Most people wrongly assume that the new contract should also have a \$1,000 stop-loss after rollover. But the reality is that the actual trades should play out as described in scenario 2. Rollovers should not impact the overall strategy performance.

The key point to remember is if you use back-adjusted continuous contracts, you can roll over and not worry about resetting stops and so on. The strategy should take care of doing the math properly. If you are still unsure, run a test during rollover with a micro contract. The small cost

The crucial point to remember is that the strategy itself does not know you performed a rollover.

of the test will provide confidence in how you and your strategy are managing the rollover.

Here are some tips to ensure that your rollover goes smoothly:

1. Test and trade with back-adjusted continuous contracts, not individual contracts. Long-term trading can get fouled up if you try to test with individual contracts (like ESU24), since the individual contracts do not have a long history.

2. Roll over when the continuous contract changes. For example, at the moment, @ESU24 is the same as @ES (the "@" is TradeStation's symbol for a back-adjusted continuous contract; your symbol may be different depending on the platform you use). But when the contract rolls (in early September), @ESU24 will no longer equal @ES. When that rollover occurs, @ESZ24 will equal @ES. That is your clue to know it is time to roll. Your broker or data provider will have this information.
3. In your slippage estimates, include a bit extra for any rollovers. Rollover costs are equivalent to an extra immediate in and out roundtrip trade.
4. For deliverable contracts, your broker will likely exit your position before FND (*first notice day*) or LTD (*last trading day*), but they will not roll positions for you. They will charge you a desk fee to do this. Just don't depend on your broker to get you out of expiring contracts—that is your job as a trader.
5. For cash-settled instruments, such as @ES, you can hold through contract expiration. But you'll still have to roll manually. I always make sure to exit when the continuous contracts indicate a rollover, which is well in advance

Continued on page 39

INSIDE THE FUTURES WORLD

Want to find out how the futures markets really work? Carley Garner is the senior strategist for DeCarley Trading, a division of Zaner, where she also works as a broker. She has written five books on futures and options trading, with the latest being Trading Commodity Options...With Creativity (July 2020), as well as A Trader's First Book On Commodities (third edition, October 2017) and Higher Probability Commodity Trading (July 2016). Garner also authors widely distributed e-newsletters; for a free subscription, visit www.DeCarleyTrading.com. To submit a question, email her at info@carleygarnertrading.com or via www.DeCarleyTrading.com. Selected questions will appear in a future issue of S&C.



Carley Garner

COMPLACENCY KILLS.

I've heard you mention that "complacency kills"; what exactly do you mean by that?

Like market prices, market sentiment goes through cycles of peaks and valleys. Market participants are often spooked into panicked liquidation when the mood is fearful but are lulled into complacency when greed takes over. Ironically, these emotions are most prevalent at the worst possible time regarding market timing. As a result, investors are often holding too much risk at market tops and not enough (liquidate) at market lows. With that in mind, market timers often attempt to use investor sentiment as a gauge of where the market is in its natural feast and famine cycle.

The reward for holding an asset is often slow, but risk comes fast. There could be many reasons for it, but my take is that investors become more comfortable buying as the market moves higher. The result is slow and consistent buy orders hitting the market. Yet, when traders liquidate, it is often done under duress and all at once. This is why they say markets climb the stairs but take the elevator down. This pattern repeats itself over and over because humans are creatures of habit. But the irony is, if we could train ourselves to do what is *uncomfortable* rather than *comfortable*, we would probably be

better traders and investors.

One of the biggest mistakes I've witnessed over the years is complacency. Market participants have short-term memories when things are going their way. For instance, stock market investors were scrambling to take on tech stock and cryptocurrency risk in hopes of outsized gains in late 2021. The buying frenzy was aggressive, illogical, and devoid of risk considerations. It was a mirror image of what transpired just a year and a half earlier when the S&P

This is why they say markets climb the stairs but take the elevator down.

shaved off 35% of its value in a few weeks. Unfortunately, the human tendency to panic when things feel bad and downplay risks when things feel good causes investors to sell their holdings at the worst time and load the boat at the most dangerous time. It isn't difficult to imagine someone ruining their retirement by selling into a 35% drawdown, then missing a 100% rally, only to start getting back in before the next 35% correction. Unfortunately, this experience happens more than one would expect.

I am a futures and options broker who, for a living, assists market participants in short-term speculation. I am not licensed or qualified to offer advice on long-term investment strategies. Nevertheless, I have learned some tough lessons and gained experience in market cycles, sentiment, and risk management. It has been my experience that when things seem too good to be true, they are.

As a young adult who had just broken into the middle class in 2005/2006, I was euphoric about my net worth. The financial crisis quickly made me aware that wealth on paper is merely a mirage unless you do something about it. In 2007, monitoring my home value on Zillow (yes, I know their "Zestimates" are not necessarily accurate estimates, but they are convenient) and hitting the browser refresh on my investment portfolio was like a drug. The higher the numbers, the wealthier I felt, and the more bullish everything appeared. Looking back, it was both euphoric and complacent. The years following were a reality check; stocks lost over half of their value, and my home in Las Vegas was among the worst-hit zip codes in the nation, with losses close to 80%.

Risk came fast and hard with very little warning. Almost two decades after the financial crisis, I have yet to forget what true despair felt like,

Futures For You

and I hope I never do because it is my mechanism for tapping the brakes on risk when things are going too well. I hope I am wrong, but it feels like things are going too well at the moment. Further, I see signs of dysfunction similar to those that were present prior to the Financial Crisis, such as overleverage (think Yencarry trade), complacency (think

Dow 14,000 caps in 2007), and yield curve inversion (inversion started in early 2006 and recession officially arrived in late 2008). If everything is going unusually well for you regarding asset valuation or even your speculative trading, it might be time to focus on protecting accumulated wealth. Unless you hit the sell button or hedge your price risk, it doesn't

Market participants have short-term memories when things are going their way.

count; complacency kills.

Find similar articles online at [Traders.com](https://www.Traders.com)



EHLERS/EMA ALPHA

Continued from page 33

observed cycle period is 8 bars or longer.

CONCLUSION

The alpha of an EMA can be computed from its critical period as $\alpha = 4\pi / (2\pi + \text{Period})$.

However, the EMA is only a first-order IIR filter. Better filtering results can be obtained by using second-order filters such as the SuperSmoother or UltimateSmoother (see the "Further reading" section for my April 2024 article on the ultimate smoother).

It is good practice to use cycle periods longer than an eight-bar period in technical analysis due to aliasing.

John Ehlers is a retired electrical engineer and a retired technical analyst, specializing in the application of DSP (digital signal processing) to trading. For more information, see www.mesasoftware.com.

FURTHER READING

Jack K. Hutson [1984]. "Moving Averages Versus Exponential Moving Averages," *Technical Analysis of STOCKS & COMMODITIES*, Volume 2: May.

Ehlers, John F. [2024]. "The Ultimate Smoother," *Technical Analysis of STOCKS & COMMODITIES*, Volume 42: April.

Find similar articles online at [Traders.com](https://www.Traders.com)



TOMASINI/MARKET RAP

Continued from page 34

have to choose our jobs over others if our roles are separable from the business and can be delegated.

Our children would then merely need to act as partners or entrepreneurs—tasks that are significantly less physically demanding. Their role would involve investing capital where it yields the most return, requiring them to manage financial accounts and evaluate investment projects, oversee employees—a delicate balancing act—and have the courage to shut down operations when no longer profitable, a decision that challenges anyone's pride and ego.

In the realm of trading, rather than

merely handing down a trading station, we should bequeath a sound financial education and algorithms that can exploit market inefficiencies. This could be an asset. I have encountered traders who compelled their children to watch the screens while they narrated the market actions as if it were a sports broadcast. This is not an asset unless the child is as poetic as the father.

Owning a business in retail trading means having procedures, processes, and customized software that automatically captures market inefficiencies without human intervention. Call them trading systems if you will—this is something more, but even just a trading system in the sense of a method, a philosophy, an

approach made up of precise rules can be enough. Here, labor becomes an independent variable that can be bought or leased as needed because the business's value does not lie in front of a computer but in organizing the components of the machine.

Those I call "clickers," those who manually navigate markets, clicking here and there and perhaps even making a profit, are not assets; they are circus acts.

If I were them, I'd worry about leaving my child a hotel, a restaurant, or even a hair salon. These can be assets. Sitting in front of four monitors is not. Everything else is merely dreams.

Find similar articles online at [Traders.com](https://www.Traders.com)



CHARTING THE MARKETS

Stella Osoba, CMT, Esq., is an attorney, trader, and financial writer in New York, NY, and is also the Senior Editor, Trading and Investing, for Investopedia.com. Her work in financial litigation involving regulatory bodies and large multinational corporations led to an interest in the financial markets, then technical analysis and the psychological aspects of market behavior. She earned a CMT charter in 2013 and was a director-at-large on the board of the CMT Association for four years. This column will focus on recognizing and applying technical chart patterns to trading with flexibility and astuteness for better decision-making in trading. She can be reached at stellaosoba@gmail.com.



Stella Osoba

HOW MANY EGGS CAN ONE BASKET HOLD?

“The way to become rich is to put all your eggs in one basket and then watch the basket.” This quote has been ascribed to Andrew Carnegie, who knew a thing or two about wealth. It was also made popular by Mark Twain who later adopted it. We will examine this quote in more detail and how we can apply it to our position sizing to build meaningful accounts.

When we are new at anything, it is always wise to start small. This is true for almost everything, including trading. The wise trader will take on small positions to test their skills and to build confidence. They will seek to limit risk above all else so they can stay in the game. They should trade small positions to limit and minimize risk. As a novice trader, you are less aware of the myriad of signals that can torpedo your position. So, as you learn, you want to master the art of being on the right sides of trades enough times for trading to work. Many times, you recognize a trading opportunity, you wait for confirmation of your signals, everything looks right. But you stay unsure because you have not learned to accept that you can be right. Trading is not rocket science. Little old you can see the same positions the wizards are trading and hop aboard. But you may second-guess yourself, especially when money is on the line.

You become hypervigilant of your position and you are likely to bail at the first sign of trouble. This is when your best advice is to take a small position. It will not make you rich, but it will give you the knowledge and habits that will be the foundation of successful trading.

Experience is what gives us the confidence to know that we can be right about our trades even when the financial media is leading the herd down the wrong path. How much time we need to study and learn while trading small positions will differ for

Risk is the *sine qua non* of this business. We cannot profit if we have an unresolved fear of risk.

everyone. But if you trade for long enough, you will know when it is time to take off the training wheels. We do not trade simply to be right; we trade to accumulate wealth. That is why position sizing becomes an essential skill one must master on the path to success.

POSITION SIZING

There are many books you can read that will discuss in mathematical detail how to calculate the optimal position size for your portfolio. They will go into detail discussing where to

place stop-losses and how to calculate the dollar or percentage amount you should be willing to risk on each trade. All of this information is very useful and you should not ignore it. But that is not what I am concerned about here.

Before we go any further, let us discuss what trading is. At its heart, trading is your participation in the financial markets with the aim of generating wealth. It can be a zero-sum game, where your loss is someone else's gain and vice versa. Because of that, risk is at the core of trading. There is the risk that you will lose money, but there is also the risk that you will make money. Most people focus on the first type of risk, which is wise. My advice is to focus on this risk for many years or until you have traded for a sufficiently long period of time that you understand how you trade, what you trade, and how the securities you trade move. The first several years of your participation in the market should be less about making money and more about understanding risk, managing risk, and protecting capital.

If you stay in the markets long enough, you will know when the time has come to move to the next stage. That is to embrace the risk that you will make money. So back to the quote. It was in Pittsburg on June 23, 1885 that Andrew Carnegie addressed students in a commercial college. He said, “The concerns

The Savvy Technician

which fail are those which have scattered their capital, which means that they have scattered their brains also. They have investments in this, or that, or the other, here, there and everywhere. ‘*Don’t put all your eggs in one basket*’ is all wrong. I tell you, ‘*Put all your eggs in one basket, and then watch that basket.*’” Carnegie was talking broadly about business concerns, but the sentiments can be just as aptly applied to trading and the positions we build.

RECKLESSNESS

“Putting all your eggs in one basket” is not an invitation to be reckless. It is embracing the knowledge that the way to accumulate wealth is to position yourself for it. I will leave out day traders from this recommendation. As I do not day trade, I have little understanding of how it can be a successful method of making substantial sums of money. But for those with longer time horizons, for example, trend traders, you will know that in one year there will likely be only a few positions that you spot where all the stars align in such a way that your trade could be successful. When this is the case, why trade a small position? Knowing that you can be wrong means you do not trade your

entire account plus margin—that is reckless. But understanding that the signals and confirmation have set up a position for likely success, do not then enter the trade like a novice waiting for added confirmation or maybe the recognition of the financial pundits.

RISK

After several years of dabbling in the markets, we should have learned to embrace risk. Risk is the *sine qua non* of this business. We cannot profit if we have an unresolved fear of risk. Behavioral finance teaches us that we are naturally loss-averse. We feel the pain of loss twice as much as the pleasure of a gain. So we are wired to engage in loss-avoidance behaviors consciously and subconsciously. Part of our education and reeducation then must be to train ourselves to manage risk and to accept it.

You must learn to accept the risk that you will make money. When you have brought your wisdom to bear on a particular trade, when all your conditions for the trade have been met, when the signals are flashing and confirmation winks at you, it is time to set aside your fear of making money and trade the position with conviction, or as George Soros is famously reputed to have said to

Experience is what gives us the confidence to know that we can be right about our trades.

Stanley Druckenmiller, “Go for the jugular.”

FILL ONE BASKET WITH EGGS

If you know what you are doing, not many high-conviction trades will appear at any one time. So it’s wise to focus on one, maybe two trades and trade them so that when you are right it will make a difference. I cannot tell anyone how to position size; it’s a subjective question and the individual trader must make that determination. But if you decide to try a larger position in your portfolio and you become uncomfortable or downright scared as you build your position, then it is time to do what J.P. Morgan supposedly told a friend to do who expressed concerns about his inability to sleep because of his stock positions. Morgan is rumored to have said, “Sell down to your sleeping point.”

And so, my friend, should you.

Find similar articles online at [Traders.com](https://www.Traders.com) 

Algo Q&A

DAVEY

Continued from page 35

of contract expiration.

6. The proper way to roll is to employ exchange-traded spreads. These simultaneously exit one position and enter another later month, without exposing you to the risk of legging in and out of

a position. The problem is that not all brokers support spread trading. With many brokers, you have to exit/enter manually.

Knowing how rollovers work is important for every futures trader, since eventually every trader will have to deal with them. They are messy and unique to futures trading, but essential to understand.

The key point to remember is if you use back-adjusted continuous contracts, you can roll over and not worry about resetting stops and so on.

Find similar articles online at [Traders.com](https://www.Traders.com) 



The focus of Traders' Tips this month is Perry Kaufman's article in the June 2024 issue, "Trading Opening Gaps And Extreme Closes In Stocks." Here, we present the July 2024 Traders' Tips code with possible implementations in various software.

The code for the following Traders' Tips selections is posted here:

- Traders.com → S&C Magazine → Traders' Tips

At Traders.com you can also right-click on any chart to open it in a new tab or window and view the chart at a much larger size.

The Traders' Tips section is provided to help readers implement a selected technique from an article in this issue or another recent issue. The entries here are contributed by software developers or programmers for software that is capable of customization.



◆ REALTEST: JULY 2024 TRADERS' TIPS CODE

For the type of research shown in Perry Kaufman's article in the June 2024 issue, "Trading Opening Gaps And Extreme Closes In Stocks," we can use the backtest engine in RealTest.

The following script, when run in the "optimize" mode, outputs a results list in RealTest that resembles the author's table of stats for different gap ranges:

```

Notes:
Implements Perry Kaufman's research into intraday movement on gap days
run Import and then Optimize to produce an entire table of pullback and runup stats

Import:
DataSource: Norgate
IncludeList: .S&P 500 Current & Past
StartDate: 1/1/2010
EndDate: Latest
SaveAs: sp500.rtd

Settings:
DataFile: sp500.rtd
StartDate: Earliest
EndDate: Latest
BarSize: Daily

TestName: Select(border < -0.11, "gap < -11%",
border >= 0.11, "gap >= 11%",
Format("from {0} to {0}", border, border + 0.02))

Parameters:
border: from -0.13 to 0.11 step 0.02

Data:
gap: O[-1] / C - 1 // look ahead to tomorrow's open for research purposes
gap_in_range: Select(border < -0.11, gap < -0.11,
border >= 0.11, gap >= 0.11,
gap >= border and gap < border + 0.02)

Strategy: gap_data
Side: Long
EntrySetup: InSPX and gap_in_range
EntryTime: NextOpen // buy at open of gap day
ExitRule: 1
ExitTime: NextClose // sell at close of gap day
Quantity: 1 // one share (position size is not relevant to this study)

Results: // override default set of results columns with ones specific to this study
Instances: {#} Sum(S.Exits, S.Number)
OpenToClose: {02} Sum(S.TradePct, S.Number) / Instances
Pullback: {02} TradeStatAvg(T.Lowest / T.PriceIn - 1)
Runup: {02} TradeStatAvg(T.Highest / T.PriceIn - 1)
    
```

Rather than a fixed universe of symbols, this uses the historical constituents of the S&P 500 index for each date since 2010 (the author's start date in his study).

The RealTest output is shown in Figure 1. Like the author's, these results show that the average "open to close" change is insignificant regardless of gap size.

Rather than only including "pullback" for gaps up and "upward pullback" (runup) for gaps down, this includes both values for all gap ranges.

It is interesting to note, though not surprising, that larger gaps in either direction have larger average intraday moves in both directions.

RealTest users can use the following script for testing to see how useful the research may be for them in practice. This script that I built backtests the following comparison for each gap range:

- enter in both cases at the close of the day prior to a gap up (obviously impractical but allows the concept to be validated)
- for each gap range compare: a) selling the next close vs. b) selling the next open then buying on pullback then (if filled) selling the close.

```

Notes:
tests Perry Kaufman's idea with gap-up days in long positions:
- sell the open, buy intraday pullback, sell on close
- vs. always selling the close

Import:
DataSource: Norgate
IncludeList: .S&P 500 Current & Past
StartDate: 1/1/2010
EndDate: Latest
SaveAs: sp500.rtd

Settings:
DataFile: sp500.rtd
StartDate: Earliest
EndDate: Latest
BarSize: Daily
AccountSize: 1e6 // $1M account size

TestName: Select(border >= 0.11, Format("gap >= 11%, pullback = {0}", pullback),
Format("from {0} to {0}", pullback, border + 0.02, pullback))

Parameters:
border: from 0.01 to 0.11 step 0.02 def 0.07 // gap up size lower border
pullback: 0, 1 // always hold until close if 0, sell at open then place limit order to buy again if 1

Data:
gap: O[-1] / C - 1 // look ahead to tomorrow's open
gap_in_range: gap >= border and (border = 0.11 or gap < border + 0.02)

Strategy: gap_sell_open_or_close
Side: Long
Quantity: 10000
QtyType: Value // $10K fixed position size
EntrySetup: InSPX and gap_in_range
EntryTime: ThisClose // enter on close when tomorrow will gap up
ExitRule: 1
ExitTime: NextClose // sell next close when not using pullback
ExitStop: if(pullback, O[-1], 0) // or sell next open when using pullback

Strategy: gap_buy_pullback_sell_close
Side: Long
Quantity: 10000
QtyType: Value // $10K fixed position size again
EntrySetup: pullback and InSPX and gap_in_range
EntryLimit: O[-1] * (1 - border/2) // enter at pullback to half the min. gap of this test
ExitRule: 1
ExitTime: ThisClose // exit on the close of the entry day
    
```

This uses RealTest's multi-strategy capability to combine two strategies: one for the initial entry, the other for the pullback reentry.



Test	Name	Dates	Instances	OpenToClose	Pullback	Runup
0001	gap < -11%	1/4/10 - 5/3/24	1,028	-0.50%	-5.16%	6.29%
0002	from -11% to -9%	1/4/10 - 5/3/24	686	-0.56%	-4.30%	4.87%
0003	from -9% to -7%	1/4/10 - 5/3/24	1,629	-0.69%	-4.46%	4.04%
0004	from -7% to -5%	1/4/10 - 5/3/24	3,656	-0.26%	-3.58%	3.43%
0005	from -5% to -3%	1/4/10 - 5/3/24	12,755	0.11%	-2.48%	2.63%
0006	from -3% to -1%	1/4/10 - 5/3/24	131,780	0.02%	-1.61%	1.59%
0007	from -1% to 1%	1/4/10 - 5/3/24	1,497,866	0.01%	-1.02%	1.00%
0008	from 1% to 3%	1/4/10 - 5/3/24	136,790	0.09%	-1.54%	1.55%
0009	from 3% to 5%	1/4/10 - 5/3/24	12,369	0.10%	-2.47%	2.39%
0010	from 5% to 7%	1/4/10 - 5/3/24	3,806	0.39%	-3.10%	3.17%
0011	from 7% to 9%	1/4/10 - 5/3/24	1,428	0.27%	-3.60%	3.63%
0012	from 9% to 11%	1/4/10 - 5/3/24	646	0.64%	-3.78%	4.45%
0013	gap >= 11%	1/4/10 - 5/3/24	753	-0.51%	-4.66%	3.95%

FIGURE 1: REALTEST. A script in RealTest, run in the “optimize” mode, outputs a list of metrics for different gap ranges.

Test	Name	Dates	Periods	Trades	NetProfit
0001	from 1% to 3%, pullback = False	1/4/10 - 12/31/19	2,516	80,348	\$12,926,290
0007	from 1% to 3%, pullback = True	1/4/10 - 12/31/19	2,516	140,962	\$12,786,296
0002	from 3% to 5%, pullback = False	1/4/10 - 12/31/19	2,516	5,820	\$2,108,426
0008	from 3% to 5%, pullback = True	1/4/10 - 12/31/19	2,516	9,136	\$2,142,479
0003	from 5% to 7%, pullback = False	1/4/10 - 12/31/19	2,516	1,594	\$892,508
0009	from 5% to 7%, pullback = True	1/4/10 - 12/31/19	2,516	2,322	\$915,600
0004	from 7% to 9%, pullback = False	1/4/10 - 12/31/19	2,516	617	\$475,123
0010	from 7% to 9%, pullback = True	1/4/10 - 12/31/19	2,516	798	\$482,812
0005	from 9% to 11%, pullback = False	1/4/10 - 12/31/19	2,515	252	\$260,024
0011	from 9% to 11%, pullback = True	1/4/10 - 12/31/19	2,515	303	\$248,741
0006	gap >= 11%, pullback = False	1/4/10 - 12/31/19	2,514	382	\$649,930
0012	gap >= 11%, pullback = True	1/4/10 - 12/31/19	2,514	451	\$659,190

FIGURE 2: REALTEST. For comparison and for testing or research, the same script could be rerun without the downward gap study, producing results such as those shown here.

To keep this a bit simpler, I omitted a downward gap study; presumably, that would compare holding to the close versus exiting with a limit order on a runup.

The results of those tests are shown in Figure 2. Ignore the specific dollar amount—this is not a tradable strategy, just a research project. Instead, focus on the difference between each pair of tests for the same gap range.

The first test of each such pair buys the close prior to the gap up and sells the following close. The second test of each pair sells the open and then reenters on pullback to half the lower gap range if touched, thus the higher trade counts.

Note that the profit differences either way are minimal and one way is not consistently better than the other, regardless of gap size.

Readers can use the scripts provided here to test for themselves some of these concepts.

—Marsten Parker

MHP Trading, Mhptrading.com

mhp@mhptrading.com



◆ WEALTH-LAB: JULY 2024 TRADERS' TIPS CODE

In “Trading Opening Gaps And Extreme Closes In Stocks” in the June 2024 issue, Perry Kaufman presents some research into price behavior surrounding opening gaps and large closes. Several tables of data are given with statistics.

Wealth-Lab users have access to an opensource tool they

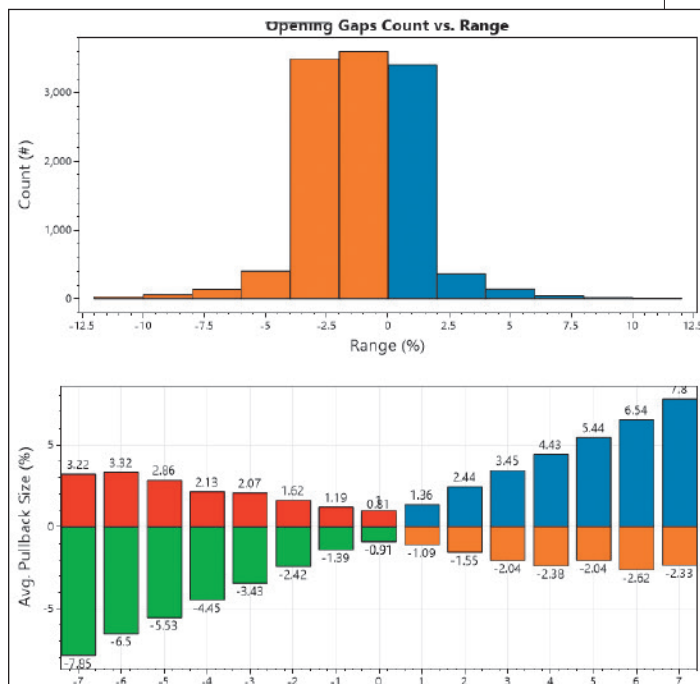


FIGURE 3: WEALTH-LAB. In the upper histogram, you see a count of opening gaps versus their % range, or cohort. In the lower graph, you see the average gap size (%) versus average pullback size (%). For both histograms, down gaps are clustered on the left and up gaps to the right of the x axis.

can use in Wealth-Lab to plot such data to make it easier to visualize. The tool is called ScottPlot.

Wealth-Lab 8 can display various custom plots such as line or bar charts, pie graphs, and scatter plots by throwing in some code. The code given here accomplishes a visualization for the purposes of the article with the help of ScottPlot.

Figure 3 consists of two histogram plots:

1. the upper plot is a count of opening gaps vs. their % range, or cohort;
2. the lower plot is the average gap size (%) vs. average pullback size (%).

For both histograms, down gaps are clustered on the left and up gaps to the right of axis X.

If you prefer raw data, on the *debug log* tab, you'll find the data behind those charts in a tabular form: the gaps themselves by symbol, cohort (the bins for gap sizes i.e. <1%, 1–3% gaps, and so on, average gap size up/down %, and average pullback % size).

Code:

```
using WealthLab.Backtest;
using System;
using WealthLab.Core;
using WealthLab.Data;
using WealthLab.Indicators;
using System.Collections.Generic;
using System.Drawing;
```

```

        }
    }
}

/* filter out small gaps within 0.5% */
if (_raw >= 0.5)
    IstGaps.Add(g);
}

static List<Gap> IstGaps = new List<Gap>();
static List<AverageGap> IstAvgGapsUp = new
List<AverageGap>();
static List<AverageGap> IstAvgGapsDn = new
List<AverageGap>();
Bitmap bmp = null;
Plot plt1, plt2;
string[] IstTicks = new string[14] { ">-11%", "-9-11%", "-7-9%",
"-5-7%", "-3-5%", "-1-3%", ">-1%", "<1%", "1-3%", "3-5%", "5-7%", "7-9%",
"9-11%", ">11%" };
string path;

public override void Initialize( BarHistory bars)
{
    bmp = null;
    plt1 = new ScottPlot.Plot(700, 350);
    plt2 = new ScottPlot.Plot(700, 350);

    /* Plot actual chart of average gap and pullback % */
    plt1.Title(string.Format("Opening Gaps Count vs. Range"));
    plt1.YLabel(string.Format("Average % Gap Up/Pullback"));
    plt1.XLabel("Cohort");
    plt1.Grid(enable: false, lineStyle: ScottPlot.LineStyle.Dot);
    plt1.YAxis.Label("Count (#)");
    plt1.XAxis.Label("Range (%)");

    plt2.SetCulture(decimalDigits: 2);
    plt2.YAxis.Label("Avg. Pullback Size (%)");
    plt2.XAxis.Label("Avg. Gap Size (%)");

    path = Environment.GetFolderPath(Environment.Special-
Folder.Desktop);
}

public override void Execute ( BarHistory bars, int idx)
{
}

public override void BacktestComplete()
{
    /* gap debug stats */
    IstGaps.OrderBy(g => g.Up);
    WriteToDebugLog ("Symbol" + "\t" + "Date" + "\t" + "Size" +
"\t" + "Cohort" + "\t" + "Pullback Size" + "\t" + "Up?");
    foreach (var item in IstGaps)
        WriteToDebugLog (item.Symbol + "\t" + item.Date.ToShort-
DateString() + "\t" + Math.Round(item.Size, 2) + "\t" + item.Cohort +
"\t" + Math.Round(item.PullbackSize, 2) + "\t" + item.Up, true);

    /* average gap size and pullback by cohort */
    IstAvgGapsUp = IstGaps.Where(i => i.Up == true).GroupBy(i
=> i.Cohort).
        Select(g => new AverageGap { Cohort = g.Key, Averag-
eSize = g.Average(a => a.Size), AveragePullback = g.Average(a =>
a.PullbackSize) }).ToList();
    IstAvgGapsDn = IstGaps.Where(i => i.Up == false).GroupBy(i
=> i.Cohort).
        Select(g => new AverageGap { Cohort = g.Key, Averag-
eSize = g.Average(a => a.Size), AveragePullback = g.Average(a =>
a.PullbackSize) }).ToList();
}

```

—Gene Geren (Eugene)
Wealth-Lab team
www.wealth-lab.com

July 2024 • *Technical Analysis of* STOCKS & COMMODITIES • 43

```
if (isSeccondUnit == false) {
    xVmp = xVmp * 1000000;
    xVmin = xVmin * 1000000;
    xVmax = xVmax * 1000000;
    xVmpSum = xVmpSum * 1000000;
    xVminSum = xVminSum * 1000000;
    xVmaxSum = xVmaxSum * 1000000;
    xVmpSum = xVmpSum * 1000000;
    xVminSum = xVminSum * 1000000;
    xVmaxSum = xVmaxSum * 1000000;
}
```



```
if (xVmp.getValueLengthVortex() == null || xVmp.TrueRange.getValueLengthVortex() == null || xVmp.TrueRange.getValueLengthVortex().length() == 0) {
    xVmpSum = xVmpSum + xVmp.getValue(i);
}
```



```
// pullback from gap higher:
bini = bins.get(thresholds.get(saveindex))
float gap_pb = low / open - 1.0
bini.gap_up_pb += gap_pb
// close relative to gap open:
float gap_close = close / open - 1.0
bini.gap_up_close += gap_close
// opening gap lower:
if gap < 0.0
float agap = math.abs(gap)
int saveindex = 0
bool found = false
for _i = 0 to 6
    if not found
        if agap < thresholds.get(_i)
            found := true
            bini = bins.get(thresholds.get(_i))
            bini.gap_freq_dn += 1
            bini.gap_dn += agap
            saveindex := _i
if not found
    bini = bins.get(thresholds.get(6))
    bini.gap_freq_dn += 1
    bini.gap_dn += agap
    saveindex := 6
// upward pullback from gap lower:
bini = bins.get(thresholds.get(saveindex))
float gap_pb = high / open - 1.0
bini.gap_dn_pb += gap_pb
// close relative to gap open:
float gap_close = close / open - 1.0
bini.gap_dn_close += gap_close
// Extreme close logic:
float extreme_close = close / close[1] - 1.0
// extreme close higher:
if extreme_close > 0.0
    int saveindex = 0
    bool found = false
    for _i = 0 to 6
        if not found
            if extreme_close < thresholds.get(_i)
                found := true
                bini = bins.get(thresholds.get(_i))
                bini.close_freq_up += 1
                bini.close_up += extreme_close
                saveindex := _i
                log.info('found!')
if not found
    bini = bins.get(thresholds.get(6))
    bini.close_freq_up += 1
    bini.close_up += extreme_close
    saveindex := 6
// next open and close:
bini = bins.get(thresholds.get(saveindex))
bini.next_open_up += open / close[1] - 1.0
bini.next_close_up += close / close[1] - 1.0
// extreme close lower:
if extreme_close < 0.0
    float aextreme_close = math.abs(extreme_close)
    int saveindex = 0
    bool found = false
    for _i = 0 to 6
        if not found
            if aextreme_close < thresholds.get(_i)
                found := true
                bini = bins.get(thresholds.get(_i))
                bini.close_freq_dn += 1
                bini.close_dn += aextreme_close
                saveindex := _i
if not found
```

```
bini = bins.get(thresholds.get(6))
bini.close_freq_up += 1
bini.close_up += aextreme_close
saveindex := 6
// next open and close:
bini = bins.get(thresholds.get(saveindex))
bini.next_open_dn += open / close[1] - 1.0
bini.next_close_dn += close / close[1] - 1.0
Data data = Data.new(thresholds, bins)
data

// Data to lists:
method get_gaps_up_freq (Data data) =>
    int[] _freq = array.new<int>(7, int(na))
    for [_i, _thrs] in data.thresholds
        _freq.set(_i, data.bins.get(_thrs).gap_freq_up)
    _freq

method get_gaps_dn_freq (Data data) =>
    int[] _freq = array.new<int>(7, int(na))
    for [_i, _thrs] in data.thresholds
        _freq.set(_i, data.bins.get(_thrs).gap_freq_dn)
    _freq

method get_gaps_up_pb (Data data) =>
    float[] _pb = array.new<float>(7, float(na))
    for [_i, _thrs] in data.thresholds
        float _pbi = data.bins.get(_thrs).gap_up_pb
        int _fqi = data.bins.get(_thrs).gap_freq_up
        if _fqi != 0 // protect against div by 0
            _pb.set(_i, _pbi / _fqi)
    _pb

method get_gaps_dn_pb (Data data) =>
    float[] _pb = array.new<float>(7, float(na))
    for [_i, _thrs] in data.thresholds
        float _pbi = data.bins.get(_thrs).gap_dn_pb
        int _fqi = data.bins.get(_thrs).gap_freq_dn
        if _fqi != 0 // protect against div by 0
            _pb.set(_i, _pbi / _fqi)
    _pb

method get_gaps_up_close_vs_open (Data data) =>
    float[] _cvo = array.new<float>(7, float(na))
    for [_i, _thrs] in data.thresholds
        float _pi = data.bins.get(_thrs).gap_up_close
        int _fqi = data.bins.get(_thrs).gap_freq_up
        if _fqi != 0 // protect against div by 0
            _cvo.set(_i, _pi / _fqi)
    _cvo

method get_gaps_dn_close_vs_open (Data data) =>
    float[] _cvo = array.new<float>(7, float(na))
    for [_i, _thrs] in data.thresholds
        float _pi = data.bins.get(_thrs).gap_dn_close
        int _fqi = data.bins.get(_thrs).gap_freq_dn
        if _fqi != 0 // protect against div by 0
            _cvo.set(_i, _pi / _fqi)
    _cvo

method get_close_up_freq (Data data) =>
    int[] _freq = array.new<int>(7, int(na))
    for [_i, _thrs] in data.thresholds
        _freq.set(_i, data.bins.get(_thrs).close_freq_up)
    _freq

method get_close_dn_freq (Data data) =>
    int[] _freq = array.new<int>(7, int(na))
    for [_i, _thrs] in data.thresholds
        _freq.set(_i, data.bins.get(_thrs).close_freq_dn)
    _freq
```

```

method get_close_up_next_open (Data data) =>
float[] _pb = array.new<float>(7, float(na))
for [i, _thrs] in data.thresholds
    float _pi = data.bins.get(_thrs).next_open_up
    int _fi = data.bins.get(_thrs).close_freq_up
    if _fi != 0 // protect agains div by 0
        _pb.set(i, _pi / _fi)
    _pb

method get_close_dn_next_open (Data data) =>
float[] _pb = array.new<float>(7, float(na))
for [i, _thrs] in data.thresholds
    float _pi = data.bins.get(_thrs).next_open_dn
    int _fi = data.bins.get(_thrs).close_freq_dn
    if _fi != 0 // protect agains div by 0
        _pb.set(i, _pi / _fi)
    _pb

method get_close_up_next_close (Data data) =>
float[] _cvo = array.new<float>(7, float(na))
for [i, _thrs] in data.thresholds
    float _pi = data.bins.get(_thrs).next_close_up
    int _fi = data.bins.get(_thrs).close_freq_up
    if _fi != 0 // protect agains div by 0
        _cvo.set(i, _pi / _fi)
    _cvo

method get_close_dn_next_close (Data data) =>
float[] _cvo = array.new<float>(7, float(na))
for [i, _thrs] in data.thresholds
    float _pi = data.bins.get(_thrs).next_close_dn
    int _fi = data.bins.get(_thrs).close_freq_dn
    if _fi != 0 // protect agains div by 0
        _cvo.set(i, _pi / _fi)
    _cvo

// Table:
method gap_table (Data data, bool gaps, bool dir) =>
table _tbl = table.new(position.bottom_center, 8, 5)
string _title = switch gaps
    true => dir ? 'GAP UP' : 'GAP DOWN'
    false => dir ? 'CLOSE UP' : 'CLOSE DOWN'
color _col_bg = color.rgb(200, 208, 231)
color _col_bg_title = color.rgb(160, 170, 180)
color _col_bg_dir = dir ? color.lime : color.orange
_tbl.cell(0, 0, _title, bgcolor=_col_bg_title)
_tbl.cell(7, 0, _title, bgcolor=_col_bg_title)
_tbl.merge_cells(0, 0, 7, 0)
_tbl.cell(0, 1, 'Ranges:', bgcolor=_col_bg_dir)
_tbl.cell(0, 2, 'Frequency:', bgcolor=_col_bg_dir)
_tbl.cell(0, 3, 'Pullback:', bgcolor=_col_bg_dir)
_tbl.cell(0, 4, 'Close vs Open:', bgcolor=_col_bg_dir)
int[] _freq = switch gaps
    true => dir ? data.get_gaps_up_freq() :
        data.get_gaps_dn_freq()
    false => dir ? data.get_close_up_freq() :
        data.get_close_dn_freq()
float[] _pb = switch gaps
    true => dir ? data.get_gaps_up_pb() :
        data.get_gaps_dn_pb()
    false => dir ? data.get_close_up_next_open() :
        data.get_close_dn_next_open()
float[] _cvo = switch gaps
    true => dir ? data.get_gaps_up_close_vs_open() :
        data.get_gaps_dn_close_vs_open()
    false => dir ? data.get_close_up_next_close() :
        data.get_close_dn_next_close()
for [i, _thrs] in data.thresholds
    _r = str.tostring(i*2-1)+'-'+str.tostring(i*2+1)+'%'
    _tbl.cell(1+ i, 1, _r, bgcolor=_col_bg_dir)

```



FIGURE 4: TRADINGVIEW. A script creates a table showing the extreme price move frequencies in the data (gaps or extreme closes), average pullbacks, and next closes.

```
_tbl.cell(1+i, 2, str.format('{0,number,integer}',
                              _freq.get(i)), bgcolor=_col_bg)
_tbl.cell(1+i, 3, str.format('{0,number,###%}',
                              _pb.get(i)), bgcolor=_col_bg)
_tbl.cell(1+i, 4, str.format('{0,number,###%}',
                              _cvo.get(i)), bgcolor=_col_bg)
tbl.cell(1, 1, '<1%', bgcolor=_col_bg_dir)
tbl.cell(7, 1, '>11%', bgcolor=_col_bg_dir)
tbl
```

```
// Calculations:
bool gaps = out1 == it0
bool dir = out2 == it2
data = get_data()
if barstate.islastconfirmedhistory
    table tb = data.gap table(gaps, dir)
```

The script is available on TradingView from the Pine-CodersTASC account: <https://www.tradingview.com/u/PineCodersTASC/#published-scripts>.

An example output table is shown in Figure 4.

—PineCoders, for TradingView
www.TradingView.com



◆ **NEUROSHELL TRADER: JULY 2024 TRADERS' TIPS CODE**

The calculations performed in Perry Kaufman's article in the June 2024 issue, "Trading Opening Gaps And Extreme Closes In Stocks," can be easily implemented in NeuroShell Trader by combining some of NeuroShell Trader's 800+ indicators. To implement the calculations, select "new indicator" from the *insert* menu and use the indicator wizard to create the following indicators:

Gap: Subtract(Divide(Open, Lag(Close,1)), 1)
 GapPBup: Subtract(Divide(Low, Open), 1)
 GapPBdown: Subtract(Divide(High, Open), 1)
 GapClose: Subtract(Divide(Close, Open), 1)

```

GapUpThreshold: A<B<C ( LowerThreshold, Gap, UpperThreshold )
GapFreqUp: CumSum ( IfThenElse( GapUpThreshold, 1, 0 ), 0 )
GapUp: CumSum ( IfThenElse( GapUpThreshold, Gap, 0 ), 0 )
GapUpPB: CumSum ( IfThenElse( GapUpThreshold, GapPBup, 0 ), 0 )
GapUpClose: CumSum ( IfThenElse( GapUpThreshold, GapClose, 0 ), 0 )
)

```



```
GapDownThreshold: A<B<C ( Mult2(UpperThreshold,-1), Gap,
Mult2(LowerThreshold,-1) )
GapFreqDown: CumSum ( IfThenElse( GapDownThreshold, 1, 0 ), 0 )
GapDown: CumSum ( IfThenElse( GapDownThreshold, Gap, 0 ), 0 )
GapDownPB: CumSum ( IfThenElse( GapDownThreshold, GapPBdown,
0 ), 0 )
GapDownClose: CumSum ( IfThenElse( GapDownThreshold, GapClose,
0 ), 0 )
```

```
ExtremeClose: Subtract( Divide( Close, Lag(Close, 1) ), 1 )
NextOpen: Subtract( Divide( Open, Lag(Close, 1) ), 1 )
NextClose: Subtract( Divide( Close, Lag(Close, 1) ), 1 )
```

```
CloseUpThreshold: A<B<C ( LowerThreshold, ExtremeClose, Up-
perThreshold )
CloseFreqUp: CumSum ( IfThenElse( CloseUpThreshold, 1, 0 ), 0 )
CloseUp: CumSum ( IfThenElse( CloseUpThreshold, ExtremeClose, 0
), 0 )
NextOpenUp: CumSum ( IfThenElse( CloseUpThreshold, NextOpen,
0 ), 0 )
NextCloseUp: CumSum ( IfThenElse( CloseUpThreshold, NextClose, 0 ),
0 )
```

```
CloseDownThreshold: A<B<C( Mult2(UpperThreshold,-1), Next-
Close, Mult2(LowerThreshold,-1) )
CloseFreqDown: CumSum ( IfThenElse( CloseDownThreshold, 1, 0 ),
0 )
CloseDown: CumSum ( IfThenElse( CloseDownThreshold, Extreme-
Close, 0 ), 0 )
NextOpenDown: CumSum ( IfThenElse( CloseDownThreshold, Next-
Open, 0 ), 0 )
NextCloseDown: CumSum ( IfThenElse( CloseDownThreshold, Next-
Close, 0 ), 0 )
```

```
GAP UP: GapFreqUp
GAP UP PULLBACK: Multiply ( 100, Divide( GapUpPB, GapFreqUp )
GAP UP CLOSE VS OPEN: Multiply( 100, Divide( GapUpClose, Gap-
FreqUp )
```

```
GAP DOWN: GapFreqUp
GAP DOWN PULLBACK: Multiply ( 100, Divide( GapDownPB, GapFreq-
Down )
GAP DOWN CLOSE VS OPEN: Multiply( 100, Divide( GapDownClose,
GapFreqDown )
```

```
CLOSE UP: CloseFreqUp
NEXT OPEN: Multiply ( 100, Divide( NextOpenUp, CloseFreqUp)
NEXT CLOSE: Multiply ( 100, Divide( NextCloseUp, CloseFreqUp)
```

```
CLOSE DOWN: CloseFreqDown
NEXT OPEN: Multiply ( 100, Divide( NextOpenDown, CloseFreqDown)
NEXT CLOSE: Multiply ( 100, Divide( NextCloseDown, CloseFreqDown)
```

Users of NeuroShell Trader can go to the STOCKS & COMMODITIES section of the NeuroShell Trader free technical support website to download a copy of this or any previous Traders' Tips.

—Ward Systems Group, Inc.
sales@wardsystems.com
www.neuroshell.com



◆ ZORRO: JULY 2024 TRADERS' TIPS CODE

In his article in the June 2024 issue, "Trading Opening Gaps And Extreme Closes In Stocks," Perry Kaufman examines opening gaps and subsequent movements. The goal is not a trading system but rather a statistical analysis

of gap-dependent price behavior. The premise investigated is that stocks tend to experience a strong pullback after a large upward gap, but revert to the opening price at the close of the day. This would present an opportunity to sell the stock at market open and then buy it back at a lower price during the day.

In the article, the author provides some EasyLanguage code that makes use of variables and arrays and allows the reader to create one table at a time. In the Zorro platform, users can generate a spreadsheet for the analysis of gaps, pullbacks, and relative closes of seven selected stocks. Here is code in C for use in Zorro to accomplish that:

```
#define STOCKS "AAPL","AMZN","BABA","BAC","NVDA","TSLA","WMT"
#define NA 7 // number of stocks
#define NR 7 // number of ranges

var Ranges[NR] = { 1,3,5,7,9,11,9999 }; // the gap ranges
int Gaps[NA][NR];
var Pullbacks[NA][NR], Closes[NA][NR];
int i,j;

void run()
{
    BarPeriod = 1440;
    StartDate = 20100101;
    EndDate = 20240101;
    assetList("AssetsSP500"); // the S&P 500 index

    if(is(INITRUN)) { // reset the arrays
        memset(Gaps,0,NA*NR*sizeof(int));
        memset(Pullbacks,0,NA*NR*sizeof(var));
        memset(Closes,0,NA*NR*sizeof(var));
    }

    for(j=0; j<NR; j++) { // calculate gaps, pullbacks, relative closes
        if(!asset(of(STOCKS))) break; // select the stock
        if(Bar < AssetFirstBar) continue;
        var Gap = 100*(priceO(0)/priceC(1)-1.);
        for(i=0; i<NR; i++) if(Gap < Ranges[i]) {
            Gaps[j][i]++;
            Pullbacks[j][i] += priceL(0)/priceO(0)-1.;
            Closes[j][i] += priceC(0)/priceO(0)-1.;
            break;
        }
    }

    if(is(EXITRUN)) { // print the results to spreadsheet
        print(TO_CSV,"Range,< 1%%,1-3%%,3-5%%,5-7%%,7-9%%,9-11%%,> 11%%\n");
        for(j=0; j<NR; j++) {
            if(!asset(of(STOCKS))) break;
            print(TO_CSV,"%s Gaps",Asset);
            for(i=0; i<NR; i++)
                print(TO_CSV,"%i",Gaps[j][i]);
            print(TO_CSV,"\n");
        }
        print(TO_CSV,"\n");
        for(j=0; j<NR; j++) {
            if(!asset(of(STOCKS))) break;
            print(TO_CSV,"%s PBs",Asset);
            for(i=0; i<NR; i++)
                print(TO_CSV,"%2f%%",100*Pullbacks[j][i]/fix0(Gaps[j][i]));
            print(TO_CSV,"\n");
        }
        print(TO_CSV,"\n");
        for(j=0; j<NR; j++) {
            if(!asset(of(STOCKS))) break;
```

↕	A	C	D	E	F	G	H	
1	Range	< 1%	1-3%	3-5%	5-7%	7-9%	9-11%	> 11%
2	AAPL Gaps	2910	347	23	10	5	1	0
3	AMZN Gaps	2910	344	21	7	5	4	5
4	BABA Gaps	1639	378	66	13	4	4	
5	BAC Gaps	2764	474	39	11	6	1	1
6	NVDA Gaps	2689	516	66	9	8	6	2
7	TSLA Gaps	2440	556	112	32	13	7	13
8	WMT Gaps	3203	80	6	4	1	1	1
9								
10	AAPL PBs	-0.98%	-1.27%	-1.74%	-2.26%	-2.79%	-1.57%	0.00%
11	AMZN PBs	-1.18%	-1.55%	-2.21%	-3.67%	-2.67%	-2.41%	-3.09%
12	BABA PBs	-1.38%	-1.55%	-2.30%	-2.33%	-4.19%	-4.51%	-4.91%
13	BAC PBs	-1.16%	-1.40%	-2.38%	-3.71%	-3.51%	-1.13%	-10.98%
14	NVDA PBs	-1.55%	-1.89%	-2.79%	-3.68%	-1.79%	-5.26%	-0.75%
15	TSLA PBs	-2.02%	-2.36%	-3.60%	-3.81%	-5.68%	-3.23%	-4.34%
16	WMT PBs	-0.67%	-1.20%	-2.30%	-1.33%	-0.88%	-2.20%	-11.81%
17								
18	AAPL CIs	0.02%	0.10%	0.61%	0.65%	-2.33%	-0.91%	0.00%
19	AMZN CIs	0.01%	0.14%	0.05%	-1.56%	0.42%	-1.51%	-0.52%
20	BABA CIs	-0.04%	-0.09%	-0.43%	-0.38%	-1.31%	-2.43%	1.61%
21	BAC CIs	-0.06%	-0.04%	0.17%	-0.88%	3.96%	4.36%	-7.72%
22	NVDA CIs	0.04%	0.13%	-0.12%	-1.46%	1.51%	-1.23%	8.36%
23	TSLA CIs	0.05%	-0.04%	-0.48%	0.04%	-1.34%	0.64%	1.55%
24	WMT CIs	0.05%	-0.21%	-0.08%	2.97%	1.61%	-1.47%	-10.54%

FIGURE 5: ZORRO. In the Zorro platform, users can generate a spreadsheet for the analysis of metrics such as gaps, pullbacks, and relative closes of seven selected stocks.

```
print(TO_CSV,"%s Cls",Asset);
for(i=0; i<NR; i++)
    print(TO_CSV,"%0.2f%%",100*Clases[j][i]/fix0(Gaps[j][i]));
print(TO_CSV,"\n");
}
exec("Data\\Gaps.csv",0,0); // open spreadsheet in Excel
}
```

I'll explain some of the code. The **of** function takes a list of items, such as stock names, and returns one after the other at any call. At the end of the list it returns 0. Since some of the assets did not yet exist in 2010, the **AssetFirstBar** variable is used to skip that empty part of the history. The **memset** function initializes all arrays to zero at start. At the end of the history, the **EXITRUN** flag becomes true and the collected data is printed to a CSV spreadsheet. I'm printing all three statistics to the same spreadsheet. The **fix0** function prevents a division-by-zero error, since some ranges have zero gaps. For replicating Kaufman's results, I have also included negative gaps in the first "< 1%" range.

The spreadsheet shown in Figure 5 yields similar results as in Kaufman's article, with some deviations since Kaufman probably used a slightly different time range.

The script can be downloaded from the 2024 script repository on <https://financial-hacker.com>. The Zorro platform for C/C++ algo trading can be downloaded from <https://zorro-project.com>.

—Petra Volkova

The Zorro Project by oP group Germany

<https://zorro-project.com>



◆ **AIQ: JULY 2024 TRADERS' TIPS CODE**

 The importable AIQ EDS file for Perry Kaufman's article "Trading Opening Gaps And Extreme Closes In Stocks" can be obtained on request via rdencpa@gmail.com. The code is also available on this magazine's website.

! Trading Opening Gaps And Extreme Closes In Stocks

GAPS RetOnGapDn Properties

Entry Range Pricing Exit

Position Opening Price

☐ Default (Next Period Open)

☒ User Defined 0

☐ Next Period

☒ Current Period

Position Closing Price

☐ Default (Next Period Open)

☒ User Defined C

☐ Next Period

☒ Current Period

OK Cancel Help

FIGURE 6: AIQ. This shows an AIQ setup screen for the pricing with entry and exit on the current bar for a backtest of down gaps.

GAPS RetOnGapDn Properties

Entry Range Pricing Exit

☒ Evaluate for 1 periods.

☐ Trade it

☐ Trailing Stop 80 %

☐ Protect 80 % of my Capital

☐ Protect 80 % of my profit above 5 %

☐ After 1 periods, exit on rule

☐ Include open positions held at least 1 days

OK Cancel Help

FIGURE 7: AIQ. This shows an AIQ setup screen for "exit on same bar as entry" for a backtest of down gaps.

! Author: Perry Kaufman, TASC July 2024

! Coded by: Richard Denning, 5/14/2024

gapSize is 7.

O is [open].

C is [close].

C1 is valresult(C,1).

gap is $(O/C1-1)*100$.

gapdn if gap < 0.

gapdn1 is iff($\text{gap} < 0$ and $\text{gap} > -1$, gap, "").

gapdn3 is iff(gap <= -1 and gap > -3,gap,"").

gapdn5 is iff(gap <= -3 and gap > -5,gap,"").

gapdn7 is iff(gap <= -5 and gap > -7,gap,"").

gapdn9 is iff(gap <= -7 and gap > -9, gap, "").

gapdn11 is iff(gap <= -9 and gap > -11,gap,"").



gapdn11p is iff(gap <= -11 ,gap,"").

gapd1 if gap < 0 and gap > -1.
gapd3 if gap <= -1 and gap > -3.
gapd5 if gap <= -3 and gap > -5.
gapd7 if gap <= -5 and gap > -7.
gapd9 if gap <= -5 and gap > -9.
gapd11 if gap <= -7 and gap > -11.
gapd11p if gap <= -11.

HD is hasdatafor(2000).
!countgapdn1 is iff(showValues,countof(gapd1,HD),"").
countgapdn1 is countof(gapd1,HD).
countgapdn3 is countof(gapd3,HD).
countgapdn5 is countof(gapd5,HD).
countgapdn7 is countof(gapd7,HD).
countgapdn9 is countof(gapd9,HD).
countgapdn11 is countof(gapd11,HD).
countgapdn11p is countof(gapd11p,HD).

rtrnToClose is (C/O - 1)*100.
showValues if C > 10 and HD = 2000.
RetOnGapDn if showValues and gap < -gapSize.

A portion of the author's code is set up in the AIQ EDS code file (the part of the code for the gap downs). The rule "ShowValues" will create a report counting the number of gap downs for stocks on your list that have 2,000 days of data or more and are greater than \$10 in price as of the end date of the listing. This report can be exported to a CSV file for further analysis. The rule "RetOnGapDn" can be used to create a backtest in EDS that buys at the open if there is a gap down greater than the "gapSize" input and sells at the close of the same bar to determine the return from open to close. Figures 6 and 7 show the backtesting setup in EDS for the "RetOnGapDn" rule.

—Richard Denning
rdencpa@gmail.com
for AIQ Systems



◆ NINJATRADER: JULY 2024 TRADERS' TIPS CODE

A script based on the article "Trading Opening Gaps And Extreme Closes In Stocks" in the June 2024 issue is available for download at the following link for NinjaTrader 8:

NinjaTrader 8: www.ninjatrader.com/SC/July2024SCNT8.zip

Once the file is downloaded, you can import it into NinjaTrader 8 from within the control center by selecting Tools → Import → NinjaScript Add-On and then selecting the downloaded file for NinjaTrader 8.

You can review the source code in NinjaTrader 8 by selecting the menu New → Ninja-

Script Editor → Indicators folder from within the control center window and selecting the ExtremeGapsAndCloses file.

NinjaScript uses compiled DLLs that run native, not interpreted, to provide you with the highest performance possible.

—NinjaTrader, LLC
www.ninjatrader.com



◆ TRADESTATION: JULY 2024 TRADERS' TIPS CODE

In "Trading Opening Gaps And Extreme Closes In Stocks," author Perry Kaufman explores the question, "What is a stock likely to do when large opening moves and large closing moves occur?" The EasyLanguage study provided here writes data as a CSV file in a formatted table for a single symbol and allows you to specify the output file through an input.

```
//TASC JULY 2024
//
// Extreme Moves Gaps and Closes
// Copyright 2023–2024, P J Kaufman. All rights reserved.
// Show frequency of gaps within a table of ranges:
// gap, pullback, relative close
// Show frequency closes within a table of ranges:
// close, next open, next close
```

inputs:
iFileName("C:\TradeStation\Extreme_Moves.csv");

variables:
double gap(0),
double gappb(0),
double gapclose(0),
double extremeClose(0),
bool found(false),
int ix(0),
int saveindex(0),
double x(0),
string FormatString(""),
string RangeRowHeaderText(""),
string Txt("");

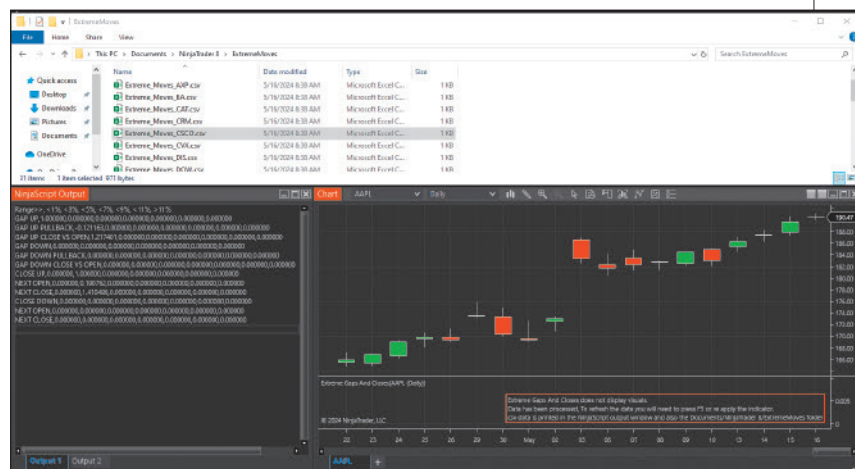
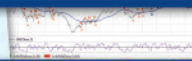


FIGURE 8: NINJATRADER. Users can explore price behavior in stocks surrounding the open and close.



```
arrays:
double thresholds[7](0),
double freq[7](0),
double gapfrequp[7](0),
double gapfreqdown[7](0),
double gapup[7](0),
double gapdown[7](0),
double gapuppb[7](0),
double gapdownpb[7](0),
double gapupclose[7](0),
double gapdownclose[7](0),
double closefrequp[7](0),
double closefreqdown[7](0),
double closeup[7](0),
double closedown[7](0),
double nextopenup[7](0),
double nextopendown[7](0),
double nextCloseup[7](0),
double nextClosedown[7](0);

method void WriteData( string pTitle )
variables:
  string OutTxt;
begin
  OutTxt = string.Format( pTitle + "", + FormatString,
    freq[1],
    freq[2],
    freq[3],
    freq[4],
    freq[5],
    freq[6],
    freq[7]);

  FileAppend( iFileName, OutTxt );
end;

once
begin
  x = -0.01;
  for ix = 1 to 7
  begin
    x = x + 0.02;
    thresholds[ix] = x;
  end;
end;

// GAP LOGIC
gap = open/Close[1] - 1;

// opening gap higher
if gap > 0 then
begin
  found = false;

  for ix = 1 to 7
  begin
    if found = false then
    begin
      if gap < thresholds[ix] then
      begin
        found = true;
        gapfrequp[ix] = gapfrequp[ix] + 1;
        gapup[ix] = gapup[ix] + gap;
        saveindex = ix;
      end;
    end;
  end;

  if found = false then
  begin
    gapfrequp[7] = gapfrequp[7] + 1;
    gapup[7] = gapup[7] + gap;
    saveindex = 7;
  end;

  // pullback from gap higher
  gappb = Low / Open - 1;
  gapuppb[saveindex] = gapuppb[saveindex] + gappb;

  // close relative to gap open
  gapclose = Close / Open - 1;
  gapupclose[saveindex] = gapupclose[saveindex] + gapclose;
end;

// opening gap lower
if gap < 0 then
begin
  found = false;
  for ix = 1 to 7
  begin
    if found = false then
    begin
      if gap < 0 and AbsValue(gap) < thresholds[ix] then
      begin
        found = true;
        gapfreqdown[ix] = gapfreqdown[ix] + 1;
        gapdown[ix] = gapdown[ix] + gap;
        saveindex = ix;
      end;
    end;
  end;

  // upward pullback from gap lower
  gappb = High / Open - 1;
  gapdownpb[saveindex] = gapdownpb[saveindex] + gappb;

  // Close relative to gap open
  gapclose = Close / Open - 1;
  gapdownclose[saveindex] = gapdownclose[saveindex]
    + gapclose;
end;

// EXTREME CLOSE LOGIC
extremeclose = Close / Close[1] - 1;

// extreme Close higher
if extremeclose > 0 then
begin
  found = false;

  for ix = 1 to 7
  begin
    if found = false then
    begin
      if extremeclose < thresholds[ix] then
      begin
        found = true;
        closefrequp[ix] = closefrequp[ix] + 1;
        closeup[ix] = closeup[ix] + extremeclose;
        saveindex = ix;
      end;
    end;
  end;

  // next open and Close
  nextopenup[saveindex] = nextopenup[saveindex]
    + Open / Close[1] - 1;
  nextcloseup[saveindex] = nextcloseup[saveindex]
    + Close / Close[1] - 1;
end;
```

```
// extreme Close lower
if extremeclose < 0 then
begin
    found = false;

    for ix = 1 to 7
    begin
        if found = false then
        begin
            if absvalue(extremeclose) < thresholds[ix] then
            begin
                found = true;
                closefreqdown[ix] = closefreqdown[ix] + 1;
                closedown[ix] = closedown[ix] + extremeclose;
                saveindex = ix;
            end;
        end;
    end;
end;

// next open and close
nextopendown[saveindex] = nextopendown[saveindex]
+ Open / Close[1] - 1;
nextClosedown[saveindex] = nextclosedown[saveindex]
+ Close / Close[1] - 1;
end;

once( LastBarOnChartEx )
begin
    FormatString = "{0:F2},{1:F2},{2:F2},{3:F2},";
    FormatString += "{4:F2},{5:F2},{6:F2}" + NewLine;

    RangeRowHeaderText = "Range>>,<1%,<3%,<5%,<7%,";
    RangeRowHeaderText += "<9%,<11%,>11%" + NewLine;

// GAPS UP
FileAppend( iFileName, RangeRowHeaderText );
Txt = string.Format( "GAP UP," + FormatString,
gapfrequp[1],
gapfrequp[2],
gapfrequp[3],
gapfrequp[4],
gapfrequp[5],
gapfrequp[6],
gapfrequp[7]);

FileAppend( iFileName, Txt );

for ix = 1 to 7
begin
    freq[ix] = 0;
    if gapfrequp[ix] <> 0 then
        freq[ix] = 100 * gapuppb[ix] / gapfrequp[ix];
    end;

    WriteData( "GAP UP PULLBACK" );

for ix = 1 to 7
begin
    freq[ix] = 0;
    if gapfrequp[ix] <> 0 then
        freq[ix] = 100 * gapupclose[ix] / gapfrequp[ix];
    end;

    WriteData( "GAP UP CLOSE VS OPEN" );

// GAPS DOWN

FileAppend( iFileName, NewLine + RangeRowHeaderText );

Txt = string.Format( "GAP DOWN," + FormatString,
```

	A	B	C	D	E	F	G	H
1	Range>>	<1%	<3%	<5%	<7%	<9%	<11%	>11%
2	GAP UP	1573	369	35	12	6	1	6
3	GAP UP PULLBACK	-0.94	-1.59	-2.73	-2.43	-4.88	-5.82	-5.56
4	GAP UP CLOSE VS OPEN	0.09	0	-0.5	0.29	0.53	1.26	1.08
5								
6	Range>>	<1%	<3%	<5%	<7%	<9%	<11%	>11%
7	GAP DOWN	1326	330	44	10	1	1	2
8	GAP DOWN PULLBACK	1.01	1.36	2.57	3.64	2.57	4.18	7.81
9	GAP DOWN CLOSE VS OPEN	-0.04	-0.17	-0.71	1.02	0.44	-16.38	1.26
10								
11	Range>>	<1%	<3%	<5%	<7%	<9%	<11%	>11%
12	CLOSE UP	965	748	153	45	8	3	6
13	NEXT OPEN	0.17	0.49	1.3	2.22	4.83	6.66	17.43
14	NEXT CLOSE	0.47	1.71	3.66	6.1	12.05	9.75	24.29
15								
16	Range>>	<1%	<3%	<5%	<7%	<9%	<11%	>11%
17	CLOSE DOWN	944	683	143	42	10	2	1
18	NEXT OPEN	-0.1	-0.43	-1.34	-2.37	-3.58	-14.79	-18.69
19	NEXT CLOSE	-0.46	-1.7	-4.18	-5.81	-8.11	-29	-28.79

FIGURE 9: TRADESTATION. This demonstrates sample output from the indicator applied to a 15-year daily chart of Boeing (BA).

```
gapfreqdown[1],
gapfreqdown[2],
gapfreqdown[3],
gapfreqdown[4],
gapfreqdown[5],
gapfreqdown[6],
gapfreqdown[7]);

FileAppend( iFileName, Txt );

for ix = 1 to 7
begin
    freq[ix] = 0;
    if gapfreqdown[ix] <> 0 then
        freq[ix] = 100 * gapdownpb[ix] / gapfreqdown[ix];
end;

WriteData( "GAP DOWN PULLBACK" );

for ix = 1 to 7
begin
    freq[ix] = 0;
    if gapfreqdown[ix] <> 0 then
        freq[ix] = 100 * gapdownclose[ix] / gapfreqdown[ix];
end;

WriteData( "GAP DOWN CLOSE VS OPEN" );

// CLOSE UP
FileAppend( iFileName, NewLine + RangeRowHeaderText );
Txt = string.Format( "CLOSE UP," + FormatString,
closefrequp[1],
closefrequp[2],
closefrequp[3],
closefrequp[4],
closefrequp[5],
closefrequp[6],
closefrequp[7]);

FileAppend( iFileName, Txt );

for ix = 1 to 7
begin
    freq[ix] = 0;
    if closefrequp[ix] <> 0 then
```



```
freq[ix] = 100 * nextopenup[ix] / closefrequp[ix];
end;

WriteData( "NEXT OPEN" );

for ix = 1 to 7
begin
  freq[ix] = 0;
  if Closefrequp[ix] <> 0 then
    freq[ix] = 100 * nextcloseup[ix] / closefrequp[ix];
  end;

  WriteData( "NEXT CLOSE" );

// CLOSE DOWN
FileAppend( iFileName, NewLine + RangeRowHeaderText );
Txt = string.Format( "CLOSE DOWN," + FormatString,
closefreqdown[1],
closefreqdown[2],
closefreqdown[3],
closefreqdown[4],
closefreqdown[5],
closefreqdown[6],
closefreqdown[7]);

FileAppend( iFileName, Txt );
```

```
for ix = 1 to 7
begin
  freq[ix] = 0;
  if Closefreqdown[ix] <> 0 then
    freq[ix] = 100 * nextopendown[ix]
    / Closefreqdown[ix];
  end;

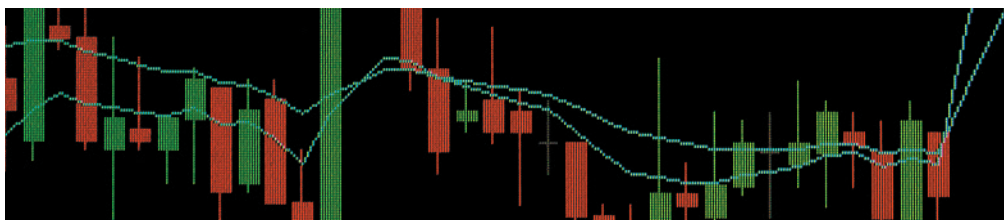
  WriteData( "NEXT OPEN" );

for ix = 1 to 7
begin
  freq[ix] = 0;
  if Closefreqdown[ix] <> 0 then
    freq[ix] = 100 * nextClosedown[ix]
    / Closefreqdown[ix];
  end;

  WriteData( "NEXT CLOSE" );
end;
```

— John Robinson
TradeStation Securities, Inc.
www.TradeStation.com

Find similar articles online at Traders.com



POSTER/TAMING THE EFFECTS OF WHIPSAW

Continued from page 14

- The scaling properties of RODC and average segment size with volatility enable improved effectiveness of the whipsaw filter.

Richard Poster, PhD, has been designing and implementing FX trading models for more than a decade along with private forex trading. He has a PhD in physics and has used the many techniques and methodologies from his experience in elementary particle physics research and later developing electronic warfare systems. He is interested in applying neural networks, fuzzy logic, fractal analysis, and quantum mechanics to forex trading models. He may be reached at raposterbnl@gmail.com.

FURTHER READING

Poster, Richard [2024]. “Taming The Effects Of Whip-

A volatility-dependent lower limit on average segment size can be included in the enhanced whipsaw filter to reduce the effects of whipsaw.

saw,” *Technical Analysis of STOCKS & COMMODITIES*, Volume 42: March.

____ [2020]. “Using Scaling Laws For The Development Of FX Trading Models,” *Technical Analysis of STOCKS & COMMODITIES*, Volume 38: February.

____ [2020]. “Using Scaling Laws For FX Trading Models: A Two-Dimensional Extension,” *Technical Analysis of STOCKS & COMMODITIES*, Volume 38: July.

Find similar articles online at Traders.com





FREE INFORMATION FROM ADVERTISERS

Advertiser	Page	Advertiser	Page
BROKERAGES			
Charles Schwab Schwab.com/Trading	15	Charles Schwab Schwab.com/Trading	15
Interactive Brokers ibkr.com/find-bonds	5	MetaStock MetaStock.com/P424	3
Ninjatrade ninjatrade.com	56	Ninjatrade ninjatrade.com	56
PUBLICATIONS			
Stocks & Commodities Store.Traders.com, Traders.com	2, 55	Stocks & Commodities Store.Traders.com, Traders.com	2, 55
SOFTWARE			
AbleSys www.ablesys.com/SCM	13		



EDITORIAL RESOURCE INDEX

OptionsAnalysis.com	6	AIQ	47
MetaTrader	9	NinjaTrader	48
Micrsoft Excel	10		
TradeStation	18		
Cboe Exchange	28		
VixCentral.com	28		
RealTest	40		
Wealth-Lab.com	41		
TradingView	43		
NeuroShell Trader (Ward Systems Group)	45		
The Zorro Project	46		



For more information about our advertisers, go to **Traders.com/reader** where you will find the alphabetized list of this month's advertisers. For reference, the list is also printed above along with the corresponding page number for each ad. Just follow the simple directions below and the advertisers will get your requests the same day!

STEP 1: Go to **Traders.com/reader** and scroll through the list of our current month's advertisers. Click the box for each advertiser you'd like to hear from. At the bottom of the list, click **Continue** when finished.

STEP 2: Fill out your contact information and click **Send Request**. Your request will then be sent to the advertisers you selected. And that's it!

TECHNICAL ANALYSIS OF STOCKS & COMMODITIES

HOW TO REACH US

For questions, address changes, or ordering information for *Technical Analysis of STOCKS & COMMODITIES* magazine and its online publications:



Toll-free 800 832-4642
(800-TECHNICAL) or:
206 938-0570.



Email us at:
circ@traders.com.



Or write to us at:
4757 California Ave. SW,
Seattle, WA 98116-4499.

Do your magazines arrive tattered and torn? Polybagging of magazines (domestic delivery) is available for \$6/year.

Single back issues from the current year (subject to availability) are \$8 prepaid. Subscribers have access to our digital archive of all past articles. Individual articles can be purchased from the Online Store at our website, Traders.com.

EDITORIAL FEEDBACK

We always want to know more about the needs of our readers: What kinds of articles would you like to see more of? What do you find useful? Address your written questions and comments to editor@traders.com or to: Editor, STOCKS & COMMODITIES, 4757 California Ave SW, Seattle, WA 98116-4499. Sorry, we cannot perform research on individual financial questions not related to this magazine and we cannot respond to all mail. Letters or emails containing questions or information that other readers may enjoy or that relate to our articles or technical analysis topics may be published in our Letters to S&C column.



Join us on Facebook at
www.facebook.com/
STOCKSandCOMMODITIES



Follow us on Twitter
@STOCKSandCOMM

To receive information on the products and services listed in the Editorial and Advertisers' Indexes, go to: Traders.com/reader. These indexes are published solely as a convenience. While every effort is made to maintain accuracy, last-minute changes may result in omissions or errors.

FUTURES LIQUIDITY

Trading liquidity is often overlooked as a key technical measurement in the analysis and selection of commodity futures. The following explains how to read the futures liquidity chart published by *Technical Analysis of STOCKS & COMMODITIES* every month.

COMMODITY FUTURES

The futures liquidity chart shown below is intended to rank publicly traded futures contracts in order of liquidity. Relative contract liquidity is indicated by the number of dots on the right-hand side of the chart.

This liquidity ranking is produced by multiplying contract point value times the maximum conceivable price motion (based on the past three years' historical data) times the contract's open interest times a factor (usually 1 to 4) for low or

very high volumes. The greatest number of dots indicates the greatest activity; futures with one or no dots show little activity and are therefore less desirable for speculators.

Courtesy of CBOT



All futures listed are weighted equally under "contracts to trade for equal dollar profit." This is done by multiplying contract value times the maximum possible change in price observed in the last

three-year period. Thus, all numbers in this column have an equal dollar value.

Columns indicating percent margin and effective percent margin provide a helpful comparison for traders who wish to place their margin money efficiently. The effective percent margin is determined by dividing the margin value (\$) by the three-year price range of contract dollar value, and then multiplying by one hundred.

STOCKS

Trading liquidity has a significant effect on the change in price of a security. Theoretically, trading activity can serve as a proxy for trading liquidity and equals the total volume for a given period expressed as a percentage of the total number of shares outstanding. This value can be thought of as the turnover rate of a firm's shares outstanding.

Trading Liquidity: Futures

Commodity Futures	Symbol	Exchange	% Margin	Effective % Margin	Contracts to Trade for Equal Dollar Profit	Relative Contract Liquidity
S&P 500 E-Mini (Jun '24)	ESM24	CME	4.9	14.5	3	>>>
Ultra T-Bond (Jun '24)	UDM24	CBOT	5.3	8	3	>
10-Year T-Note (Jun '24)	ZNM24	CBOT	2.1	8.7	10	>
5-Year T-Note (Jun '24)	ZFM24	CBOT	1.5	7.9	14	>
Ultra 10-Year T-Note (Jun '24)	TNM24	CBOT	2.8	7.7	7	>
30-Year T-Bond (Jun '24)	ZBM24	CBOT	3.7	8.5	5	>
2-Year T-Note (Jun '24)	ZTM24	CBOT	0.6	7.1	15	.....
Nasdaq 100 E-Mini (Jun '24)	NQM24	CME	5.2	11.9	2	.....
Soybean (Jul '24)	ZSN24	CBOT	2.1	4.8	5	.....
Soybean Meal (Jul '24)	ZMN24	CBOT	1	2.5	3	.....
Corn (Jul '24)	ZCN24	CBOT	6.2	7.9	15	.....
Crude Oil WTI (Jul '24)	CLN24	NYMEX	8.8	12.6	5	.....
Natural Gas (Jul '24)	NGN24	NYMEX	9.4	3.9	4	.....
Russell 2000 E-Mini (Jun '24)	QRM24	CME	3.5	17.1	6	.....
3-Month SOFR (Dec '24)	SQZ24	CME	0.1	2.2	21	.....
Gold (Jun '24)	GCM24	COMEX	4.7	15.3	4	.....
Wheat (Jul '24)	ZWN24	CBOT	6.3	6.1	7	.....
Euro FX (Jun '24)	E6M24	CME	1.7	12.9	15	.....
Silver (Jul '24)	SIN24	COMEX	7.6	17.8	4	.....
ULSD NY Harbor (Jul '24)	HON24	NYMEX	7.3	6.4	2	.....
Gasoline RBOB (Jul '24)	RBN24	NYMEX	7.5	9.9	3	.....
30-Day Fed Funds (Aug '24)	ZQZ24	CBOT	0.1	1.3	12	.....
Cotton #2 (Jul '24)	CTN24	ICE/US	8.1	8.7	7	.....
High Grade Copper (Jul '24)	HGN24	COMEX	4.6	13.5	7	.....
Sugar #11 (Jul '24)	SBN24	ICE/US	10.8	20	24	.....
Dow Futures Mini (Jun '24)	YMM24	CBOT	4.7	17.6	5	.....
Hard Red Wheat (Jul '24)	KEN24	KCBT	6.2	6.6	8	.....
S&P 500 VIX (Jun '24)	VIM24	CFE	44	26.9	12	.....
Bitcoin Futures (May '24)	BTX24	CME	25.5	32.7	1	.....
Live Cattle (Aug '24)	LEQ24	CME	3.7	9.7	9	.....
British Pound (Jun '24)	B6M24	CME	2.6	14.5	18	....
Cocoa (Jul '24)	CCN24	ICE/US	19	26.1	4	....
Coffee (Jul '24)	KCN24	ICE/US	8.2	23.9	10	....
Palladium (Jun '24)	PAM24	NYMEX	14.1	5.7	1	....
S&P Midcap E-Mini (Jun '24)	EWM24	CME	5.6	21.3	3	....
Australian Dollar (Jun '24)	A6M24	CME	2.4	13.7	23	...
Canadian Dollar (Jun '24)	D6M24	CME	1.5	10.6	25	...
Mexican Peso (Jun '24)	M6M24	CME	4.2	17.3	36	...
S&P 500 Micro (Jun '24)	ETM24	CME	4.9	14.5	30	...
Canola (Jul '24)	RSN24	ICE/CA	5.3	6.5	24	..
Crude Oil Brent (F) (Jul '24)	QAN24	NYMEX	7.3	10.7	5	..
Feeder Cattle (Aug '24)	GFG24	CME	3.5	7.8	5	..

2407

Trading Liquidity: Futures is a reference chart for speculators. It compares markets according to their per-contract potential for profit and how easily contracts can be bought or sold (i.e., trading liquidity). Each is a proportional measure and is meaningful only when compared to others in the same column.

The number in the "Contracts to Trade for Equal Dollar Profit" column shows how many contracts of one commodity must be traded to obtain the same potential return as another commodity. Contracts to Trade = (Tick \$ value) x (3-year Maximum Price Excursion).

"Relative Contract Liquidity" places commodities in descending order according to how easily all of their contracts can be traded. Commodities at the top of the list are easiest to buy and sell; commodities at the bottom of the list are the most difficult. "Relative Contract Liquidity" is the number of contracts to trade times total open interest times a volume factor, which is the greater of:

$$1 \text{ or } \exp \left(\frac{\ln(\text{volume})}{\ln(5000)} \right) - 2$$

ADVISORY SERVICES

Yes, You Can Cash In On Chaos! Certified Chaos Traders Courses teach you how. Learn to earn at <http://moneytide.com?r=s> EMini MoonTide Hotline up **267 months** in a row <http://daytradingforecasts.com?r=s>



SOFTWARE



Build and test systems without coding!

www.NeuroShell.com

TO ADVERTISE CONTACT: ESchramm@traders.com • (206) 660 8577



TRADERS' RESOURCE TOP 10 VIEWED PUBLICATIONS FOR TRADERS



Where can traders turn for market insight, trade recommendations, and education about trading and investing? Perhaps the question should be where can't you? These days, financial information is put out in print, on TV, on your smartphone, and over the Internet in various formats, but there's still nothing more readable, reliable, or researchable than a regularly published newsletter or magazine.

In the Traders' Resource section of our website, Traders.com, we present a listing of publications on a variety of subjects—printed on paper, accessed online, or delivered straight to your email inbox—that may help you improve your trading. Some publications have been around for quite a while (in fact, this magazine itself has been published since 1982), and they can be well worth the asking price for the information they deliver.

In the listing, you'll find information about each publication, such as how many years it's been published and whether it is available on the newsstand.

TRADERS' RESOURCE AT TRADERS.COM

In the Traders' Resource area you'll not only find the publications listing, but also information on other products and services in numerous other categories, such as data services, brokerages, consultants, seminars, hardware,

software, and trading systems. Just click on the Traders' Resource link. Then follow the Publications category link, or use the search feature to find products or services with specific attributes in this or other categories.



Product	Company
1. The Elliott Wave Financial Forecast	Elliott Wave International
2. The Bollinger Bands Letter	Bollinger Capital Management, Inc.
3. Technical Analysis of STOCKS & COMMODITIES	Technical Analysis, Inc.
4. The Zanger Report	ChartPattern.com
5. Traders.com Advantage	Technical Analysis, Inc.
6. Working Money, at Working-Money.com	Technical Analysis, Inc.
7. Tomorrow's Market Email	MicroMedia
8. Chaos Trader's Email	MicroMedia
9. Cash In On Chaos Newsletter	MicroMedia
10. Monthly Product Special	MicroMedia

These are the 10 publications for traders clicked on most often on the Traders' Resource website, in order of clicks received. This is not an editorial rating or ranking. For more information on specific products and services, try checking store.Traders.com for archived S&C product reviews.

The information in Traders' Resource is the most accurate at the time of posting and is subject to change. Because the vendors posting to Traders' Resource are responsible for their own listing, Technical Analysis, Inc. declines any and all liability for any representations made by the businesses and individuals listed. Nor can Technical Analysis, Inc. endorse any business or individual listed on Traders' Resource. Technical Analysis, Inc. makes no warranties, express or implied, as to the accuracy and reliability of claims herein. You agree to release Technical Analysis, Inc., together with its respective employees, agents, officers, directors and shareholders, from any and all liability and obligations whatsoever in connection with or arising from your use of Traders' Resource. If at any time you are not happy with the information posted to Traders' Resource or object to any material within Traders' Resource, your sole remedy is to cease using it. This list is updated frequently. If you are aware of a business that should be listed, please email us at Editor@Traders.com.



SUBSCRIBE OR RENEW TODAY!

Every STOCKS & COMMODITIES subscription (regular and digital) includes:

- Full access to our Digital Edition
The complete magazine as a PDF you can download.
- Full access to our Digital Archives
Every article from 1982 onward!
- Complete access to WorkingMoney.com
The information you need to invest smartly and successfully.
- Access to Traders.com Advantage
Insights, tips and techniques that can help you trade smarter.

PROFESSIONAL TRADERS' STARTER KIT

A 5-year subscription to S&C magazine that includes everything above PLUS a free* book, Charting The Stock Market: The Wyckoff Method, all for a price that saves you \$150 off the year-by-year price!

*Shipping & handling charges apply for foreign orders.

1 year	\$89 ⁹⁹
2 years	\$149 ⁹⁹
3 years	\$199 ⁹⁹

5 years \$299⁹⁹
That's around \$5 a month!

VISIT **TRADERS.COM** TO FIND OUT MORE!

NINJATRADER

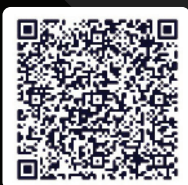
NO RISK, ALL REWARD: PRACTICE FUTURES TRADING WITH LIVE DATA

Test and tweak your futures trading strategies risk-free with **unlimited simulated trading** and live market data on our powerful, award-winning platform.



JUMPSTART YOUR TRADING JOURNEY with the leading futures broker:

- 1,000+ third-party tools, apps, and add-ons
- Education for new and experienced traders
- 100+ technical analysis tools and 24/5 live support
- Daily market prep and analysis from our pros



**BETTER FUTURES
START HERE.**

Open your free
account today.

VISIT

 NinjaTrader.com/TASC

Futures trading contains substantial risk
and is not suitable for every investor.