Volatility-Based Technical Analysis: Strategies for Trading the Invisible

Kirk Northington

With Companion Website
http://www.tradingtheinvisible.com
Kirk Northington

BIO


- The owner of Northington Trading, LLC, and the creator of MetaSwing, a MetaStock and TradeStation Add-On. He trades his own money, and uses MetaSwing technical analysis methods exclusively.

- Kirk Northington is a technical analyst. He is an associate member of the Market Technicians Association, through which he is participating in the Chartered Market Technician (CMT) Program.

- Kirk has a B.S. degree from Nicholls State University, in Thibodaux, Louisiana. He has extensive experience in control system engineering, software engineering, and project management. Kirk, his wife Faith, and his two sons live in Charlotte, North Carolina.

- kirk@metaswing.com or (910) 789-0673
The Companion Website: tradingtheinvisible.com
Goal of Volatility-Based Technical Analysis

Goal:

Identify a point where, mathematically speaking, price should not be, at that point in time;

i.e., find the true inefficiencies.
Mantra of Volatility-Based Technical Analysis

Mantra:

Money is made at the Extremes
Money is made at the Extremes
Money is made at the Extremes

2 Day Chart

20 Period Exponential Moving Average

Northington Trading  tradingtheinvisible.com
metaswing.com
How is this possible?

Volatile Measurement:

Identifies Extremes
Can I understand volatility measurement?

Yes

Volatility Measurement with:

Calculus
This Presentation:

Will pick one concept and capability and solve for it:

Trend Compensation

We will also view volatility-based support and resistance.
Money is made at the Extremes
Why is Volatility Measurement Important?

**FIGURE 1.1** In the first decade of the twentieth century, the Dow Jones Industrial Average achieved significant price gains, while direct trading of its individual equity components experienced negative volume growth.

*Data source: Reuters QuoteCenter.*

**FIGURE 1.2** By contrast, total equity options trading has increased by almost 200 percent since the year 2002.

Why is Volatility Measurement Important?

Why?

• Equity Options Trading

• VaR – Value at Risk modeling
  • Portfolio Management
  • Risk Management

• Program Trading
Why is Volatility Measurement Important?

**Brain Power**

Senior Quantitative Analyst—Salary/Rate: 300K+

Essential skills, experience, and qualifications:

- Two to four years of relevant quantitative research, or trading experience.
- PhD or equivalent degree in Math, Financial Mathematics, Physics, Engineering, or Computer Science.
- Very strong analytical, mathematical, and problem solving capabilities.
- Excellence in probability theory, stochastic processes, statistics, partial differential equations, and numerical analysis.

Experience in any of the following:

- Interest rate derivatives modeling.
- FOREX modeling.
- Credit derivatives modeling.
- Commodity modeling and research.
- Grasp of PDEs and Monte Carlo.
- Very good understanding of quantitative models for pricing and hedging derivatives.
- Outstanding C/C++ programming skills.

Quatitative mathematics focuses heavily on volatility measurement
Why is Volatility Measurement Important?

Horse Power

‘Programmatic’, ‘automated’, ‘model driven’, ‘alternative execution’: whatever you call it, algorithmic trading is reshaping the securities industry. Whether your interest is in efficient execution algorithms or advanced alpha generating models, Reuters provides a complete suite of content and technology capabilities to serve any algorithmic trading need.

 Reuters has extensively researched and evaluated the requirements of algorithmic trading firms. We are the only vendor to provide a complete suite of cohesive solutions.

tradingtheinvisible.com
metaswing.com
**Thomson Datafeeds**

For use with MATLAB® for Financial Modelling, Analysis and Application Deployment

**Key Benefits:**

- Single-point access to the largest range of quality-checked company, security and economic data
- Confidence that the decisions made using Thomson Datafeeds are based on reliable data
- Complete control over the data received and time of receipt
- Integrated reference data available, along with pricing and other securities data
- Enterprise-wide content solution
- Full integration into MATLAB® for financial modelling, analysis and application deployment

**Powering investment decisions – maximising investment returns**

To succeed in today’s competitive marketplace, effective quantitative analysis requires ready access to the broadest range of reliable, best-quality data. Thomson Datafeeds provide the answer. With independently sourced, clean data across all asset classes, Thomson Datafeeds combine superior data with flexible delivery, giving ultimate confidence and maximum return from investment decisions.

Thomson Datafeeds provide single-point access to the largest range of quality-checked data, covering historical securities data, company fundamentals, earnings estimates and economic indicators. The full breadth and depth of this timely content can now be accessed from directly within The Mathworks’ MATLAB® application.

**Highlights for Equity Based Analysis**

- Price information for companies/industries/countries has become freely available, but Thomson Financial delivers the ability to aggregate estimated earnings information for each category.
- Growth-orientated analysts can access the estimated earnings of more than 22,000 companies in over 50 countries. Value-orientated analysts can search through fundamental data on over 46,000 companies.
- Thomson Datafeeds provide access to over 360,000 micro and macro-economic time-series from all leading sources covering over 180 countries with histories dating back to 1950.

**Seamless Integration with MATLAB®**

- Instant access to Thomson content through the MATLAB® datafeed toolbox
- Integration of Thomson content, along with client proprietary content and other third-party data with the powerful numerical, computational and graphical capabilities of MATLAB®
Why is Volatility Measurement Important?

Brain Power

Senior Quantitative Analyst—Salary/Rate: 300K+

Essential skills, experience, and qualifications:

- Two to four years of relevant quantitative research, or trading experience.
- PhD or equivalent degree in Math, Financial Mathematics, Physics, Engineering, or Computer Science.
- Very strong analytical, mathematical, and problem solving capabilities.
- Excellence in probability theory, stochastic processes, statistics, partial differential equations, and numerical analysis.

Experience in any of the following:

- Interest rate derivatives modeling.
- FOREX modeling.
- Credit derivatives modeling.
- Commodity modeling and research.
- Grasp of PDEs and Monte Carlo.
- Very good understanding of quantitative models for pricing and hedging derivatives.
- Outstanding C/C++ programming skills.

Quatitative mathematics focuses heavily on volatility measurement
Why is Volatility Measurement Important?

For the first time, a comprehensive machine-readable archive of Reuters global news is available for customers seeking to develop news-based programmatic trading strategies. Events are presented exactly as they broke to the markets, with each release of information timestamped to the millisecond and tagged with an array of metadata fields for easy machine consumption.

If you’re in trading execution, access to this comprehensive global news archive will help you identify events that affect your securities, so you can better manage event risk.

If you’re looking to exploit market inefficiencies and generate alpha, it’s a unique source of insight for drawing trends, uncovering patterns and spotting correlations.

Whatever your focus, if you need to replay market moves and analyse trends to enhance your trading strategies, Reuters NewsScope Archive is your source of structured, unbiased, machine-readable news content.

Follow story development, millisecond by millisecond

Reuters NewsScope Archive lets you see every stage in a story’s development tick by tick through the day, not just the final article. Replay market behaviour, from the initial alert that hits the wire and notifies the markets of a new development, through to the publication of the
Opportunities

Take the Offensive

- Redraw the Playing Field
- Simple Volatility Measurement
- Avoid Systemic Risk
- Hidden Momentum
- True Overbought and Oversold
- Exit on Cue
Preparing to Use VBTA

TENETS OF VOLATILITY-BASED TECHNICAL ANALYSIS

Let’s first focus on some important underlying foundations that I feel are important to this form of technical analysis. Here’s what we are about to cover:

- *Discretionary or Mechanical*: Are we bound by ironclad rules, or do we use judgment?
- *Trading System Object Terms*: A hierarchy of terms used.
- *The Trend*: Important or a necessity?
- *Time frame*: Understanding your time frame within the mathematics of technical analysis.
- *Broad Market Cycle*: Its influence on your trading.
- *Minimum Time in Market*: Making market exposure a primary consideration.
- *Analysis by Cross-Verification*: Achieving high probability decisions.
### PART TWO: Seeing the Invisible

#### CHAPTER 4: New Volatility Indicator Design

- Volatility Unmasked...56
- Standard Deviation...57
- Example: Volatility Based Support and Resistance...61
- Average True Range...66
- Molding a Volatility-Based Indicator...69
- The Whole Picture...83
- Building Blocks...86

#### CHAPTER 5: Integrated Volatility Indicator Design

- Volatility Pointed Forward...87
- Projected Implied Volatility...90
- More from the Math Toolbox...101
- Using Tools to Leverage TTI ATR Extreme...107
- Development Efficiency...114
- Inventing Wheels: You're Not Alone...115
- Onward...126
What is Volatility?

Concept . . . Not a Specific Measurement

• “In truth volatility is more of a concept applied to whatever the task at hand needs it to be. So conceptually volatility as it applies to a tradable instrument is just a measurement of an instrument’s price, in terms of rise or fall, within a given time frame.”

• Used to project an extreme that might be reached, within a reasonable probability

• Most commonly expressed with Standard Deviation
What is Volatility?

**Historical and Implied**

- **“Historical Volatility”** (also referred to as Statistical Volatility) is a measure of movement within a given period of time. Historical volatility is normally measured using forms of standard deviation and is expressed in terms of percent.

- **“Implied Volatility”**: A measure of possible, or ‘expected’ movement of the underlying stock’s price, as projected forward through time, expressed as a percentage. It is created by any of many options pricing models. These pricing models utilize all known options trading factors, in addition to the actual current trading price of the option’s premium.”
Option Pricing

**Historical**

- Option Type—call or put
- Interest Rate
- Dividends
- Strike Price
- Time to Expiration
- Underlying Stock Price

**Implied**

- Option Type—call or put
- Interest Rate
- Dividends
- Strike Price
- Time to Expiration
- Underlying Stock Price

**FIGURE 5.1** This is an example of theoretical option pricing.

**FIGURE 5.2** Here is an illustration of deriving implied volatility.
Basic Forms of Volatility Measurement

- Standard Deviation
- Average True Range
- Percentage
- Mean (or Average)
- Linear Regression
- Standard Error
- R Squared
- Variance
Volatility Measurement is Simple as 1 - 2 - 3

**Standard Deviation (20)**

1. Difference between Close and moving average

2. Square it **(Key Step)**

3. Add the most recent 20 of these, and calculate square root.

\[ \text{Stdev}(C, 20) \]
Average True Range

It is the greatest of:

- The distance from today’s high to today’s low.
- The distance from yesterday’s close to today’s high.
- The distance from yesterday’s close to today’s low.

\[ \text{ATR}(C, 14) \]
Linear Regression

**Most Efficient – Least Squares**

1. Difference between price and theoretical line, then square it.

2. Add up all the squared values

3. Redraw the line so that the sum of the squared values is lower.
   (lather, rinse, repeat)

\[ \text{LinearReg}(C, 20) \]
Predictive Qualities

Basic Forms of Volatility Measurement

- Standard Deviation
- Average True Range
- Percentage
- Mean (or Average)
- Linear Regression
- Standard Error
- R Squared
- Variance

Forward Predictive Value = 2 to 5 Periods

- Are Fractal and therefore Chart Periodicity independent
- Dependent on lack of conflicting / overriding fundamental news; as is all TA
- Amplified by Trend
- Design specific components for specific purposes
Specific Purpose

Basic Forms of Volatility Measurement

- Standard Deviation
- Average True Range
- Percentage
- Mean (or Average)
- Linear Regression
- Standard Error
- R Squared
- Variance

Trend Compensated

OverSold / Overbought Detection
Northington RSIV

Two Day Chart

TTI Fabric LR

Northington RSIV (40,30)

Relative Strength Index (14)
Northington RSIV

[Copyright Kirk Northington, Northington Trading, LLC. All rights reserved]

{User Inputs}
pds1:= Input("Lookback", 2, 1000, 30);
pds2:= Input("Linear Regression Periods", 2, 1000, 40);
pds3:= Input("ATR Periods", 2, 1000, 7);
Upper:= Input("Upper Threshold", 50, 99, 70);
Lower:= Input("Lower Threshold", 1, 59, 30);

(Express the prevailing trend)
x1:= (C - LinearReg(C, pds2));

(Trend Compensation)
x2:= If(x1 > Ref(x1, -1), 1, 0);
x3:= If(x1 > Ref(x1, -1), x1 - Ref(x1, -1), 0);
x4:= If(x1 < Ref(x1, -1), 1, 0);
x5:= If(x1 < Ref(x1, -1), Ref(x1, -1) - x1, 0);
x6:= Sum(x3, pds1) * Sum(x2, pds1);
x7:= (Sum(x5, pds1) * Sum(x4, pds1)) + .00001;
x8:= 100/(1+(x6/x7));

(Volatility threshold calculation)
x9:= (ATR(pds3) / Mov(C, pds3, E)) * 100;
x10:= x9 - LinRegSlope(x9, pds2);

(Plot the indicator)
Upper + x10;
Upper;
x8;
{Fml("Northington RSIV Fast");}
Lower;
Lower - x10;
Example

![Chart Image]

Entry bar

Exit bar

S&P 500

Resistance

Northington Trading

tradingtheinvisible.com

metaswing.com
Required Capabilities

Capabilities of a VBTA Trading System

- Oversold and Overbought
- Trend Detection
- Broad Market Integration
- Support and Resistance
- Historical Volatility
- Implied Volatility
- Multi-Timeframe Verification
The Framework

Capabilities of a VBTA Trading System

- Oversold and Overbought
- Trend Detection
- Broad Market Integration
- Support and Resistance
- Historical Volatility
- Implied Volatility
- Multi-Timeframe Verification

<table>
<thead>
<tr>
<th>Capabilities</th>
<th>Components</th>
<th>TTI ATR Extreme</th>
<th>TTI Fabric SD</th>
<th>TTI Fabric Ratio LR-SD</th>
<th>TTI RSIV-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Oversold / OverBought</td>
<td>Trending</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-Trending</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>TTI Trend Entry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Trend Detection</td>
<td>Trending</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-Trending</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TTI Trend Entry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Broad Market Integration</td>
<td>Trending</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-Trending</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TTI Trend Entry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Support and Resistance</td>
<td>Trending</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-Trending</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TTI Trend Entry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Historical Volatility</td>
<td>Trending</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-Trending</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>TTI Trend Entry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Implied Volatility</td>
<td>Trending</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-Trending</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TTI Trend Entry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Multi Time Frame Verification</td>
<td>Trending</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-Trending</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TTI Trend Entry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

tradingtheinvisible.com
metaswing.com
Volatility-Based Trading Bands  (N Bands)

N Bands are calculation of price volatility.

They represent an extreme level of support and resistance on a chart.

When price approaches the N Bands a reversal, or at least a pause is likely.

Higher significance when volatility is higher.
Volatility-Based Support and Resistance (S/R) Lines

Daily Chart

S/R 5 = 33.83

Hourly Chart

S/R 6 = 33.89
Volatility-Based Support and Resistance (S/R) Lines
Other Examples
Other Examples
Other Examples
Other Examples
Live Charts of Your Choice
Volatility-Based Technical Analysis

Kirk Northington

- www.tradingtheinvisible.com
- www.metaswing.com
- kirk@metaswing.com or (910) 789-0673
Volatility-Based Technical Analysis: Strategies for Trading the Invisible

Kirk Northington

With Companion Website
http://www.tradingtheinvisible.com