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Submission and Style Instructions

1. All submitted manuscripts must be original work that is not under submission at another journal or under consideration for publication in another form, such as a monograph or chapter of a book. Authors of submitted papers are obligated not to submit their paper for publication elsewhere until the *Journal of Technical Analysis* renders an editorial decision on their submission. Further, authors of accepted papers are prohibited from publishing the results in other publications that appear before the paper is published in the Journal of Technical Analysis, unless they receive approval for doing so from the editor. Upon acceptance of the paper for publication, we maintain the right to make minor revisions or to return the manuscript to the author for major revisions.

2. Authors must submit papers electronically in Word (*.doc) format with figures (charts) in *.jpg or *.bmp format to the editor, Charles D. Kirkpatrick, (kirkco@capecod.net). Manuscripts must be clearly typed with double spacing. The pitch must not exceed 12 characters per inch, and the character height must be at least 10 points.

3. The cover page shall contain the title of the paper and an abstract of *not* more than 100 words. The title page should not include the names of the authors, their affiliations, or any other identifying information. That information plus a short biography including educational background, professional background, special designations such as Ph.D., CMT, CFA, etc., and present position and title must be submitted on a separate page.

4. An acknowledgement footnote should *not* be included on the paper but should also be submitted on a separate page.

5. The introductory section must have no heading or number. Subsequent headings should be given Roman numerals. Subsection headings should be lettered A, B, C, etc.

6. The article should end with a non-technical summary statement of the main conclusions. Lengthy mathematical proofs and very extensive detailed tables or charts should be placed in an appendix or omitted entirely. The author should make every effort to explain the meaning of mathematical proofs.

7. *Footnotes*: Footnotes in the text must be number consecutively and typed on a separate page, double-spaced, following the reference section. Footnotes to tables must also be double-spaced and typed on the bottom of the page with the table.

8. *Tables*: Tables must be numbered with Roman numerals. Please check that your text contains a reference to each table. Indicate with a notation inserted in the text appropriately where each table should be placed. Type each table on a separate page at the end of the paper. Tables must be self-contained, in the sense that the reader must be able to understand them without going back to the text of the paper. Each table must have a title followed by a descriptive legend. Authors must check tables to be sure that the title, column headings, captions, etc. are clear and to the point.

9. *Figures*: Figures must be numbered with Arabic numerals. All figure captions must be typed in double space on a separate sheet following the footnotes. A figure's title should be part of the caption. Figures must be self-contained. Each figure must have a title followed by a descriptive legend. Final figures for accepted papers must be submitted as either *.jpg or *.bmp files.

10. *Equations*: All but very short mathematical expressions should be displayed on a separate line and centered. Equations must be numbered consecutively on the right margin, using Arabic numerals in parentheses. Use Greek letters only when necessary. Do not use a dot over a variable to denote time derivative; only D operator notations are acceptable.

11. *References*: References to publications in the text should appear as follows: "Jensen and Meckling (1976) report that …."

    References must be typed on a separate page, double-spaced, in alphabetical order by the leading author's last name. At the end of the manuscript (before tables and figures), the complete list of references should be listed *in the formats that follow*:

    For monographs or books:

    Fama, Eugene F., and Merton H. Miller, 1972, The Theory of Finance (Dryden Press, Hindsdale, IL)

    For contributions to major works:

    Grossman, Sanford J., and Oliver D. Hart, 1982, Corporate financial structure and managerial incentives, in John J. McCall, ed.: The Economics of Information and Uncertainty (University of Chicago Press, Chicago, IL).

    For Periodicals:

    Jensen, Michael C., and William H. Meckling, 1976, Theory of the firm: Managerial behavior, agency costs and ownership structure, *Journal of Financial Economics* 3, 305-360.

    Please note where words are CAPITALIZED, *italics are used*, (parentheses) are used, order of wording, and the position of names and their order.

Letter from the Editor

Between the lack of a Dow Award and the personnel turnover at the MTA, the *Journal* was somewhat hamstrung this year and will have only one issue, the current one. Nevertheless, the CMT III paper requirement, which was disbanded this fall, produced some interesting work, as did some submissions for the Dow Award. The project of compiling, arranging, and producing the *Journal* has passed to Tim Licitra for the first time, and as you will see, he has done a marvelous job.

In this issue, we have included a more complete description of the style requirements for submission of papers. It is based on the requirements for the *Journal of Finance* and appears to be the most reasonable and least complicated. Anyone wishing to submit a paper please follow the style instructions, otherwise we will have to return the paper to you for revision.

For the current issue, a larger one than usual to account for the missing half-year issue, we have seven excellent papers that should get your brain cells stimulated. John Jonelis shows us the advantages of using Monte Carlo simulations in testing systems and what can be inferred from the results. He has made the subject considerably less painful to understand than most textbooks on the subject. Jeff Cheah introduces an interesting method of sentiment evaluation using option premiums in the FOREX market. He uses "risk reversals," a concept I have not seen used in the equity markets. Andrew Hyer looks at group action in the stock market to see if, on a contrary basis, it tells us anything about the potential direction for the stock market. Our old and dear friend, former editor of the *Journal*, Professor Hank Pruden, provides us with the final paper in a series he has been publishing over the last several issues. He describes the three basic requirements for a successful technical trading system. The use of volume in point-and-figure charts has always been a problem, perhaps not for the purists who believe it is irrelevant, but certainly for practical analysts of point-and-figure price action. Frank Testa provides us with a new look at how to integrate volume into P&F analysis with excellent risk to reward results. Unfortunately, we cannot do justice to his chart presentations because we cannot print in color. Professor Tokic is a newcomer to this *Journal* and writes about the rewards and risks inherent in timing momentum and contrarian strategies. Finally, Cory Venable, attacks the age-old problem of too many whipsaws in moving-average cross-over systems by using translation filters. Interesting stuff.

Charles D. Kirkpatrick II, CMT, Editor

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MTA Member

Member category is available to those "whose professional efforts are spent practicing financial technical analysis that is either made available to the investing public or becomes a primary input into an active portfolio management process or for whom technical analysis is a primary basis of their investment decision-making process." Applicants for Membership must be engaged in the above capacity for five years and must be sponsored by three MTA Members familiar with the applicant's work.

MTA Affiliate

MTA Affiliate status is available to individuals who are interested in technical analysis and the benefits of the MTA listed below. Most importantly, Affiliates are included in the vast network of MTA Members and Affiliates across the nation and the world providing you with common ground among fellow technicians.

Dues

Dues for Members and Affiliates are $300 per year and are payable when joining the MTA and annually on July 1st. College students may join at a reduced rate of $50 with the endorsement of a professor. Applicants for Member status will be charged a one-time application fee of $25.

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- receive the *Journal of Technical Analysis,* bi-annually
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Alternate Histories: *A Visual Comparison of Randomness*

John Jonelis

1

Purpose

When evaluating a rule-based trading strategy, a backtest can demonstrate what *would have happened* over a slice of history, but not the many things that *could have happened* if events had unfolded differently. These are the alternate histories. They foreshadow how far actual trade results might stray from expectations. Unfortunately, this kind of analysis has been obscure and inaccessible—bogged down in the rigors of Statistics or the arcane workings of the Monte Carlo simulation. But for traders accustomed to pattern-recognition, a simple set of visual cues can transform these disciplines into intuitive tools.

A Trader's Story

To gain an appreciation of the need, let us put ourselves in the shoes of a green trader and a first-time system developer. Consider the following hypothetical situation:

You have $10,000 set aside and want to try your hand at active trading. You attend a session put on by Tremendous Trading Seminars LLC, for which you pay $1,000, plus $500 for travel, hotel, and meals. The speaker, Mr. X, is a dynamic fellow who has been extremely successful day-trading Fish Head Futures, an important commodity in the pet food processing industry. He started in 1995 with $10 thousand in capital, just like you, and by Y2K, had parlayed it into $10 million. He's laid out his system test and all his trading rules in a flashy 150 page manual that comes with special software and two weeks free access to an exclusive Internet chat room—all for the one-time-only special low price of $4,000. It's called *System X*. Naturally, you buy it.

Your package arrives overnight express. You install the software and read the manual cover-to-cover three times. A couple weeks later, you've completed all the exercises and feel you have a handle on the system. The thing can't miss—you call your boss and quit your job.

You log onto the *System X* Internet chat room, register for the trial subscription, and start paper trading. It goes well and you find the interaction with other members exhilarating. After a week, it's clear you could be earning some serious cash, and you regret wasting your time trading Monopoly™ money. That profit could have been real, and after all, you won't be getting a paycheck this Friday. So you take the plunge. You start trading real money.

Monday you make $1,000 and feel like a king. Three more days like this and you will have paid for the course. You call your mom and tell her she can stop worrying—you're finally a success. You e-mail all your friends.

Tuesday, you lose $600. It's a choppy trendless day and everybody in the chat room is down. Wednesday, you lose $200 more, but you are actually profitable except for those pesky commissions, and of course, there's that *really huge trade* you missed because your IP went down momentarily. Thursday, one of the really good traders is absent from the chat room (he's at the dentist) and you lose $1,600 due to whipsaw market action—but that could happen to anybody. On Friday, you make $400, ending the week on a positive note. An email arrives announcing the end of your free chat room period and you promptly subscribe for the monthly fee of $500.

That weekend, your wife asks for an accounting, so you add it all up. You are down $7,000. You have $3,000 left.

You write a nasty email to Mr. X, attaching your trades. Mr. X points out that you are really down only $1,000 in trade revenue. The rest is just normal business expense. You need to commit more money. Then he asks why you failed to take that big trade on Wednesday, which could have netted $6,000. He admonishes you to hone your skills and success will surely follow.

On Monday, you log onto the chat room, sit on your hands, and watch. Sixty members are in the room when a big trade unfolds and many post enthusiastic comments about how much money they are making. Completely frustrated, you admit your failure to the group, and ask how everybody did the previous week. Six respond. Of those, all got their orders filled on that big Wednesday trade, but each got out at a different point. For the week, one of them reported a net total of $5,000, as he should have, and another, $5,500. But one—a very experienced and savvy trader—made $16,000. Strangely, another regular lost $2,500, which he claims was his worst week on record and nobody can understand how it happened. Another lost $3,000, and the last $3,500. So, naturally, you ask yourself WHAT'S GOING ON HERE?

You write Mr. X again, asking for his actual trades over the past month. He's a good guy, wants you to succeed, and sends the information. You drop the data into a spreadsheet, normalize his starting equity to $10,000, and generate an equity curve—a simple graph of his account growth over time. (See Figure 1 below.) Mr. X is clearly an accomplished trader.

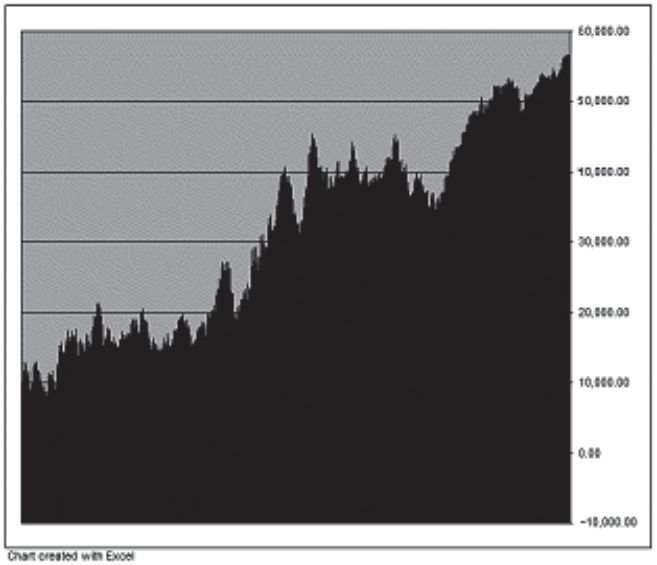


Figure 1: "Mr. X's" Equity Curve (1 Month)

Alternate Histories

Let us step away from the story and ask what else might have happened. What if different traders took their vacations at different times or became sick at different times? What if some traders didn't get their orders filled on a few

winning trades, while others missed losing trades? What if some chased entries aggressively, while others got out early or late? What if some, by instinct or design, changed position size from trade to trade? What if the commission schedule was different at various brokers, and some experienced excessive slippage? What if some trader's accounts were sufficiently capitalized while others, like yours, were not? Clearly the outcome could not be the same for each trader. In fact, the possibilities are beyond imagining. How can you even begin to collect data on so many variables? You can't. Nevertheless, such variation can be estimated, using a Monte Carlo engine (MC). MC plots alternate histories—*the many things that might have been*. Figure 2 below shows 100 alternate equity curves for System X in our story. Look at the potential variety in performance:

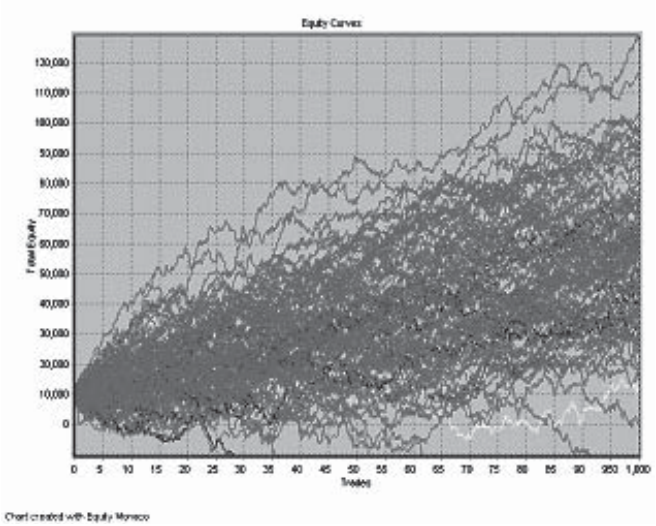


Figure 2: "System X" Alternate Equity Curves

To the world, the upper lines represent the wizards, the kings, the skilled ones who really know what they are doing. Note the paths that fall below zero. To the world, those are bums, goats, and failures. However, each path was generated using Mr. X's own trade results shown in Figure 1. They are all based on *exactly the same data*, but each curve is plotted in a different way by the MC engine. Taken together, they reveal more about the nature of *System X* than was evident in the simple equity curve.

Mr. X's Dilemma

In our story, Mr. X is frustrated. He confides in you that some of his customers have gone broke. He does not understand why. After all, he carefully tested his strategy, and then went on to build a personal fortune trading it. He truly believes in his methods. He thinks those losing traders need to practice their entry/exit technique, and even suspects that some of them lack the proper psychological makeup to be successful traders. He may be right on those points, but he is missing the main reason for the variation in performance among his customers. If he had run an MC simulation after his backtest, he would have seen a high degree of randomness inherent in his strategy. It may have given him pause; *he might never have traded his strategy and made all that money*. We now know that because of the variation built into his system, he could just as easily have gone broke.

There are a large variety of trading strategies in use today, some commercially available, others written for hedge funds, quant shops, or by independent traders for their personal use. Some are rule-based, but rely partially on a trader's skill, like *System X*. Others are more methodical. Platforms exist that identify and place trades automatically, entirely separating the human from the process. However, no matter how mechanical, each strategy has a degree of randomness. The question is not whether or not the system is random, but rather, how random is the system. MC answers that question, but until recently, its use has been shrouded in mystery.

Monte Carlo De-Mystified

In the movie *The Blues Brothers* Jake Blues, facing the muzzle of an assault rifle, blurts out a list of increasingly outrageous and contradictory excuses for jilting his fiancé. "I ran out of gas; I had a flat tire; I didn't have enough money for cab fare; my tux didn't come back from the cleaners; an old friend came in from out of town; somebody stole my car; there was an earthquake—a terrible flood; *locusts*."

Clearly, an MC engine lacks the imagination to fabricate such scenarios. Instead, it uses a simple method: Net trade results are fed in. A random number generator scrambles the sequence of trades. The process is repeated many times, with replacement, resulting in an array of possible equity lines. *Simple*. In this way, MC gives a rough measure of what *could* have happened, but did not. It *estimates* the degree of randomness in a system.

Reading Monte Carlo

MC is used throughout industry—an established tool, waiting on the shelf. Until recently, it has been technically obscure and inaccessible to the bulk of the trading community. Some are unaware of it, some afraid of its complexity. Others consider it a "brute force" approach, and believe it inferior to more elegant mathematics. Some object that it treats each outcome as an independent event, assuming no serial dependency. Some rightly point out that it has been used in overly precise ways to reach highly sophisticated and spectacularly wrong conclusions.

Keeping in mind that an MC study is no more than an estimate, I would like to steer around all the complexity and get at the basic power of the tool. I will demonstrate a visual approach, painted with a broad brush, and keep calculations to a minimum. I will suggest five basic steps in reading MC, and assign descriptive names (rather than technical ones) to help the concepts stick. Each illustration represents actual trade results from well-known, mechanical trading systems. (The system names are omitted.)

Rules of the Game

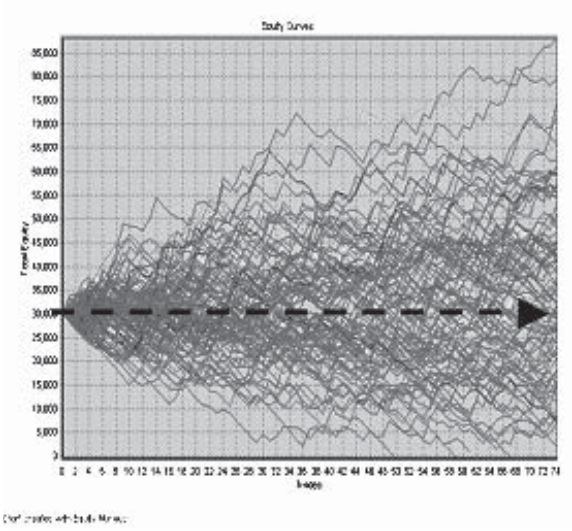
For our comparisons to be meaningful, we will follow two simple rules: 1.) Any two backtests will be compared across the same amount of time. 2.) Each MC test will use the same number of trades as the backtest from which it is derived. (See procedure.) To allow for individual creativity, the rest is left open.

To demonstrate the accessibility of the tool, each MC test is performed using the Equity Monaco package, which at time of writing is free to download. For input, Equity Monaco uses a net dollar result per trade. Sophisticated packages are available for sale, some using percent change, random day of entry, or other approaches. Each has its advantages. The same simulations can be run in Excel or another spreadsheet program.

Five Visual Steps

Slope–In Figures 3a and 3b, the approximate Mean or Expectancy is superimposed on the MC distribution for clarity. The slope of the Mean for

one strategy (3a) is flat to slightly negative, while the other (3b) is positive. A positive slope implies that *on average*, traders using that strategy will make money. As can be clearly seen in the MC plot, a positive slope does not indicate that any single trader will be profitable—only the average of a large group. However, it is an important measure. (In our story, *System X* had a strongly positive slope. That attribute allowed Mr. X and many others to make money,



even though some did not.)

Figure 3a

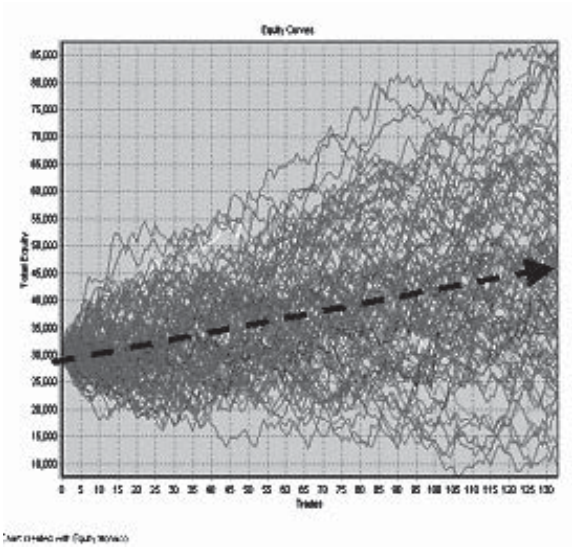


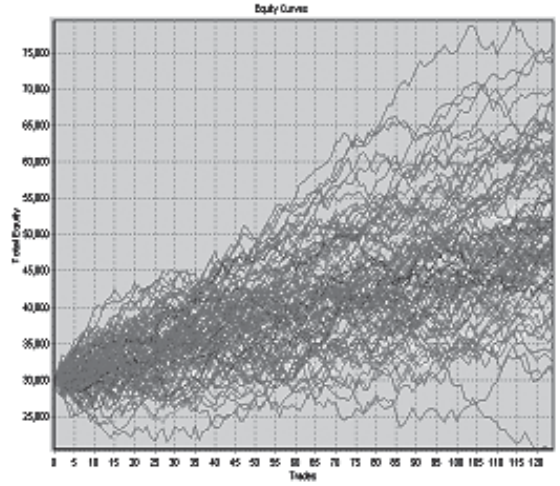
Figure 3b

A numerical value for Slope can be derived by using the original data to calculate the rise over the run. Divide the equity gain (Δe) by calendar days (t) and compare.

If $(\Delta e/t)_a < (\Delta e/t)_b$ then "b" is better. Because our "rules of the game" dictate that we run both tests across the same time period, the variable "t" will cancel out of the equation, leaving

$(\Delta e)_a < (\Delta e)_b$ which can be interpreted directly from the MC plot.

Spread–Figure 4a and 4b visually compare the random nature of one strategy to that of another. This is quite literally, a picture of risk. A wide spread implies widely diverse outcomes, while the tightly clustered distribution is less random. (*System X*'s spread is wide, which explains the wild



variation in results.)

Figure 4a

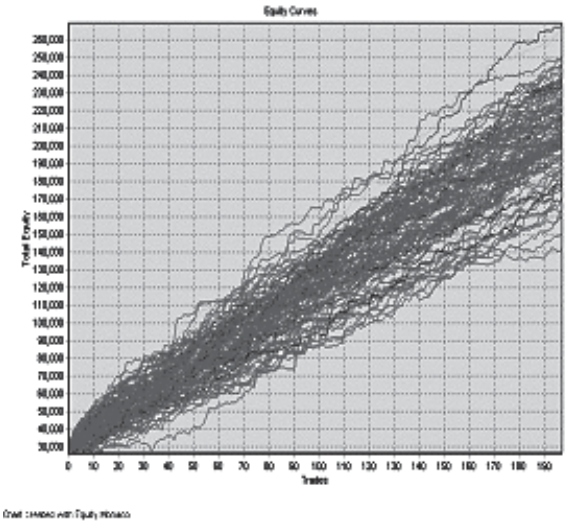


Figure 4b

Spread is also used to determine the minimum initial capital needed to trade a system, by finding an entry level at which no paths lead to ruin. This is visually apparent on the MC display. If a path has led to ruin. Re-run the test with a larger initial equity.

Given sufficient iterations, the lines at the extremes will approximate the third standard deviation of final equity from the original data (**3σ**) or ultimately, the largest gain (or loss) multiplied by the total number of trades. These are unlikely but possible events, and perhaps an analogy is in order. *It is not safe to venture across the ocean in a rowboat. On the other hand, an unexpected iceberg can sink even the Titanic*.

If the Y-axis for each plot has a similar range, the comparison of Spread can be performed visually. However, there are exceptions. As shown in Figures 4a and 4b, the computer program will auto-scale the Y-axis, and the scale of one chart can be significantly different from the other, making the comparison misleading. Double check using simple arithmetic. Take the difference between the terminal mean value "**e**" and the worst terminal value "**w**" and divide the result by "**e**" as in **(e-w)/e**. Approximate numbers from the charts will do. This gives downside risk as a ratio. For "**a**" it's about **0.7**, while for

"**b**" it's **0.3**. The smaller number is better, in this case, "**b**," confirming the visual pattern in Figures 4a and 4b.

Statisticians take a different slant on what I have termed Spread, calculating the Relative Efficiency using the variance (σ^2) of each set of original data. For example, given the two systems shown (Figures 4a and 4b), calculate the ratio (σ_b^2/σ_a^2). If **eff(a,b) < 1**, then "**b**" is better, confirming the visual interpretation. This calculation also makes a number of other statistical comparisons possible, but if the Y-axis is similar for each, a visual comparison is more intuitive and compelling.

Scatter–the figures below display one plot (Figure 5a) with little or no discernable grouping of paths, and another (5b) more weighted to the center. A scattered distribution implies that one outcome is nearly as likely as another, (as in *System X*). There is also a higher probability of outliers beyond the plotted range—a possibility not frequently considered. A clustered grouping, on the other hand, implies a statistical distribution, however skewed, with some outcomes much more likely than others. It is less random. Statisticians refer to this phenomenon as *Kurtosis*.

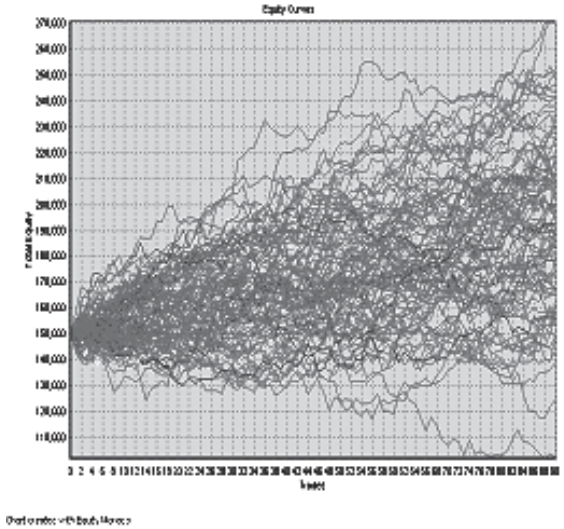


Figure 5a

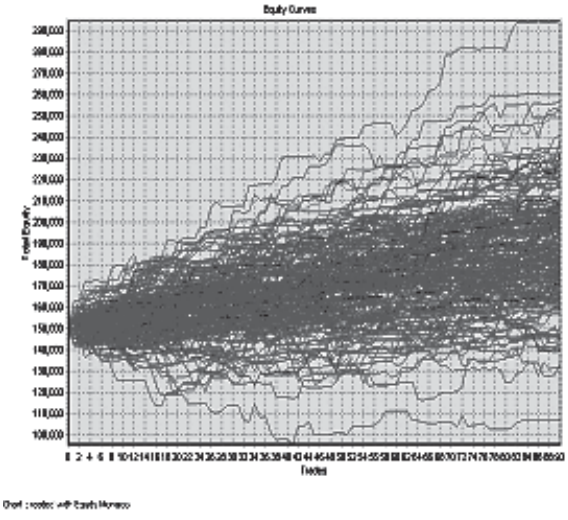


Figure 5b

Streak–a backtest package will report the largest streak of consecutive losing trades *encountered during the test*. MC can go further, estimating the largest streak that *might have occurred*, and then plot the outcomes by percentile. How this information is used depends upon an individual's tolerance for risk. As a rule of thumb, consider the number of consecutive losses posted at the 95th percentile. The strategy in Figure 6a below returned fourteen consecutive losses while 6b only five. Obviously, the fewer, the better.

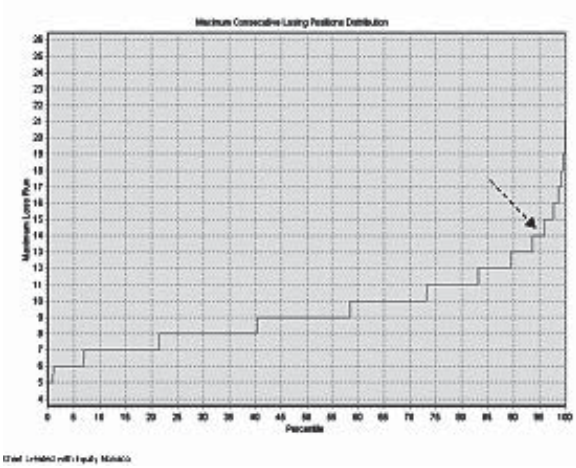


Figure 6a

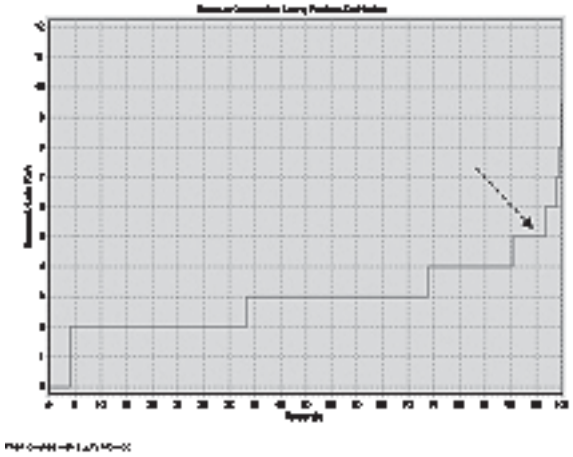


Figure 6b

For a clear comparison, verify that the number of trades is somewhat similar, as is the case for Figures 6a and 6b. Some strategies intentionally rely on many small losses, offset by a few large gains. To assess such strategies, multiply the number of consecutive losses by the average size of a loss, and weigh that in light of your personal tolerance for risk.

Shape–Figure 7a and 7b compare position-detail charts that provide a visual overview or *shape* of each strategy by plotting the number of occurrences of every trade outcome. Consider the area under the curves in relation to the zero line. 7a is skewed negative, while 7b is skewed positive. The more

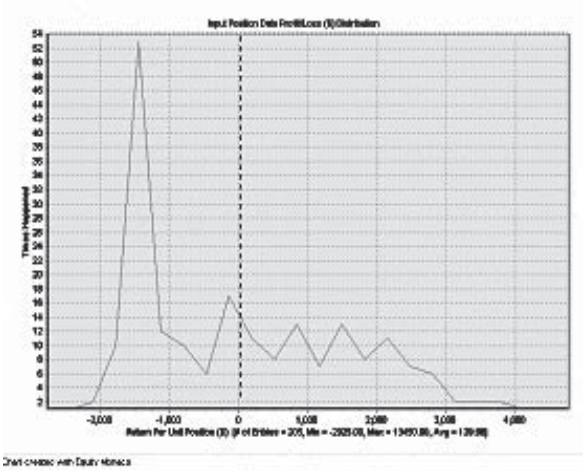


Figure 7a

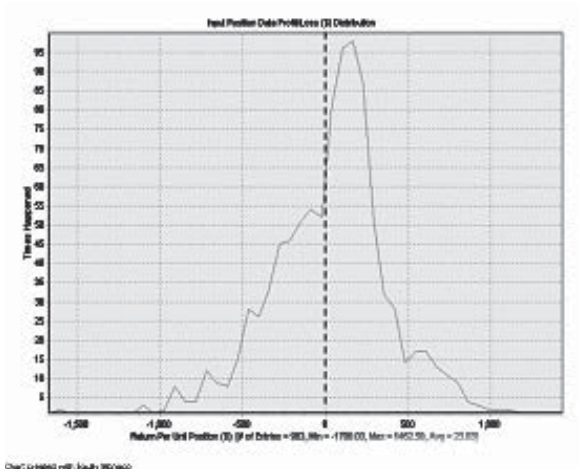


Figure 7b

results to the right of zero, the better.

Another system's shape may tightly hug the zero line, demonstrating that it depends on small gains and is easily overwhelmed by commissions and slippage. On the other hand, a shape leaning heavily to the right of zero implies a positive average reward/risk ratio and resistance to small price swings and noise. Always check the Y-axis of each test to verify that the scales are similar.

An Application–System Y and System Z

S*lope, Spread, and Scatter, Streak, and Shape*– five visual cues. Let us create two systems and see what we can learn about them, using this simple toolbox.

The first strategy–*System Y*–tests the idea of buying on the first trading day of each month and selling on the last of each month, essentially asking the question, "How safe is it to go Long at any given time?" Any number of technical indicators could be chosen to time our entries and exits, but for this comparison, we will use our monthly rule as a proxy for all indicators. The strategy is tested on daily data from the Dow Jones Industrial Average, running from January 1915 to January 2004, a period of almost 90 years. For this test, all positions are Long 100 shares and executed at the average daily price. Currently available commissions and nominal slippage are included. Figure 8a displays the equity curve from the backtest of System Y. Figure 8b shows its MC distribution of

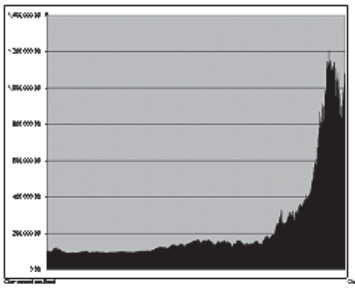


Figure 8a: System Y Equity

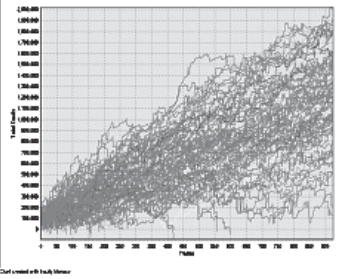


Figure 8b: System Y Alternates

alternate equity lines.

The next strategy–System Z–is identical to Y in every respect except that a Stop Loss has been added. If equity drops 8% below the purchase price for any given month, the trade is terminated, then re-entered the following month. Figure 9a below displays the equity curve from the backtest of System Z. Figure 9b displays its MC distribution of alternate equity lines.

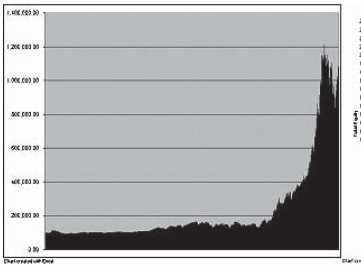
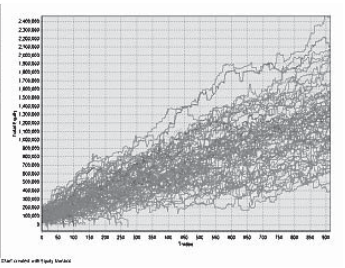


Figure 9a: System Z Equity Figure



9b: System Z Alternates

Comparison–Both strategies survived the Great Depression, the malaise of the 70's, and the Internet bubble. Both had an average annualized return slightly better than 11%, with significant gains occurring after 1982. Both had reward/risk ratios better than 1.0 and both were on the right side of the trade more than 50% of the time. The *Shape* for each (not shown) was virtually identical. The *Streak* for both (not shown) was 10 consecutive losses.

Now compare Figure 8a to Figure 9a. Note that the backtested equity curves for Systems Y and Z are virtually indistinguishable. But Figures 8b and 9b demonstrate that the MC distributions are quite different. *Slope* and *Scatter* are about the same. However, *System Z* displays a significantly narrower *Spread*. Z's distribution is actually quite tight and fewer paths lead to ruin. The stop loss made it more predictable, less random, and less risky. So, which system would one choose to take a Long position on a Dow derivative? Given a choice between *System Y* and *System Z*, one would clearly choose Z.

Analysis of System X

Now let us return to *System X*. Putting aside the viability of the Fish Head Futures market, let us ask whether the system has any technical merit. Referring to Figures 1 and 2, the *Slope* is strongly positive, demonstrating that the system can make a lot of money. However, its *Spread* is wide, with a number of paths leading to ruin. In terms of *Scatter*, there is no discernible cluster about the mean, making it relatively unpredictable. Its *Streak* of consecutive losses is eleven, but its *Shape* (not shown) is strongly positive. The system is high-risk/high-reward, with a significant probability of loss and a much greater probability of profit. Some may say that trading such a strategy is gambling,

but consider that the odds are slanted toward the player.

System X may have merit if the risk can be managed. The common approach is total commitment, hoping for a few initial good years. However, a glance at the MC distribution warns that this is a financial form of Russian roulette. A low-risk money management strategy requires sufficient capital to implement. First, commit a small portion of the portfolio to the strategy, making sure that starting capital is above the predicted threshold of ruin (see Figure 4–*Spread*). Second, trade *System X* as one element in a group of dissimilar strategies. Third, trade across a diversified basket of non-correlated markets. Examine the MC distribution of several aggregate combinations. The optimum solution will be found in a balance of these three diversification techniques.

Conclusion

MC is a readily available tool that provides an important measure—the degree of randomness in a trading strategy. However, its utility has been hidden behind a veneer of technical obscurity. No matter how precise and sophisticated the mathematics, it is still no more than an estimate of the likely range of events. Therefore, I have proposed a simple visual method of analysis, using pattern-recognition, and have painted it with a broad brush. In this way, MC is intuitive and accessible, adding a wealth of information not evident in a system backtest. It points to the range of outcomes that *might have been*, and by extension, the range of *what might occur* in actual trading.

Limitations

In system testing, it is important to have an intuitive grounding in statistics. One needs a general feel for probability distributions, an ability to distinguish trend from noise, a way to judge the statistical significance of a price move, and a method for avoiding the phenomenon known as curve fitting. These subjects are outside the scope of this article.

The names and organizations portrayed are fictitious and any similarity to reality is entirely random. All that can be known with any degree of certainty is what actually happened, and even that is suspect. All analysis is based on assumptions, there are no guarantees, and all traders should be prepared for the unexpected. This material is not intended as investment advice. This author has been known to make errors and reach erroneous conclusions. No doubt, some of that has crept into this paper. That said, these ideas are put forward with the intention of proposing a simple but meaningful method for using an otherwise obscure tool. It is hoped that other writers will add to what has been presented.

Monopoly is a trademark of Parker Brothers Inc.

Procedure

The following procedure generates MC output like that shown in the article, using MetaStock, Equity Monaco, and Excel:

1.) ***MetaStock***
- a. Run a system test.
  - i. Run each system across exactly the same number of years.
- b. Write down the following information:
  - i. The number of trades.
  - ii. The terminal equity.
  - iii. Total profit (Equity gain).
- c. Go to the positions page. *Highlight* and *Copy* all the data (not the chart).

2.) ***Excel***
- a. Paste the data into cell "A1."
- b. In a blank cell, write an *IF statement* that will copy the trade results into a separate column:
  - i. **=if (B5="Total",H5, "")** The word "Total" should correspond to B5, while H5 should represent the net dollar result of the trade. *(The logic is as follows: If the row says "Total" then print the trade result, otherwise print blank text.)*
  - ii. Copy the formula down the column. Your trade results should appear.
- c. The data must be formatted as "-300, 450.5". If it is not, *Format* the cells as *Text*.
- d. *Copy* the column of data to the clipboard.

3.) ***Notepad***
- a. Paste the data into the *Notepad* display.
- b. *Save* the text file under a meaningful name.

4.) ***Equity Monaco*** (*TickQuest* provides a PDF file of instructions.)
- a. Settings Tab:
  - i. *Import* the text file:
    1. Under "*Position Data Source*" click the radio button labeled "*Text File.*"
    2. Click the adjacent box with the *ellipsis (...)*. Browse and select the text file that holds your data.
  - ii. Look at "*Basic Settings*" at the top-right of the page:
    1. For the analysis shown in this paper to be meaningful, the number of trades in the MC simulation must match the number of trades in the backtest.
       - a. Under "*Positions per Trial*," click the *ellipsis* to bring up the calculator.
       - b. If the "*Current # of Positions in Data Source*" matches the number of trades in your test, click "*Cancel*," and enter that number under "*Positions per Trial*."
       - c. If the number of trades is unknown, use the calculator to estimate it, as follows:
         - i. In "*Days of Trading*" enter the approximate *calendar days*.
         - ii. In "*Duration You Wish to Test*" enter the same number.
         - iii. Select the "Day" radio button.
    2. Under "*Trials*" enter a number between 100 and 1,000 if equity curves are to be generated. (If no equity curves are to be generated, enter up to 1,000,000.)
    3. Enter starting capital.
    4. Under "*Minimum Capital*" enter "0".
  - iii. Under "*Options*," click "*Enable Equity Lines*."
  - iv. Before running a simulation, click "*Clear All*" at the top left.
  - v. Click "*Start*"
- b. Tab to any chart.
  - i. Go to the "*File*" pull-down menu and select "*Copy to Clipboard*," to save the chart.

5.) ***Excel***
- a. Bring up the previous spreadsheet of data and paste the saved chart into the desired location.

Acknowledgements

These concepts have grown out of a collaboration with David Jonelis and Robert Jonelis of Project 304. Thanks also go to Erik Olson as well as the members of the Barrington Writer's Workshop.

Software

This article has made use of software, including EQUITY MONACO by TickQuest; METASTOCK PROFESSIONAL by Equis International; TELECHART 2000 by Worden Brothers; PAINT SHOP PRO by JASC Software; EXCEL and NOTEPAD by Microsoft Corporation.

Suggested Reading

STATISTICS WITHOUT TEARS, by Derek Rowntree; Scribners 1981, ISBN 0-02-404090-8

FOOLED BY RANDOMNESS, by Nassim Nicholas Taleb; Texere 2001, ISBN 1-58799-071-7.

About the Author

John Jonelis has been an artist, inventor, corporate vice president, and has served on the boards of two companies. His paintings are represented in various museums and private collections, he holds seven US patents, MBA and BFA degrees, and has been published in technical journals and websites. He is currently writing a novel while building and trading systems with his private research group, Project 304.

Risk Reversals Analysis and Evaluation: *An Option-Based Sentiment Indicator for the Foreign Exchange (FX) Markets.*

Jeff Cheah, CMT

2

Section I: Introduction

Given that buying an out-of-the-money option is a highly leveraged view (and used by both speculators and hedgers), risk reversals may be considered a valuable market sentiment indicator. Sections I & II will introduce and explain the concept of risk reversals.

In technical analysis literature, market sentiment is the term used to describe cumulative market expectations. Market practitioners employed sentiment indicators such as risk reversals data to quantify the levels of optimism or pessimism in the Foreign Exchange (FX) market. For example, a higher call to put premium ratio for a specific currency suggests that the majority of option traders expect the currency to rally. Conversely, a higher put to call premium point to higher expectation of currency depreciation.

To answer the question; Can risk reversals be used to identify buy and sell signals; this research paper will first determine if there is any correlation between risk reversals and currencies. If so, this raises the possibility that risk reversal is a potentially valuable forecasting tool. From a statistical perspective, measuring how well the regression model predicts movement in the dependent variable will help determine whether or not risk reversals can be considered a leading indicator for currency forecasts and can therefore be used to identify buy and sell signals. Section III summarizes the results from the regression analysis.

Section IV will provide some empirical evidence under very volatile conditions in the currency market and will investigate further the concept of market sentiment used in technical analysis. Particular attention is paid to extreme levels of risk reversals to determine if such occurrences would signal market turns. Section V will explore the use of some technical analysis tools. The focus will be on Bollinger Bands analysis on the assumption that risk reversals fluctuations may be contained within a statistical confidence band. The objective of this exercise is therefore to determine if risk reversals can provide reliable turning points in the currency markets.

1.1 - What are Risk Reversals?

Risk reversals are commonly used in the FX option markets to describe the strategy of buying and selling the same amount of out-of-the-money currency calls and puts (at the same exercise price). The standard and most common risk reversal contract is the 25-delta[1] option. A risk reversal is made up of two transactions that together take into consideration the implied volatility[2] of both put and call options. For example, the combination of a 25-delta currency call together with the same delta put is known as the risk reversal.

Risk reversals are calculated by taking the difference between the implied volatility on the 25-delta currency call and the same delta put, with the exact maturity date. This difference generates the risk reversal value. For example, if the one-month implied volatility on the 25-delta U.S. dollar- Japanese yen (JPY) call is 8.25%, and the one-month implied volatility on the 25-delta JPY put is 8.75%, the one-month 25-delta risk reversal on (JPY) is referred to as the 0.50 JPY put (8.75%-8.25%).

What does a one-month risk reversal of 0.50 JPY put mean? If the risk of JPY depreciation is deemed higher than an appreciation in the future, it will be highlighted in the implied volatility curve[3]. Based on this example, the implied volatility is higher for a JPY put than it is for a JPY call. The risk reversal quotation, therefore, communicates the market's bias. In this example, a 0.50 JPY put reveals a bearish inclination toward the Japanese yen.

Risk reversals can therefore bring skew information about the market expectations of future currency rate changes.

Section II: Concept

2.1 - Why use Risk Reversals?

Underlying Assumptions

The Black-Scholes[4] theory is the primary model for calculating option prices on stocks, commodities, interest rates, and foreign exchange instruments. However, not all of the underlying assumptions of the Black-Scholes theory are applicable in the FX markets. For example, it assumes that returns in the FX markets are subject to "normal distributions." In other words, if returns are distributed normally, then according to Chebyshev's theorem, 68% of the currency returns will fall within +/- 1 standard deviation of the mean, and 95% of the returns will fall within +/- 2 standard deviations of the mean. In practice, however, returns in the FX markets tend to have much more frequent occurrences of extreme values. Indeed, less than 68% of currency returns fall within one standard deviation and less than 95% of them will fall within two standard deviations of the mean currency return.

Rather than following a normal probability distribution, currency returns in the FX markets follow a "leptokurtosis distribution," which means that the kurtosis[5] of the distribution is greater than zero. From a statistical perspective, this indicates that it is more probable that FX returns will be extreme. One way to visualize this trend is to imagine that the tail end of a "bell curve" would be thicker than it would in a normal distribution (see Charts 1, 2 and 3). For example, the distribution of one-day returns on the U.S. dollar-Canadian dollar (USD-CAD) exchange rate from the end of Bretton Woods[6] (August 1971) until recently has an abnormal distribution with a kurtosis of almost six (note: the end of Bretton Woods marked the beginning of a floating exchange rate regime). This implies that the risk probability assigned for a catastrophe (or an unanticipated pleasant event), such as an extreme negative return (or positive return), is higher under a leptokurtosis distribution than it is in a normal distribution. This also implies that the application of the Black-Scholes model would systematically misprice and underestimate option prices. The risk reversal, however, avoids this problem because it uses the implied volatility of put and call options, rather than their prices.

The charts below illustrate the shape of a normal distribution as compared to that of a leptokurtosis distribution. (Note that the latter has a thicker tail distribution.)

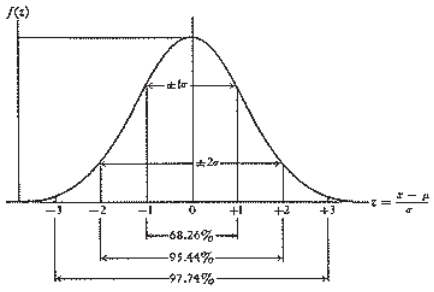


Chart 1: Standardized Normal Distribution

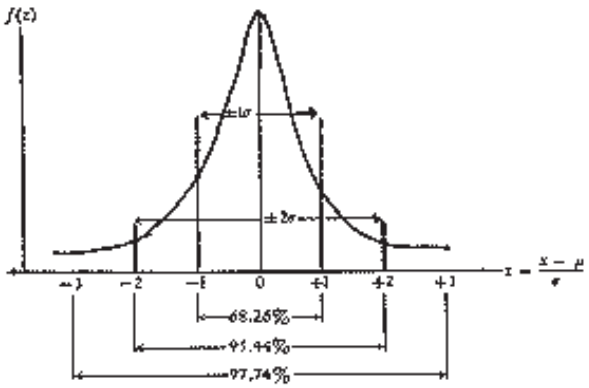


Chart 2: Leptokurtosis Distribution

The leptokurtosis distribution graph above implies that risk reversals may be an important variable used in a forecasting currency model.

Chart 3 below from the RiskMetrics Technical document by J.P. Morgan and Reuters (reference document, fourth edition 1996) illustrates this point. This graph shows the leptokurtosis distribution of log price changes in U.S. dollar-Deutsche mark (DEM) exchange rates for the period March 28 1996 through April 12 1996 compare to a normal distribution.

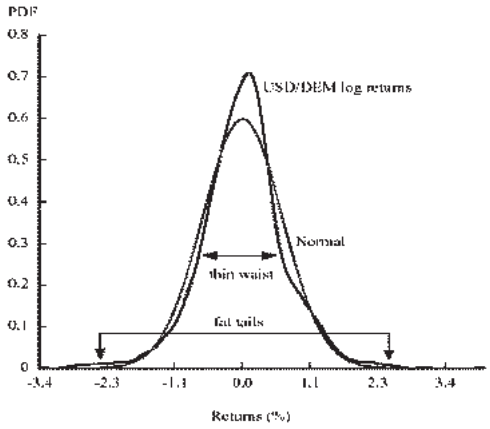


Chart 3: Leptokurtosis vs. Normal Distribution

Section III: Risk Reversal Regression Model of Exchange Rates

3.1 - Regression Analysis

The regression analysis is restricted to a simple linear regression model. The dependent variable is the currency pair "Y." The independent variable is the specific currency's risk reversals (C^2). Regression equation: $Y = c_1 + c_2 * x$.

Most financial time series are "random walks", meaning that often the best predictors of their future values are today's values. From a statistical perspective, this means that there could be a spurious regression problem in the regression equation. Spurious regressions occur when two or more variables do not influence each other, but whose R-squared and t-values indicate a significant relationship. Variables whose value contains a trend are said to be non-stationary. That is, the mean and variance of the variables are not constant over time. If the variables were non-stationary, then it would not be correct to use Ordinary Least Squares (OLS) method to test our regression equation. The hypothesis is that variables are non-stationary. The null hypothesis is that variables are stationary. It is important to determine whether or not to accept or reject the null hypothesis. $H_0: \beta_2 = \beta_3$, $H_1: \beta_2 \neq \beta_3$

To test whether the regression variables are stationary or non-stationary, an Augmented Dickey-Fuller Unit Root Test (ADF) is carried out on both the dependent and independent variables.

ADF Test Statistic	**-2.149848**	1% Critical Value*	-3.4371
		5% Critical Value	-2.8637
		10% Critical Value	**-2.5679**

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D (JPY)
Method: Least Squares
Date: 08/28/03 Time: 14:48
Sample (adjusted): 1/08/1996 7/31/2002
Included observations: 1713 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
JPY (-1)	-0.005342	0.002485	-2.149848	0.0317
D (JPY (-1))	-0.027741	0.024207	-1.145964	0.2520
D (JPY (-2))	-0.008176	0.024175	-0.338211	0.7352
D (JPY (-3))	-0.055481	0.024169	-2.295521	0.0218
D (JPY (-4))	0.006192	0.024195	0.255930	0.7980
C	0.641240	0.294191	2.179671	0.0294

R-squared	0.007031	Mean dependent var	0.009813
Adjusted R-squared	0.004122	S.D. dependent var	0.991895
S.E. of regression	0.989848	Akaike info criterion	2.820967
Sum squared resid	1672.519	Schwarz criterion	2.840042
Log likelihood	-2410.158	F-statistic	2.417255
Durbin-Watson stat	1.999570	Probe (F-statistic)	0.034052

Table 1

The ADF results on both variables pass the 10% critical value mark. Therefore, the hypothesis is rejected and the null hypothesis is accepted. The results of this test indicate that the regression model does not have a spurious regression problem and the OLS method can be used to test the regression equation.

3.2 - Methodology

To test whether or not there is a strong correlation between risk reversals and currency pairs using OLS method, risk reversals are compared to closing spot rates.

3.3 - Data

The FX rates and risk reversals database are from the Bank of Canada, JP Morgan Chase, Standard & Poor's MMS, Bloomberg and Reuters, and cover the period from 1996 to 2002. (Note that risk reversals data are difficult to obtain prior to 1996).

These major currency pairs were selected because they were among the most liquid currency pairs and data on their risk reversals are easy to obtain. In addition, if the daily quotes on the risk reversal are illiquid, the information content may not be very useful.

1. AUD-USD (Australia-US dollar exchange rate)
2. EUR-USD (Euro-US dollar exchange rate)
3. GBP-USD (British Pound-US dollar exchange rate)
4. USD-CAD (US dollar-Canadian dollar exchange rate)
5. USD-JPY (US dollar-Japanese Yen exchange rate)

To prove that risk reversals have a strong influence on currency rates the following test is used:

Test: If the cut-off F-statistic is <0.05, and the P-value is <0.05, then the risk reversal model is significant. In addition, the t-statistics and the R Square have to confirm that the independent variable (risk reversal) is a significant input in explaining movements in the dependent variable.

Dependent Variable: USD-JPY
Independent Variable: Risk Reversals
Method: Least Squares
Date: 08/20/03 Time: 18:23
Sample (adjusted): 1/01/1996 7/31/2002
Included observations: 1718 after adjusting endpoints

Variable	Coefficient	Std. Error	**t-Statistic**	Prob.
C	121.4448	0.252450	481.0654	0.0000
Risk Reversals	4.697124	0.203009	**23.13747**	0.0000
R-squared	**0.237788**	Mean dependent var		117.9991
Adjusted R-squared	0.237344	S.D. dependent var		9.674838
S.E. of regression	8.449054	Akaike info criterion		7.107149
Sum squared resid	122499.2	Schwarz criterion		7.113493
Log likelihood	-6103.041	**F-statistic**		**535.3423**
Durbin-Watson stat	**0.020838**	**Prob (F-statistic)**		**0.000000**

Table 2

3.4 - Regression Results

Both the t-statistics and the F-statistics on the USD-JPY regression model results above are significant (at the 99% level). Although the R-squared does not reveal a perfect fit, the 0.237788 number indicate that JPY risk reversals may have some explanatory power in this regression model. The JPY risk reversals movement can explain 23.7788% of the total variation in USD-JPY between 1996 and 2002 (See appendix 1 for the results on other currency pairs). However, it is important to note that the Durban-Watson[7] statistics highlight a statistical problem in this model. The Durbin-Watson statistic for the risk reversal equation is 0.020838. The 5 percent critical values from the Savin-White tables[8] are 1.758 and 1.778. Since the sample value falls outside the inclusive region, there is autocorrelation problem in this regression equation. To solve for this problem, three other scenarios are chosen. These assume that a lag factor may influence the relationship between currency pairs and risk reversals and would therefore solve for the autocorrelation problem:

1. Change in risk reversal (1-day lag) compared to closing spot rates.
2. Risk reversal compared to change in closing spot rates (1-day lag)
3. Change in risk reversals (1-day lag) as compared to change in spot rates (1-day lag).

These test results are not encouraging and continue to indicate an autocorrelation problem. It is possible that under volatile market conditions, and in situations of market stress, risk reversals may provide good signals. But when testing this assumption using the OLS method, (referring to the Asian currency and the Russian rouble currency devaluation crisis in the 1990s as benchmark periods of highly stressful times in the currency market), the results also indicate an autocorrelation problem. A more rigorous test, which is outside this paper's scope, may solve for the autocorrelation problem. Additional tests may include independent variables such as fluctuations in short-term interest rate differentials, inflation expectations, or flow of funds type data.

3.5 - Regression Conclusion

A significant regression conclusion would obviously imply that risk reversals have strong predictive powers. The goal then is to construct a model that would make a reliable forecast on currency movements. Because of the autocorrelation problem, further econometric test is required. A more rigorous econometric analysis should be conducted before developing a model that could accurately identify buy or sell signals in the currency market. Additional econometric analysis is beyond the scope of this paper as this would shift its focus away from a technical analysis perspective. The risk reversals data up to this point do not add value to the forecast of FX rates. Furthermore, they do support the underlying concepts of risk reversals. However, two observations are worth noting: 1. R-squares are fairly significant. 2. R-squares increase under extreme volatile conditions in the FX market.

Section IV: Empirical evidence and an overview of market sentiment

The empirical evidence in this section suggests a possible link between risk reversals and FX rates from a market sentiment perspective. The relationship between risk reversals and currency movements under volatile conditions in the FX markets seems particularly strong. The focus from hereon is on quantifying the level of optimism or pessimism of risk reversals. Based on the theoretical presentation of this paper, risk reversals can be considered a sentiment indicator used to gauge the level of bullish or bearish activity in the FX market. For example, what happens when risk reversals reach extreme levels? There are many ways to quantify market sentiment (see amongst others P. Kaufman, J. Murphy and M. Pring). The underlying idea is on the premise that the majority is usually wrong. The focus of sentiment indicators is therefore on investor expectations. Usually, highly optimistic (bullish) readings indicate market tops while highly pessimistic (bearish) readings indicate market bottoms.

The experiences of the Bank of Canada (section 4.1) and the US Federal Reserve (section 4.2) in the 1990s provide some insight on how risk reversals can be used to gauge market senti-ment in the FX market.

The experiences of the Bank of Canada and the US Federal Reserve

From a central bank's perspective, there is sometimes a need to signal to the market place that its currency is undervalued or overvalued. Risk reversals may provide some insight as to the timing of when to conduct the appropriate intervention. An example of how a central bank examined the role of risk reversals as a measure of market expectation can be found on the July-September 1996 New York Fed's operation report.

> *"The dollar's largest one-day move occurred early in the period on July 16. On this day, the dollar traded in a 3.1 percent range against the mark, implied volatility on one-month dollar-mark options spiked higher, and prices of risk reversals indicated a rise in the perceived risk of a further significant dollar decline. As with other sharp dollar moves over the period, the dollar's trading ranges over subsequent days fell back toward the period's average, implied volatility on dollar-mark options reverted toward record-low levels, and risk reversal prices moved closer to neutral".*

Some portfolio managers and FX traders also look to risk reversals for vital information about market sentiment. Citigroup FX Weekly "Commentary and Ideas update on 30th November 2004 illustrates the usefulness of risk reversals as a measure of market sentiment:

> *"Gamma is higher in USD-JPY due to the premium for the US Payrolls, although we have started to see sellers as the cash market fails to break lower. The value still appears to be in the back-end of the curve and the 4-year 25-delta risk reversals got paid at 3.70% today, highlighting the structural problems in the market and continued demand for longer dated JPY Calls. The 1-week risk reversals have more than halved the skew in favour of JPY Calls this week and decreased from 1.25% to 0.50%."*

These examples suggest that market participants may be able to elicit essential clues from risk reversals for the timing of currency sales and purchases. Against this backdrop, it may be useful to identify the stage where a market is entering an extreme speculative market condition. Indeed, it can be shown empirically that risk reversal analysis may sometimes be used as a contrarian indicator.

4.1 - The Bank of Canada

In 1998 the Bank of Canada aggressively defended the Canadian dollar

from speculative attacks. That experience reveals some of the predictive powers of risk reversal.

In 1998, the Bank of Canada made 44 interventions in the FX market. Nearly half of those interventions occurred in August. Assuming that the Bank has a longer holding period and much larger war chest than any currency manager, one could argue that its intervention was a success. However, it came at an extraordinarily expensive. Between January and December 1998, the Bank of Canada spent US$10.7 billion to guard against CAD devaluation. The intervention in August was the most aggressive in the Bank's history, when US$5.8 billion was spent. Only after August has USD-CAD declined from its peak at 1.5850 (August 27 1998) to its trough at 1.4452 (May 6 1999).

The risk reversals revealed that the Bank of Canada's interventions were untimely until the last week of August 1998. The Bank was in the market 13 times in August, and made about 20 transactions to protect the Canadian dollar. Prior to the final week of August, every Bank of Canada intervention occurred when the one-month 25-delta risk reversal was around 0.2 in fa-vour of CAD puts. For Canadian dollar risk reversals during the period under consideration, the 0.2 risk reversal quotation is viewed as a neutral reading (average CAD risk reversals were around 0.1 favouring CAD puts). That is the risk reversals did not show a strong directional bias despite seeing USD-CAD climb from 1.5115 to 1.5850 from the beginning of August 1998 to August 27 1998. For the most part, the Bank's costly intervention had zero influence in altering the market's perceived value of the currency. Nevertheless, CAD risk reversals reached extreme levels towards the end of August (CAD risk reversals were around 0.8 favouring CAD puts). This in all likelihood sets the stage for the Bank of Canada to catch the markets off guard. Precisely when the markets were getting complacent with what were considered sure-win bets, the Bank struck again. The Bank of England also intervened by buying Canadian dollars on August 27 1998. This rare occurrence introduced fears that more co-ordinated central bank effort was forthcoming. On the same day, the Bank of Canada jolted market sentiment with a surprise 100 basis points rate hike. The timing was perfect and was finally effective in transforming a bearish market sentiment to a moderately bullish one.

The Bank of Canada's experience reveal that when the consensus view on the Canadian dollar reached extreme pessimistic levels in August 1998, the market had already positioned on the short Canadian dollar side and there was little potential selling power left. In this situation, market bottom on the Canadian dollar was associated with a risk reversal bias toward puts of around 0.8 (the average CAD risk reversal reading was 0.1 favoring CAD puts). The Bank of Canada's intervention in late August is an example of using risk reversal to gauge market sentiment. From a technical analysis perspective, the Bank of Canada's experience showed that extreme levels in risk reversals could be used as a contrarian signal.

4.2 - The U.S. Federal Reserve

The Fed's FX experience under the Clinton Administration illustrates a slightly different perspective on the use of risk reversals. In 1995 there was a determined effort to boost the value of the dollar and the Federal Reserve intervened heavily in the FX market--by buying US dollars against the Japanese yen. For the most part, the effort was to stabilise an extremely disorderly market place for the dollar.

However, on July 7 and August 2, 1995, the strategy shifted to what is called a "strong dollar policy". Part of the objective was to establish two-way risk in the FX market and to stave off speculative attacks on the US dollar. The Fed's FX intervention goal was to establish a floor on the dollar and to signal to the market place that the Treasury department wanted an orderly reversal of its decline. Note that prior to the Fed's July 7 and August 2 1995 Fed FX intervention, the risk reversals had a skew of over 2.0 favouring Yen calls (an extreme quotation for Yen risk reversals during this time frame). On July 7, the Yen risk reversal was still in favour of a Yen call (0.9/1.3), but had been trading lower all week and was already well below the 2.0 level. By August 2, the Yen risk reversal had shifted to a bias favouring Yen puts.

That is, the options market was turning bullish on the dollar when the Fed intervened. In addition to the bullish risk reversal reading on the dollar, the Treasury issued a clear statement about its dollar policy. On August 2, the Treasury indicated that the Fed's FX intervention was consistent with the April and June G7 FX communiqués, calling for an orderly reversal of the dollar's decline during the previous two years.

The strategy worked. The Fed intervened when the market was already turning and the dollar strengthened considerably from 1995 to early 2003.

The US Federal Reserves experience is an example of how a policy maker took advantage of shifting market sentiment. In the situation described in section 4.2, the market psychology was already starting to shift from outright pessimism on the US dollar to one of growing confidence in the dollar's future prospects. Between July 7 and August 2 1995, the Yen risk reversals had fallen rapidly from a relatively extreme reading of 2.0 (favouring Yen calls) to a risk reversal reading of 0.2 favouring Yen puts. The speed in which the Yen risk reversals reading shifted from extreme pessimistic to neutral reading was unusual. The Fed's FX intervention in August 1995 is an example of using risk reversals as a sentiment indicator to alert that an important move may be in the offing. From a technical analysis perspective, sudden shift in risk reversals should prompt a closer than normal examination of market condition.

4.3 – How reliable is the Risk Reversal as a Directional Indicator?

The Bank of Canada's and the Fed's experiences above suggest that an oscillator type indicator may help in the analysis of market sentiment. The charts below represent a typical oscillator used in technical analysis. In this analysis, the oscillator calculation is based on risk reversals movements. The two standard deviation[9] shows risk reversals movement from one extreme to another, which is from –2 (extreme pessimism) to +2 (extreme optimism). When the risk reversals oscillator reaches the extreme pessimism or the extreme optimism lines, the probability favor that the prevailing currency trend reverses direction.

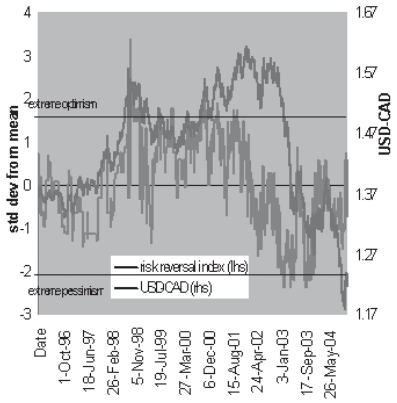


Chart 4: CAD risk reversal oscillator

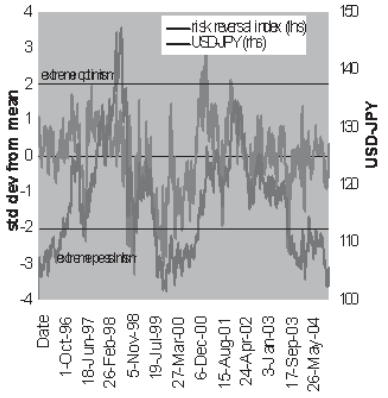


Chart 5: YEN risk reversal oscillator

Note however that not every signal results in a significant reversal. There are instances when the USD-CAD and USD-JPY trend continues much further when the CAD and Yen risk reversals oscillator touches the lower or upper bands. Sometimes the risk reversal oscillator is on the mark, and sometimes it gives premature signals.

Table 4 captures the CAD risk reversals oscillator's turning points. The table is a summary of the oscillator impact on the USD-CAD rate one week later. The turning point is defined as when the CAD risk reversals oscillator reaches either the lower or upper boundaries of the two standard deviation bands.

Dates of occurrence	*USD-CAD*	*Impact 1-week later*
August 27 1998	1.5775	1.5378
October 1 1998	1.5474	1.5450
January 27 2003	1.5234	1.5165
February 20 2003	1.5040	1.4897
May 6 2003	1.4076	1.3915
May 20 2003	1.3590	1.3801
June 4 2003	1.3591	1.3532
June 13 2003	1.3414	1.3530
October 7 2003	1.3275	1.3235
November 12 2003	1.3010	1.3021
December 2 2003	1.2960	1.3126
Average change		**0.0147**

Table 4: Summary of when the CAD risk reversals oscillator touches the two standard deviation bands and their impact on USD-CAD

Between 1996 and 2003, the CAD risk reversals oscillator generated 11 signals of which 6 were correct in its direction prediction. The currency movements were wider than usual one week after the risk reversal oscillator signal (an average of 147 points vs. the mean weekly USD-CAD movement of 93 points between 1996 and 2003). The most profitable signal occurred on August 27 1998 in which USD-CAD moved 400 points one week after the signal was generated. This coincides with the most extreme CAD risk reversal quotation at that time.

The Yen risk reversal oscillator generated 21 signals, of which 14 accurately predicted the direction of the currency movement. The EUR risk reversals had the best success rate on currency directions (nine out of ten signals). Both the AUD and GBP risk reversal oscillator had the lowest success rate on currency directions (four out of thirteen signals for the AUD-USD and three out of eleven for the GBP-USD).

The main drawback in interpreting the risk reversal oscillator results are that they do not provide reliable exit points once a trading position is taken after the oscillator touches their extreme points. This flaw demonstrates the necessity of using the risk reversals oscillator with other technical analysis tools. Another drawback is that the risk reversals data are available only after 1996, which is a very short time, compared to other sentiment indicators.

Overall, this paper finds the risk reversal oscillator to be a valuable tool to have when assessing market sentiment in the FX market. The use of one standard deviation risk reversal oscillator should generate more signals. However, the results will be more erratic than the two standard deviation risk reversal oscillator. There may be more signals with the one standard deviation measure, but the results may not be as useful for identifying intermediate term currency trend.

4.4 – Market Sentiment Conclusion

The conclusion this paper draws from this section is that an option-based indicator such as the risk reversal do provide useful signals on market expectations. This finding is based on the Bank of Canada's and the Fed's FX intervention experiences in 1998 and 1995 respectively. The risk reversal oscillator tests conducted on currencies between 1996 and 2003 appears significant. At the minimum, risk reversals can be useful in analysing the stability of the FX market. On its own, the risk reversal does not inform us of what the appropriate level will be for any particular currency, but its quotation often helps uncover periods of "systematic buying" or "systematic selling" of the currency in the option market. This will often shed light on the market's perception of risk. At extreme levels, particularly at the two standard deviation bands, a contrarian view on the currency may be appropriate. The main drawback is that it is difficult to devise a timing filter for short-term trading purposes. It seems useful to combine the risk reversals oscillator with other technical analysis tools.

Section V: Volatility Studies & Technical Indicators

5.1 - Bollinger Bands

Bollinger Bands may have a place in the risk reversal analysis. The empirical evidence highlighted in Section IV implies that extreme risk reversal quotations may provide useful guidance to currency direction. Recall that currency returns in the FX markets follow what is statistically known as a "leptokurtosis distribution." This means that it is highly likely that FX returns will be extreme and do not follow what statisticians' term as a "normal bell curve." Therefore under a leptokurtosis condition, it may be possible to associate extreme readings in risk reversals to the near term directional bias of the currency. For this research, Bollinger Bands can help identify periods of extreme conditions in the options market. The area of interest corresponds to those times when risk reversals approach the lower or upper boundary of the Bollinger Bands. The objective of the volatility analysis is to determine a consistent method to pinpoint when to liquidate or reverse existing FX positions.

Test: Can Bollinger Bands and Risk Reversals help identify points when to liquidate or reverse current positions in the FX market?

Assumption: Bollinger Bands properties can help identify extreme points in the FX market. Calculating a 2 standard deviation of risk reversals over a 20-day period implied that 95% of the times risk reversals will hover between the lower and upper Bollinger Band boundaries.

Proof: Using the Metastock software to help identify periods when risk reversals touch the lower or upper boundaries of Bollinger bands. The attached graphs on USD-CAD, USD-JPY and AUD-USD revealed that when risk reversal reach an extreme point[10] this often coincides with turning points in the FX market.

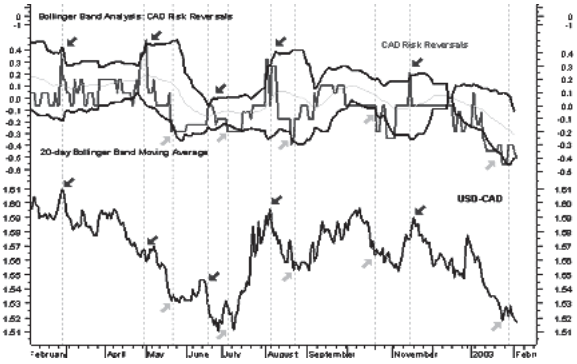
Bollinger Bands definition: Bollinger Bands consist of an upper and lower band, and a moving average. The upper and lower bands are standard deviations calculated from the moving average. The standard deviation represents a confidence level and our choice of 2 standard deviations equate to a 95% confidence band. These bands tend to alternate between expansion and contraction. In a period of rising price volatility, the distance between the upper and lower bands will widen. Conversely, in periods of low market volatility, the distance between the upper and lower bands will contract. When the upper and lower bands are unusually wide, the current trend is said to be ending. Times when the Bollinger Bands are unusually narrow often indicate that the market may be about to initiate a new trend.

5.2 – Bollinger Bands Results

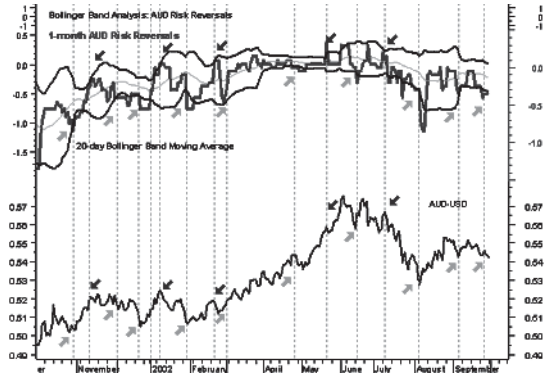
The arrows on the Bollinger Bands risk reversals indicate when risk reversals touch the upper or lower boundaries of the trading bands. An example of the Bollinger Bands risk reversals impact is presented on Table 5.

The Bollinger Bands on Yen risk reversals appear wider than usual in October

2002 and again in August 2003. On both occasions, this corresponds to a shift in the USD-JPY trend. This is the expected reaction based on the Bollinger Bands definition. However, it is more difficult to obtain a precise timing filter for trading purpose. The key point is that Bollinger Bands highlight extreme market conditions. It makes sense to use Bollinger Bands as a complementary tool with other technical analysis tools.



The wider than usual Bollinger Bands on the CAD risk reversals in May 2000 was an alert to a possible trend change. But it took USD-CAD nearly two months to respond to the signal. This illustrates that Bollinger Bands do not necessary provide precise buy or sell signals. This also illustrates the drawback in using Bollinger Bands on risk reversals as a stand-alone timing tool.



The Bollinger Bands on the AUD risk reversals were unusually narrow between April and June 2003. This signaled the possibility that the AUD-USD rally in June 2003 may have peaked. Although this proved to be an accurate forecast, it took AUD-USD one month to react to the signal.

These examples indicate the difficulty in using Bollinger Bands as a precise timing indicator. Table 5 is the summary of the JPY risk reversal signals and the impact they had on the USD-JPY rate. The turning point is defined as when the risk reversals touch the upper or lower boundaries of the two standard deviation Bollinger Bands.

Dates of Bollinger Bands	*USD-JPY*	*Impact 1-week later*
August 20 1999	111.43	111.42
September 17 1999	106.92	104.12
January 28 2000	107.08	107.38
December 1 2000	111.17	111.34
March 16 2001	122.82	122.65
August 24 2001	120.02	118.96
September 21 2001	116.57	119.03
December 7 2001	125.64	127.35
January 4 2002	131.07	132.01
June 28 2002	119.84	120.20
October 18 2002	125.39	123.98
May 16 2003	116.04	117.33
September 19 2003	116.47	111.43
September 26 2003	111.97	110.70
November 28 2003	109.48	107.97
Average change		**1.37**

Source: Bloomberg (data from 1998 to 2003)

Table 5: JPY risk reversals turning points and their impact on USD-JPY

Over the sample period 1998 to 2003, the Bollinger Bands on Yen risk reversals generated 15 signals. These signals indicate market tops and bottoms but the currency movement often took longer to respond. The average currency movement one week after the signals were generated was in line with the average seen over the sample period. As a stand-alone indicator, it is difficult to devise a trading strategy.

5.3 – Bollinger Bands Analysis Conclusion

The Bollinger Bands charts suggest that incorporating risk reversals with Bollinger Bands analysis can provide important insights into market perceptions of FX movements. It is a worth-while exercise to pay particular attention to situations when risk reversals get to the lower or upper boundaries of the Bollinger Bands.

5.4 – MACD[11] Analysis

Table 6 captures the MACD turning points of JPY risk reversals and summarizes the impact this had on the USD-JPY rate. The turning point of the risk reversals is defined as when the 9-day MACD line crosses over the 20-day MACD line.

The result generated from the MACD crossover was significant. USD-JPY movement one week after the signal was generated revealed average movement of 1.27 points, higher than the average of 1.05 points. The results were also significant on the USD-CAD, GBP-USD, and AUD-USD but not on the EUR-USD.

5.5 – MACD Results

The Bloomberg graph below is an example showing MACD turning points on JPY risk reversals. The code is; USJYVRR <INDEX> GPO MACD.

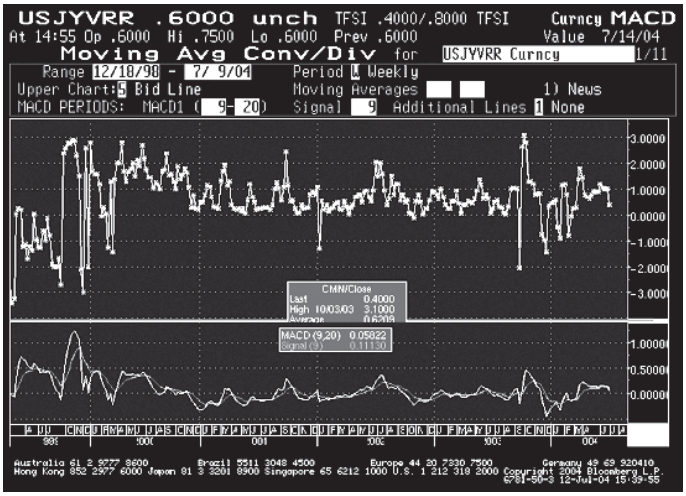
5.6 – MACD Conclusion

The key highlight from Table 5 shows that on average, USD-JPY moved 1.27 points 1 week after the MACD lines generated a signal. This is above the median figure of 1.05 as calculated by the week over week USD-JPY change measured

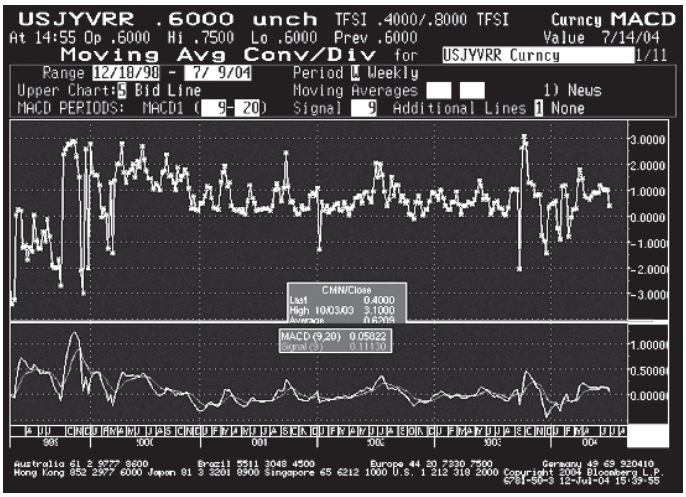
Dates of MACD Turning points	*USD-JPY*	*Impact 1-week later*
January 8 1999	111.62	113.03
July 16 1999	120.94	116.47
September 24 1999	103.90	104.96
November 26 1999	106.30	101.75
April 7 2000	105.36	104.75
July 7 2000	107.84	107.80
January 19 2001	117.18	117.20
February 2 2001	115.75	117.50
February 23 2001	115.80	119.01
April 13 2001	124.19	122.54
April 25 2001	122.54	123.99
June 22 2001	124.50	124.65
August 10 2001	122.01	120.24
October 12 2001	121.12	121.20
December 14 2001	127.29	129.58
January 18 2002	132.57	134.46
March 15 2002	129.00	132.88
August 2 2002	118.85	120.16
December 20 2002	120.38	119.88
February 7 2003	120.27	120.47
February 28 2003	118.10	117.11
April 25 2003	120.21	119.01
June 13 2003	117.42	118.35
August 22 2003	117.54	116.92
Average change		**1.27**

Source: Bloomberg (data from 1998 to 2003)

Table 6: Summary of JPY risk reversals turning points and their impact on USD-JPY



Source: Bloomberg



Source: Bloomberg

from 1998 to 2003.

The implication drawn from this analysis is that the MACD indicator is a useful technical tool for risk reversals. The MACD signals can help determine the direction and give reasonable confidence that the magnitude of the currency movements is generally greater than the norm.

5.7 – Moving Average Analysis

According to most technical analysis authors, the most commonly used Moving Average is the 7, 21, 50, 100 and 200 period averages. From an analytical perspective, there is no correct period. Usually, experience will determine which period is most appropriate for a given security. The 7-period Moving Average will be more sensitive than the 200-period Moving Average.

5.8 – Moving Average Results

Investors use the moving average indicator for a variety of reasons. This research paper examined the moving average indicator from a filter perspective. In the example below, a turning point is confirmed whenever the 7-period moving average cuts below or above the 21-period moving average[12]. The graph below is an example of a USD-JPY risk reversal graph. The code on Bloomberg is USJYVRR <Index>.

5.9 – Moving Average Conclusion

The Moving Average is essentially a lagging indicator. It is therefore not prudent to conclude that using moving averages on its own will provide useful buy or sell signals in the FX market particularly when risk reversals have a high tendency to make abrupt movement away from its mean. This is clearly reflected in the sharp spike up, and sharp fall in the JPY risk reversal graph above. However, the key point here is that the Moving Average indicator can still be a useful filter. It is simple and intuitively easy to understand. Using the Moving Average indicator will help increase the confidence of spotting turning points and will in general confirm an emerging trend of the underlying security. Using an exponential moving average indicator is also useful but in this analysis, the indicator does not improve the results significantly.

Section VI: Research Conclusion

The regression results revealed an auto correlation problem, which means that a multi-variable model may be required to explain short-term currency movements. The regression results do not prove conclusively that risk reversals have strong predictive powers, but they do suggest that risk reversals may be a useful variable for inclusion in a more elaborate equation model.

The empirical evidence outline and the overview of market sentiment in sec-

tion IV, and the Bollinger Band Analysis in section V suggests that risk reversals do provide good signals when they reach extreme points. Risk reversals, while straightforward, should at certain times be looked at in a different context. Notable shifts in the risk reversal reading are often associated with a sudden shift in market sentiment and therefore market expectation of future movement in the currency market. It appears that significant shifts in the risk reversals often precede big moves in the FX markets. The risk reversal oscillator and the Bollinger Bands analysis imply that it may be important to pay attention to extreme readings in the risk reversal quotation.

The primary purpose of analyzing risk reversals is to determine the directional bias and the turning points of a currency. On its own, risk reversals do not indicate what the appropriate level will be for any particular currency. This research paper finds that extreme levels of risk reversals provide valuable information on market sentiment. Sudden and big shifts in risk reversals often preceded big moves in the FX markets. Combining a risk reversals analysis with other technical analysis tools may prove useful in gauging market sentiment in the FX market.

Appendix 1: Regression Results

Dependent Variable: USD-CAD
Independent Variable: Risk Reversals
Method: Least Squares
Date: 08/18/03 Time: 18:24
Sample (adjusted): 1/01/1996 12/06/2002
Included observations: 1810 after adjusting endpoints

Variable	Coefficient	Std. Error	**t-Statistic**	Prob.
C	1.458250	0.001809	805.9179	0.0000
Risk Reversal	**0.137381**	0.006834	**20.10327**	0.0000
R-squared	**0.182692**	Mean dependent var		1.474283
Adjusted R-squared	0.182240	S.D. dependent var		0.076412
S.E. of regression	0.069100	Akaike info criterion		-2.505427
Sum squared resid	8.632792	Schwarz criterion		-2.499349
Log likelihood	2269.412	**F-statistic**		**404.1414**
Durbin-Watson stat	**0.045768**	**Prob (F-statistic)**		**0.000000**

Dependent Variable: AUD-USD
Independent Variable: AUD Risk Reversals
Method: Least Squares
Date: 08/20/03 Time: 18:11
Sample (adjusted): 1/01/1996 8/07/2002
Included observations: 1723 after adjusting endpoints

Variable	Coefficient	Std. Error	**t-Statistic**	Prob.
C	0.664309	0.003089	215.0518	0.0000
Risk Reversals	**0.072037**	0.005903	**12.20243**	0.0000
R-squared	0.079630	Mean dependent var		0.638194
Adjusted R-squared	0.079095	S.D. dependent var		0.096356
S.E. of regression	0.092467	Akaike info criterion		-1.922763
Sum squared resid	14.71491	Schwarz criterion		-1.916434
Log likelihood	1658.460	**F-statistic**		**148.8993**
Durbin-Watson stat	**0.010826**	**Prob (F-statistic)**		**0.000000**

Dependent Variable: EUR-USD
Independent Variable: EUR Risk Reversals
Method: Least Squares
Date: 08/20/03 Time: 17:50
Sample (adjusted): 1/01/1996 7/29/2002
Included observations: 1716 after adjusting endpoints

Variable	Coefficient	Std. Error	**t-Statistic**	Prob.
C	1.058754	0.003372	313.9725	0.0000
Risk Reversals	**-0.065094**	0.006623	**-9.827829**	0.0000
R-squared	**0.053345**	Mean dependent var		1.055505
Adjusted R-squared	0.052793	S.D. dependent var		0.142838
S.E. of regression	0.139016	Akaike info criterion		-1.107290
Sum squared resid	33.12385	Schwarz criterion		-1.100940
Log likelihood	952.0546	**F-statistic**		**96.58623**
Durbin-Watson stat	**0.007614**	**Prob (F-statistic)**		**0.000000**

Dependent Variable: GBP-USD
Independent Variable: GBP risk Reversals
Method: Least Squares
Date: 08/20/03 Time: 18:20
Sample (adjusted): 1/01/1996 7/24/2002
Included observations: 1713 after adjusting endpoints

Variable	Coefficient	Std. Error	**t-Statistic**	Prob.
C	1.564944	0.002126	736.0302	0.0000
Risk Reversals	**0.060471**	0.006560	**9.217410**	0.0000
R-squared	0.047307	Mean dependent var		1.560195
Adjusted R-squared	0.046750	S.D. dependent var		0.087445
S.E. of regression	0.085376	Akaike info criterion		-2.082335
Sum squared resid	12.47161	Schwarz criterion		-2.075976
Log likelihood	1785.520	**F-statistic**		**84.96065**
Durbin-Watson stat	**0.011701**	**Prob (F-statistic)**		**0.000000**

Appendix 2: Durbin-Watson Test

For a test of positive autocorrelation in the errors the null and alternative hypotheses are:

$$H_0: \rho = 0 \quad \text{against} \quad H_1: \rho > 0$$

The Durbin-Watson test statistic is calculated from the OLS estimated residuals $\hat{e}_t$ as:

$$d = \sum_t^N{}_{=2} (\hat{e}_t - \hat{e}_{t-1})^2 / \sum_t^N{}_{=1} \hat{e}_t^2$$

The d-statistic has values in the range [0, 4]. Low values of d are in the region for positive auto-correlation. Values of d that tend towards 4 are in the region for negative autocorrelation. There-fore, for a one-tailed test against positive autocorrelation, at a 5% significance level the null is rejected if

$$d < d_{cp}$$

Where d_{cp} is a critical value such that:

$$P(d < d_{cp}) = 0.05$$

For a one-tailed test against negative autocorrelation, at a 5% level the null is rejected if

$$d > d_{cn} \quad \text{where}$$

$$P(d > d_{cn}) = 0.05 \quad \text{or}$$

$$P(d < d_{cn}) = 0.95$$

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Endnotes

1 In the options market, delta is defined as the first-order (derivative) measure of sensitivity to movement in the underlying security. In this research paper, the underlying security is the respective foreign exchange (FX) rate. The 25-delta is the out-of-the-money option quoted by dealers in the FX market. Market participants in the FX options market view the 25-delata options as the standard risk reversal quotation as opposed to other numeric deltas. Since changes in the underlying security are often the primary source of risk in the options market, noticeable changes in the delta may provide some useful directional clues in the FX rate.

2 FX options are quoted in terms of their implied volatility. The implied volatility represents the standard deviation of price movement. Implied volatility is based on an expectation as opposed to a posted value. The more uncertain the outcome of an event is, the more expensive the implied volatility of an option will be. As a result, the implied volatility of an option is usually associated with the riskiness of the underlying security. A high implied volatility rate therefore implies more volatile market conditions and as such, dealers will require a higher risk premium for the underlying security. The calculation of implied volatility is based on; (1) the risk less rate of return; (2) the exercise price of the underlying security; (3) the maturity date; and (4) the price of the option. These four variables go into the Black-Scholes Option Pricing Model (the most popular option pricing model). Movement in any of these vari-ables will affect the price of the FX option. Most option pricing models use all of these four variables to calculate the implied volatility of the FX option. Inherent in any FX option pricing is an implicit estimate of the future volatility of the implied volatility. The implied volatility quotations can therefore provide some impression of which scenario the market is leaning toward. A high probability implies greater risk.

3 The slope of the implied volatility curve may reveal how complacent or nervous the market is concerning future events. For example, a downward sloping implied volatility curve would suggest that dealers are demanding a higher risk premium in the near future as opposed to further out in the future. Aside from demand and supply considerations, this could also indicate that the risk premium surrounding an upcoming event is particularly high. A downward sloping curve could also imply that current market conditions are extremely volatile and unpredictable, and as such, require a risk premium.

4 The factors that affect implied volatility are the riskless rate of return, the exercise price, maturity date and the price of the option. Implied volatility appears in several option pricing models, including the B*lack-Scholes Option Pricing Model*.

5 Kurtosis is based on the size of a distribution's tails. Distributions with relatively large tails are called "leptokurtic"; those with small tails are called "platykurtic." A distribution with the same kurtosis as the *normal distribution* is called "mesokurtic."

The following formula can be used to calculate kurtosis:

$$\text{kurtosis} = \frac{\Sigma(X-\mu)^4}{N\sigma^4} - 3$$

where σ is the *standard deviation*.
The kurtosis of a normal distribution is 0.

The following two distributions have the same *variance*; approximately the same skew, but differ markedly in kurtosis.

Kurtosis definition provided by Deborah Rumsey PhD (see reference section for details).

6 On August 15, 1971, without prior warning to the leaders of the other major capitalist powers, US president Nixon announced in a Sunday evening televised address to the nation that the US was removing the gold backing from the dollar. The commitment by the US to redeem international dollar holdings at the rate of $35 per ounce had formed the central foundation of the post-war international financial system set in place at the Bretton Woods conference of 1944.

7 The Durbin-Watson test statistic is calculated from the OLS estimated residuals êt as:

d = tN=2 (êt - êt-1)2 / tN=1 êt2

The d-statistic has values in the range [0,4]. Low values of d are in the region for positive autocorrelation. Values of d that tend towards 4 are in the region for negative autocorrelation. Therefore, for a one-tailed test against positive autocorrelation, at a 5% significance level the null is rejected if

d < dcp

Where dcp is a critical value such that:

P (d < dcp) = 0.05

For a one-tailed test against negative autocorrelation, at a 5% level the null is rejected if

d > dcn where
P (d > dcn) = 0.05 or
P (d < dcn) = 0.95

8 Critical values for Durbin-Watson can be found in the Savin-White tables in the back of most econometrics texts (Savin & White, 1997).

9 Calculates how prices are dispersing around an average value. The two standard deviation ensures that 95% of the price data will fall within the two trading bands. The two standard deviation provides less erratic signals. The draw-back is that there will be considerable fewer signals of currency trend reversals.

10 Note however that this paper's reference to extreme points cover the sample period after 1996. Risk reversals data are difficult to obtain prior to 1996.

11 Moving Average Convergence/Divergence. *Technical analysis* term for the crossing of two exponentially smoothed *moving averages* Source: Investorwords.com

12 The default parameters of 7 and 21 periods for the moving averages were chosen because they appear less erratic than a shorter sample period. A longer sample period would probably omit some valuable signals.

Implications of Bullish Percent Average (BPAVG) and Broad Market Movement

Andrew C. Hyer

3

There are many indicators designed to identify when the broad equity market is overbought or oversold. Two well known such indicators are the Advance/Decline Ratio and the McClellan Oscillator. Bullish Percent Average (BPAVG) is an indicator that Dorsey, Wright & Associates created in late 1997 to determine overbought and oversold market conditions. Because the construction and interpretation of BPAVG, the Advance/Decline Ratio, and the McClellan Oscillator are completely different, testing which of the three is "better" is not the purpose of this paper. As explained in this paper, BPAVG is a diffusion oscillator bound by a low of 0 and a high of 100. The McClellan Oscillator is generally bound by a low of –100 and a high of 100. The Advance/Decline Ratio is not bound. To try to determine which is better at determining overbought and oversold levels is like trying to compare apples to oranges, though their goal is similar. Given their different construction, testing them using the same rules is not practical.

Dorsey, Wright has approximately 5,600 stocks in its database, which trade on the NYSE, NASDAQ, and Amex. They divide those stocks into the 40 sectors listed in Figure 1.

40 Dorsey Wright Sectors

Aerospace Airline	Utilities / Electric	Leisure	Retailing
Auto & Parts	Finance	Machinery & Tools	Savings & Loans
Banks	Food / Beverage / Soap	Media	Semiconductors
Biomedics/Genetics	Forest Products / Paper	Metals Non-Ferrous	Software
Building	Gaming	Oil	Steel/Iron
Business Products	Utilities / Gas	Oil Service	Telephone
Chemicals	Healthcare	Precious Metals	Textiles / Apparel
Computers	Houshold Goods	Protection Safety	Transports / Non-Air
Drugs	Internet	Real Estate	Wall Street
Electronics	Insurance	Restaurants	Waste Management

Figure 1

A sector bullish percent is found by calculating the percentage of stocks in a given sector on a point & figure buy signal. For example, if there are 100 stocks in the Aerospace Airline Sector and 60 of those stocks are on a point & figure buy signal, then we would say that the Aerospace Airline sector has a Bullish Percent of 60 percent. On a point & figure chart, a stock is either on a buy signal or on a sell signal. A buy signal indicates that a column of X's exceeds a previous column of X's, and the stock's short-term trend is higher. A sector bullish percent is calculated for each of the 40 sectors. An arithmetic average is then taken of those 40 sector bullish percents to create the Bullish Percent Average (BPAVG).

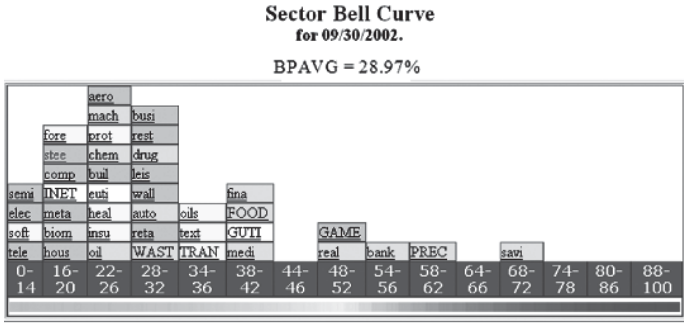
What Does the BPAVG Imply about the Broad Market?

BPAVG oscillates between 0 and 100 percent, though the extreme readings of 0 and 100 have not been reached during the life of this indicator. This study will determine if the relative position of the BPAVG has any implication of future performance of the broad market. In Figures 2-4, each of the 40 Dorsey, Wright sectors are positioned on a sector bell curve according to each sector's bullish percent. The BPAVG is also shown for these three examples.

Method of Study

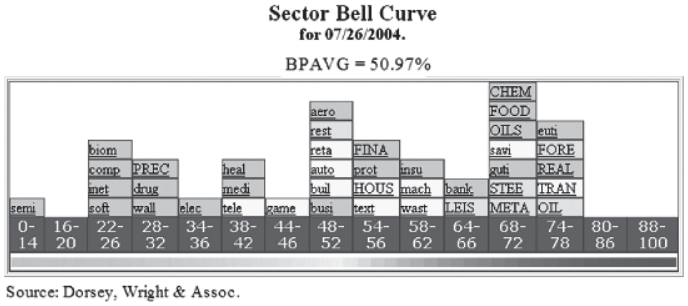
The data base for this study is the weekly BPAVG reading (on Mondays unless the market was closed on that day, in which on the next Tuesday) from January 6, 1998 to January 24, 2005 – a period of over 7 years. This includes all available data on BPAVG. In addition, the Value Line Geometric Index was recorded each week as a proxy for the market. This index was chosen because it is an equal weighted index composed of about 1700 stocks – small, mid, and large capitalization stocks. Finally, the Value Line Geometric was weekly recorded one hundred calendar days later and the percentage change calculated. The returns of the Value Line Geometric were grouped into deciles of the BPAVG. For example, the percentage change in the Value Line Geometric for each reading of the BPAVG between 30 and 40 percent, between 40 and 50 percent, etc. was grouped into sectors. The average return in the Value Line Geometric Index for all readings in each of the deciles was calculated, as well as the maximum return, minimum return, percentage positive returns, and number of readings (count) in each of the deciles.

The detailed results of the study are shown in Figure 6. It was found that indeed, the position of the BPAVG did provide very useful information about the probabilities of future broad market performance over the next 100 calendar days. The highest average returns came following readings of the BPAVG in the 10-19 range. The second highest average returns came following readings of the BPAVG in the 20-29 percent range. In addition, continuing the pattern, the third highest average returns in the broad market came following a reading of the BPAVG in the 30-39 percent range. That range is where the pattern ends as



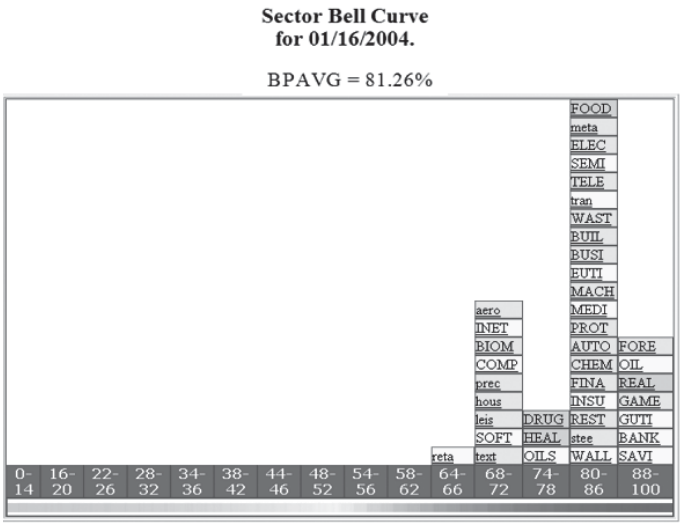
Source: Dorsey, Wright & Assoc.

Figure 2



Source: Dorsey, Wright & Assoc.

Figure 3



Source: Dorsey,Wright & Assoc.

Figure 4

the range with the fourth highest average returns came following readings of the BPAVG in the 70-79 range. This tells us that when the BPAVG has been below 40 percent, there have been positive average returns in the broad market over the next 100 calendar days. Therefore, when the BPAVG is skewed to the left hand side of the sector bell curve, there has been a high probability of a broad market advance. However, when the BPAVG is skewed to the right hand side of the sector bell curve, it has not necessarily implied a broad market decline. That said, the average returns of the broad market following readings of the BPAVG in the 40-49, 50-59, 60-69, and 89-90 ranges have all been negative. The highest average losses in the broad market came following readings of the BPAVG in the 60-69 range. The next highest average losses came following readings of the BPAVG in the 80-89 range. The third highest average losses came following readings of the BPAVG in the 50-59 range. The fourth highest average losses in the broad market came following readings of the BPAVG in the 40-49 range.

BPAVG and AAII Sentiment Survey

Date	BPAVG	AAII Date	AAII Bullish	AAII Neutral	AAII Bearish
31-Aug-98	13.35%	27-Aug-98	23%	32%	45%
8-Sep-98	16.04%	10-Sep-98	29%	31%	40%
14-Sep-98	19.56%	17-Sep-98	34%	35%	31%
12-Oct-98	18.58%	15-Oct-98	25%	34%	41%
10-Aug-98	28.86%	13-Aug-98	27%	38%	35%
17-Aug-99	26.34%	20-Aug-98	25%	42%	33%
24-Aug-98	25.49%	27-Aug-98	23%	32%	45%
21-Sep-98	22.68%	24-Sep-98	34%	38%	28%
28-Sep-98	28.10%	01-Oct-98	32%	35%	33%
5-Oct-98	22.32%	08-Oct-98	25%	43%	32%
19-Oct-98	29.51%	22-Oct-98	32%	35%	33%
24-Sep-01	26.04%	27-Sep-01	51%	27%	22%
1-Oct-01	28.15%	04-Oct-01	51%	20%	29%
22-Jul-02	29.06%	25-Jul-02	28%	23%	49%
29-Jul-02	25.46%	01-Aug-02	34%	34%	31%
5-Aug-02	26.59%	08-Aug-02	38%	23%	39%
12-Aug-02	28.94%	15-Aug-02	38%	21%	41%
30-Sep-02	28.97%	03-Oct-02	35%	17%	48%
7-Oct-02	26.07%	10-Oct-02	29%	16%	55%
14-Oct-02	23.85%	17-Oct-02	40%	21%	40%
*Average AAII Survey Results (7/27/1987- 5/26/2005)					
			38.92%	33.13%	27.95%

Source: The American Association of Individual Investors

Figure 5

The highest maximum returns came following readings of the BPAVG when it was skewed to the left hand side of the sector bell curve. However, the greatest losses in the broad market did not come following readings of the BPAVG when it

Results of Tiling BPAVG in Deciles

BPAVG Range	0-9%	10-19%	20-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-89%	90-100%
Average Return	N/A	13.19%	7.91%	5.96%	-0.89%	-2.59%	-8.63%	5.77%	-2.90%	N/A
Min Return	N/A	6.42%	-3.79%	-12.77%	-30.28%	-23.05%	-28.59%	-8.09%	-4.48%	N/A
Max Return	N/A	21.59%	22.31%	31.40%	22.62%	15.96%	15.77%	15.32%	0.17%	N/A
% Positive Returns	N/A	100.00%	68.75%	70.83%	43.52%	38.61%	18.75%	78.05%	33.33%	N/A
Count	0	4	16	48	108	101	48	41	3	0

Figure 6

was skewed to the right hand side – it came following a reading of the BPAVG in the 40-49 range. This is further indication that this oscillator has been more reliable at pointing out oversold conditions than pointing out over-bought conditions.

The percentage of positive returns demonstrated the success rate of this oscillator. Following readings of the BPAVG below 40 percent there has been a high success rate of positive broad market returns. Additionally, following readings of the BPAVG in the 70-79 range, the broad market had positive returns in 78.05 percent of the readings – once again pointing out that when the sector bell curve is skewed to the right hand side of the sector bell curve the broad market has not necessarily performed poorly. The lowest success rate came following readings of the BPAVG in the 60-69 range.

The distribution of readings of the BPAVG (count) is what would be expected, with the majority of the readings coming from around the middle of the sector bell curve and then evenly distributed to the right and left of the curve. Eighteen percent of the total readings of the BPAVG came from readings below 40 percent – a level that has proven to be a threshold into oversold territory. This information gives a portfolio manager an edge, especially because it is common that when the BPAVG is at levels below 40 percent, the morale on Wall Street is typically very low and one often fears that a declining market will persist. Investor sentiment was also recorded during periods when the BPAVG was skewed to the left hand side of the sector bell curve. 20 readings of this indicator in the 10-29 range were compared it to The American Association of Individual Investors (AAII) Sentiment Surveys. The AAII Sentiment Survey measures the percentage of individual investors who are bullish, bearish, and neutral on the stock market short term; individuals are polled from the AAII Web site on a weekly basis. In all except for three cases, the percentage of individual investors that were bullish during these times was lower than the average bullish reading over the life of the survey (7/27/1987 to 5/26/2005).

Additionally, in all except for one case, the percentage of individual investors who were bearish during these times was higher than the average bearish reading over the survey's life. In summary, individual investors were more bearish than average when the BPAVG was skewed to the left hand side of the sector bell curve.

Further Insight

In Figures 2-4, the sector bullish percents of the 40 Dorsey, Wright sectors are displayed on a sector bell curve along with the BPAVG reading. This is a visual way of showing oversold and overbought levels of BPAVG. BPAVG can also be plotted on a point & figure chart as shown in Figure 7. When BPAVG is in a column of X's, it means that the indicator is rising in value and when it is in O's it means that the indicator is falling in value. This is a 3-box reversal point & figure chart, where each box is worth two percent. For example, if the current reading of the BPAVG was 60 and it was in a column of X's, it would only reverse into a column of O's if the BPAVG fell below 54.

To determine if the broad market, once again measured by the Value Line Geometric, performed better when the BPAVG was in a column of X's than when it was in a column of O's, a return was calculated of the Value Line Geometric from the day that the BPAVG reversed into a column of X's until the day that it reversed to a column of O's. This was repeated for the indica-tor when in a column of O's. This study covered the period from the indicator's inception in 1998 through the most recently completed column of X's on January 23, 2005. The results are found in Figure 8.

This portion of the study found that the broad market has performed better

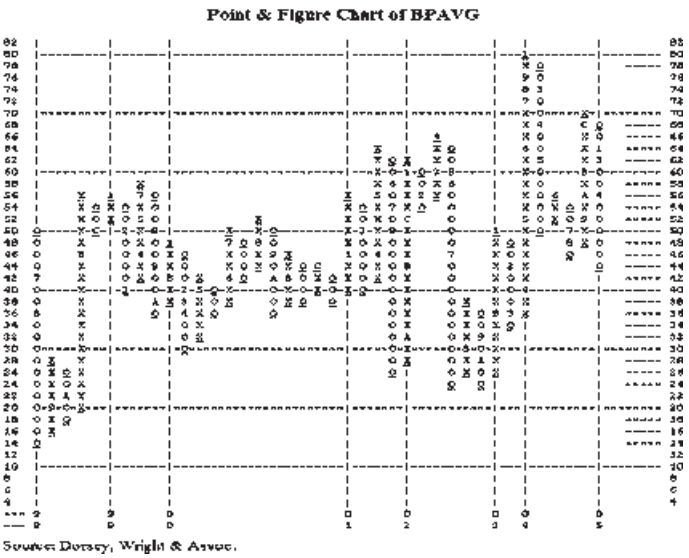


Figure 7

Study of BPAVG in Column of X's and O's

Column	Average Return	Min Return	Max Return	Min Days in Column	Max Days in Column	Average Days in Column
X's	1.95%	-11.09%	44.91%	8	344	75.25
O's	-2.03%	-22.94%	7.97%	7	119	52.84

Figure 8

on average, when the BPAVG was in a column of X's. The highest returns also came during periods of time when the BPAVG was in X's and the largest declines came during periods when the BPAVG was in O's. Furthermore, the BPAVG has on average, stayed in a column of X's longer than a column of O's.

Application to Portfolio Management

In conclusion, the study shows that the relative position of the BPAVG has provided meaningful implications on broad market movement. BPAVG has been particularly useful at pointing out oversold conditions. Further insight has been gained by knowing whether the BPAVG is in a column of X's or a column of O's on a point & figure chart. A portfolio manager may likely benefit by raising the cash position when the BPAVG is in a column of O's and declining from the right hand side of the sector bell curve towards the left. It appears however that the most useful conclusion from this study is that when the BPAVG is skewed to the left hand side of the sector bell curve, particularly below the 40 percent level, the portfolio manager will likely be better rewarded by positioning a portfolio more offensively than defensively. This may mean increasing the equity exposure. It may also mean increasing the beta in the portfolio, or adding leverage.

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About the Author

Andrew C. Hyer received a B.S. (magna cum laude) from Utah State University in 2003 with a dual degree in Finance and Economics. He completed the Chartered Market Technician program in August 2005 and is currently an assistant portfolio manager at Dorsey Wright Money Management and very involved in their marketing efforts. He is a joint author of an article on relative strength published in the September, 2005 issue of Technical Analysis of Stocks & Commodities.

The (Mis)behavior of Markets and the 3-in-1 Trader Model

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Introduction

There is powerful agitation in the U.S.A. and globally to shift responsibility for the management of one's own investments onto the shoulders of each individual manager.

Just as this shift in the burden toward the individual manager is occurring at the corporate and government levels, the manager is faced with a quandary as to how to manage her/his financial investments. As Benoît B. Mandelbrot and Richard L. Hudson observed in their recent book, THE (MIS)BEHAVIOR OF MARKETS (Basic Books, U.S.A., 2004., 204): "Orthodox financial theory is riddled with false assumptions and wrong results." The call, therefore, is for new thinking and different approaches for understanding markets and managing investments. Mandelbrot and Hudson went on to say that "Market 'Timing' Matters Greatly. Big Gains and Losses Concentrate into Small Packages of Time."

This article is a partial report on the arrival of new thinking and different methods to explain market behavior and to approach the management of investments. This new thinking emanates from social science models generally known as "behavioral finance." This article will present a framework anchored upon the mathematical and behavioral insights of Benoît B. Mandelbrot and the crowd behavior concepts of Gustave Le Bon.

Behavioral Finance is one of the latest, most significant trends in financial theory. Subtrends in investor decision-making and emotional states are too frequently disconnected from the more global models of mass behavior that seek to explain market behavior. The *3-in-1 Investor Model or Framework* seeks to clarify and to link together these individual psychology and mass behavior subtrends of behavioral finance. Technical Market Analysis is an age-old practice on Wall Street that has been receiving greater respect and recognition during the past decade. Technical Analysis becomes a particularly powerful analytical tool when it is tied to an underlying model drawn from the social sciences. Finally, the psychology of trading and mental discipline, with roots in behavioral finance, is a vital component in the effective implementation of technical market analysis decision rules.

The 3-in-1 Trader Investor Framework is deemed to be a useful and innovative idea for aiding the manager in understanding and integrating the latest trends in financial thinking. *The 3-in-1 Trader Investor Framework* is also a useful integrative framework for diagnosis, planning, evaluating, and capturing synergy in the disciplines of behavioral finance, trader psychology and the practice of technical market analysis.

The (Mis)behavior Of Markets

THE (MIS)BEHAVIOR OF MARKETS: A Fractal View of Risk, Ruin, and Reward (ISBN 1 86 197 76 54) is a brilliant *tour de force* by the award winning mathematician and father of fractal geometry Benoît B. Mandelbrot. His varied and long-standing interests in the behavior of financial market are brought together into this important book that should be required reading for every serious student of finance.

Mandelbrot goes directly into the non-linear, dynamic behavior that rules the true mathematical makeup of markets. While so doing he destroys the Efficient Market Hypothesis and its allies of orthodox finance. Mandelbrot concludes that "'Modern' financial theory is founded upon a few, shaky myths that lead us to underestimate the real risk of financial markets...Orthodox financial theory is riddled with false assumptions and wrong results."

Among other things, Mandelbrot observes that markets are ruled by "power curves," and not normal probability curves, and that there exists long-term dependence and not independence of sequential price action. Financial markets are turbulent- like the wind or the flood- and thus fractal analysis applies. The behavior of markets, what the real data show in numerous markets over many different time frames, says Mandelbrot, is that:

Market « Timing » Matters Greatly
Big Gains and Losses Concentrate into Small Packages of Time
(Mandelbrot, page 233)

Mandelbrot asks the rhetorical question: "what is an investor to do?"

"Brokers often advise their clients to buy and hold. Focus upon the average annual increases in stock prices over the long term future. And do not try to 'time the market,' seeking the golden moment to buy or sell." But the foregoing advice against market timing is, according to Mandelbrot simply "wishful thinking."

What matters is the particular, not the average, says Mandelbrot. He notes that some of the most successful investors/traders are those who did, in fact, get the timing right. "In the space of just two turbulent weeks in 1992, George Soros famously profited about $2 billion by betting against the British Pound Sterling. Now, very few of us are in that league, (observes Mandelbrot,) but we can in our own modest way take cognizance of concentration."

Mandelbrot is critical of most of what passes for the technical analysis approach to market timing, which he feels is too often done superficially and with erroneous interpretations of charts. He also criticizes technical analysts for their tendency to base their decisions upon spurious patterns they discern on the charts (p244). Nonetheless, Mandelbrot spins around and lauds George Soros for his success stemming from good market timing! From Soros he goes on to underscore the need for "timing". Mandelbrot and Hudson relate a story that captures what individual characteristics it takes for good timing. They capture the combination of different talents that it takes for good timing in the case of Jessica James at Canary Wharf:

> *Jessica James at Canary Wharf: Citigroup runs one of the biggest foreign-exchange operations at Canary Wharf. On a typical day in 2003, it is crowded, busy and self-absorbed. The Citigroup trading room is vast, with hundreds of computers, ceilings, track lighting, and 130 currency traders and salespeople arrayed along rows of desks, six to a side. Above the desks, small flags- the Union Jack, the Stars and Stripes, the Rising Sun- mark the currencies in which each clusters of traders specializes. Their language is colorful and arcane: "Nokie-Stokie" for trades between Norwegian and Swedish kronor (Nokie for the currency's computer code, NOK; Stokie for the Swedish capital, Stockholm); "cables" for the dollar-pound market whose rates were once cabled across the Atlantic; "plain vanilla" for the most common, standardized currency options. Each day, the multinational bank moves about one-ninth of all the world's internationally traded dollars, yens, euros, pounds, zlotys, and pesos; and about a third of its global "FX" business happens on the second floor of the London office.*
>
> *Now, by orthodox [EMH] theory, there should be no research depart-*

ment. You cannot beat the market, so all you need are a few traders and computers to stay even with it. But Jessica James, a Citigroup research vice president, punches up on her computer screen a simple chart, a graph of the dollar-yen exchange rate over the past decade. It wiggles across the screen, a seeming random walk reflecting the world's mercurial views on the relative merits of the American and Japanese economies: up, down or sideways in what the eye sees as an irregular pattern, but which standard financial theory calls random fluctuation. Then she performs an elementary tasks, of the sort chartists have been doing for a century. She calculates a moving average- for each day, the average of the exchange rate over the prior sixty nine days. This calculation traces a smoother, gentler line than the raw price data, averaging out all the peaks and troughs. Now, she suggests, here is a simple way to make some money in the currency market: Every time the actual exchange rate climbs above the average line, you buy. Every time it falls below the average line, you sell. Simple.

The result? If you had followed this strategy over the past decade, she calculates, you could have pocketed an average annual return of 7.97 percent. Heresy. Impossible. According to the Efficient Market Hypothesis, there should be no such predictable trends. Certainly, skepticism is warranted. As James notes, their is a big difference between spotting veins of gold in old price charts and minting real gold in live markets. Those 7.97 percent average returns included some periods of hair-raising loss, when sticking to the strategy would have required steel nerves and deep pockets. Still, a by-now substantial body of economics research suggests that there is, indeed, money to be made in such a "trend-following" strategy; how much, and whether it is worth the risk and expense, is a matter of debate. But clearly, the market pros have already voted: More than half of currency speculators play some form of trend-following game, market analysts estimate." (Mandelbrot, pp.80-82).

Three Key Elements

The *three key elements* for Technical Analysis and trading success that are extractable from the Jessica James case study are:

1.) She has an implicit *behavioral model, a theory, an idea* about how the world works that she uses to gain superior profits.

2.) She applies both *pattern recognition and quantitative TA tools*, such as moving-average cross-overs.

3.) "... required 'steel nerves'..." means that Jessica James saw the need to employ *individual self-discipline or mental state control*, in order to mint real gold in live markets from the veins of gold she spots in historical price charts.

Putting It All Together: The 3-in-1 Trader Model

Identification, integration and adoption of the three key elements of *behavioral models, pattern recognition* and *mental discipline* are what is needed to move the art-and-science of technical analysis and technical trading to a higher level of sophistication. An integrative approach is needed to meet the failings of TA noted by Mandelbrot. An integrative approach is needed to overcome the piece-meal approach that has characterized TA research and practice, [see Appendix 1]. An integrated approach calls for placing the individual decision-maker, the trader in the center of our focus. <*See The 3-in-1 Trader Model*>

This article sets forth a 3-in-1 TRADER MODEL in an effort to "put things together" in an integrative, mutually reinforcing analytical package that makes intuitive sense. This article also serves to bring together previous articles and editorials I've written for the JOURNAL OF TECHNICAL ANALYSIS (formerly THE MTA JOURNAL). Prominent among those earlier pieces were "The Life Model of Crowd Behavior," "Wyckoff Tests: Nine Classic Tests for Accumulation and Nine New Tests for Reaccumulation," and (with Dr. Van R. Tharp) "The Ten Tasks of Top Trading."

Figure 1: The 3-in-1 Trader Model

The Three In One Trader Model: "Like A Triple Threat From A Single Wing"

Analysts in general and traders in particular are accustomed to and enjoy using analogies to explain their world and to help them capture a deeper grasp of what it takes to be a complete, high performer. One favorite field from which to draw analogies is competitive athletics, where one can observe and appreciate the exercise of skills that make for a winning performance. One compelling analogy for the three part skills of the complete trader is the "triple threat" notion in American football.

In the early 1950's, TIME magazine ran a cover story on the then Princeton University All-American Dick Kazmier. The cover story was titled "A Triple Threat from a Single Wing." Princeton's football team operated out of a "single wing" formation. Kazmier personified the complete football player of his era: he was outstanding at the run, the pass and the kick. These three complementary talents, all combined into one individual, made Kazmier an awesome competitor and an All-American Performer.

The 3-in-1 Trader Model presents a "triple threat" skill set. It is not running, passing and kicking, but rather 1. Systems building, 2. Pattern recognition and 3. Mental state management. Through acquiring this "triple threat" skill set the analyst and the trader become more adept and versatile.

The Three Elements Of The 3-in-1 Trader Model

Introduction

Figure 1 shows a model of the "complete trader," *The 3-in-1 Trader*. In this model three complementary decision frameworks support the trader. Starting

with the lower-left quadrant and proceeding clockwise, we see this trader is made "complete" by his comprehension of: 1. A behavioral finance framework for system building; 2. A pattern recognition scheme for discretionary trading and then, 3. A model of trader psychology for mental state control. These three decision frameworks are supplementary and complementary one to the other and indeed they are organized in a natural order of progression. As noted above, these were the three key elements of success that were discernable in the case study of Jessica James at Canary Wharf.

Mark Douglas has stated, "one should start with a mechanical trading system in order to appreciate the probabilistic nature of the market." Then once sufficient skill has been acquired and confidence and self-trust have been garnered, the trader is ready to move upward to the challenge and potentially greater rewards of discretionary trading. In both the Life Cycle Model and the Wyckoff Method, the psychology of the trader plays an important role. Most traders are not ready to "tune in" to a message about trader psychology and mental state control until after they have satisfied their need for knowing some sort a technical method. Later, as the trader grows and matures to become a more complete trader, the psychology/mental state control element becomes the center of attention. Those who have progressed through the stage of gaining knowledge and skill with a judgmental method (i.e. discretionary trading) become keenly aware of the need for mental state control. Cognitive and emotional issues heighten in importance as discretionary trading becomes the responsibility of the trader. At this stage the trader is advised to practice the Ten Tasks of Top Trading.

Section 1: Behavioral Finance and System Building

The Life Cycle of Crowd Behavior gives a "big picture" perspective of the recent, yet important academic discipline of behavioral finance (see Figure No.2). Think of our insights and actions as guided by models or ideas of why and how we believe the world works. This world of models contains two distinct aspects: a "positive model" which explain why something works the way it does and a "normative" model which provides rules/guides for action on how to cope with the world. The history of technical analysis reflects an emphasis upon the normative model of trading rules. The logical, comprehensive and empirical explanations have been largely ignored. However, with the arrival of behavioral finance, there now exists a "positive" theory for explaining the whys of market behavior. (See SIDE BAR I).

The Life Cycle provides a structure for integrating and interpreting indicators organized along the key dimensions of price, time, volume, and sentiment. This behavioral finance model with roots stemming back to The Crowd by Gustave

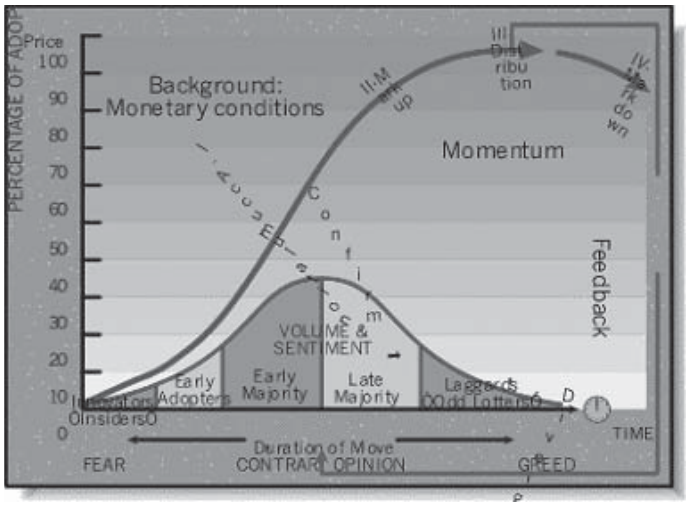

Figure 2: The "Life Cycle Model of Crowd Behavior" is a key article for gaining an introduction to the 3-in-1 TRADER. (JOURNAL OF TECHNICAL ANALYSIS NO.59)

SIDE BAR I

Over the past twenty years, students of technical analysis have frequently asked me: "Now that I've learned all of these various indicators, how do I put them all together?"

Recently the same sort of question was posed to me by an ardent yet frustrated student of technical analysis, a Mr. M. M. of New Jersey, who called to ask: "Where can I go to learn how to put it all together?" This man, it turned out, had read many books on technical analysis, studied charts, acquired software and attended numerous seminars about technical analysis indicators. Along the way he had compiled a lengthy list of assorted technical indicators he wished to follow. But he had not learned these indicators in an integrated manner; rather, he had learned them two, by two, by two. That is he picked them up by studying one predictor indicator and one dependent indicator at a time (e.g., stochastics and the S&P 500). Mr. M. M. was perplexed and frustrated because he lacked the tool/the perspective for putting them all together. He believed that something, somewhere must exist that would show him how to put all of the indicators together. He believed that with them all together he could extract more, and more valuable information from his analysis. He is still searching for some method for putting all of his individual indicators together into some meaningful whole.

Mr. M. M. remains perplexed and frustrated because there is an absence of places to go to learn "how to put it all together," and this is because there are a lack of methods and guiding principles that tell the analyst how to... "put them all together." What is missing is a thing that systematically, meaningfully and exhaustively puts indicators together so that superior diagnosis and better prognosis result.

Mr. M. M.'s frustration and perplexity points out a large hole in the fabric of the technical analysis discipline.

To fill the apparent hole in technical analysis requires a shift in perspective from part to the whole and a shift in research/testing attention from the piece-meal creation and testing of indicators to a more inclusive study of the combined contribution of several interacting indicators. In brief, this means a shift of attention to conceptual schemes, frameworks, models, systems or theories, all of which are viewed as being synonymous with a theoretical model. In effect, filling the hole in technical analysis involves the creation and testing of theoretical models of technical analysis.

Le Bon provides a discipline for selecting, interrelating and adding up technical indicators. The life cycle article can also provide a sound, systemic or "mechanical" framework for the technical-trader. By supplementing technical chart pattern recognition with a model of technical indicators, the trader is better able to distinguish between continuation and reversal patterns, thus, lessening the risk of being caught by debilitating whipsaws.

Section 2: Pattern Recognition and Discretionary Trading

Whereas the preceding section equips the trader with the logic for a "mechanical" system for triggering buy signals and sell signals that are independent of the trader's judgment and intervention, the methods in this second section of the *3-in-1 Trader* Model operate differently. Here, rather than seeking to eliminate or minimize personal intervention and judgment, the trader is personally thrust onto center stage. Discretionary trading relies upon pattern recognition, 'and pattern recognition relies upon the ability of the trader to see, to diagnose, to interpret and to act upon each case observable on the charts. Experience is important for acquiring judgment and for building a seemingly automatic application of the discretionary method.

The Wyckoff Method of chart reading and of technical analysis furnishes the trader with an almost ideal set of laws and principles that the trader can use as general guidelines to interpret chart patterns and to take action. See Figure No.3 for a schematic example of the Wyckoff Method.

The Wyckoff Method is a school of thought in technical market analysis that necessitates judgment. The analyst- trader acquires judgment through experience

and through well-guided illustrations of basic principles. Although the Wyckoff Method is not a mechanical system per se, nevertheless high reward/low risk entry points can be routinely and systematically judged with the aid of a check-list of "Nine Tests." Each test in the list of "Nine Tests' represents a Wyckoff Principle.

Jim Forte's "Anatomy of a Trading Range" article (MTA JOURNAL, Winter 1994) introduces the Wyckoff Schematics. Then Pruden, in his article "Wyckoff Tests: Nine Classic Tests For Accumulation; Nine New Tests For Re-Accumulation" expands upon the Wyckoff Method. (JOURNAL OF TECHNICAL ANALYSIS, NO.54)

As Mr. Richard D. Wyckoff himself said, "Mastering the technical analysis aspects of the method was only half of the battle of working effectively in the stock market" The other half of the battle was controlling emotions and keeping a clear head when actually applying technical analysis in a not-so-perfect market world. The trader's psychology is a particularly important but too often neglected aspect of the Wyckoff Method of Technical Analysis and Trading.

Section 3: Trader Psychology and Mental Discipline

The third and final dimension of the *3 in 1 Trader* addresses the issues of "the other half' of the battle of trading, the mental discipline half. In this section, you are encouraged to read "The Ten Tasks of Top Trading," which can act as a guide to implementing the Wyckoff Method. An inescapable linkage exists, therefore, between the previous note on the Wyckoff Method and the subsequent section on trader psychology and mental state control.

"The Ten Tasks of Top Trading" (V. Tharp and H. Pruden, MTA JOURNAL, Winter 1992/93) grew out of Hank Pruden's collaborative research with Dr. Van K. Tharp, the investor/ trader psychologist. Dr. Tharp has successfully used "The Ten Tasks..." with trader clients; whereas, Dr. Pruden has seen its versatility and utility help numerous students and traders. (See Figure No.4).

You should appreciate the multiple functions that the "Ten Tasks" Model performs. "The Ten tasks..." presents a series of discrete contexts for selecting appropriate mental states; it provides a logical and comprehensive sequence of tasks for the trader to follow; and "The Ten Tasks..." furnishes a framework to summarize most of the other principles contained within the 3-in-1 TRADER. I suggest that after you complete a study of "The Ten Tasks...," you return to Section 2 and rework the chart illustrations found in the San Francisco Company that appears in the "Wyckoff Tests..." article by Pruden. Seek to place yourself in the correct frame of mind for each task that arises as the chart evolves.

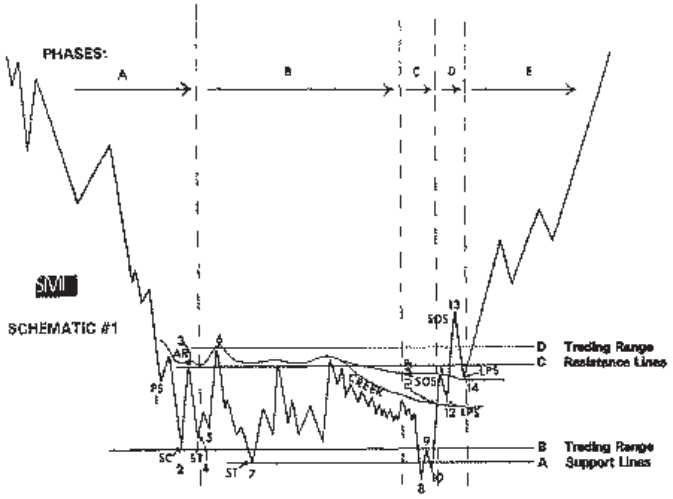

Figure 3

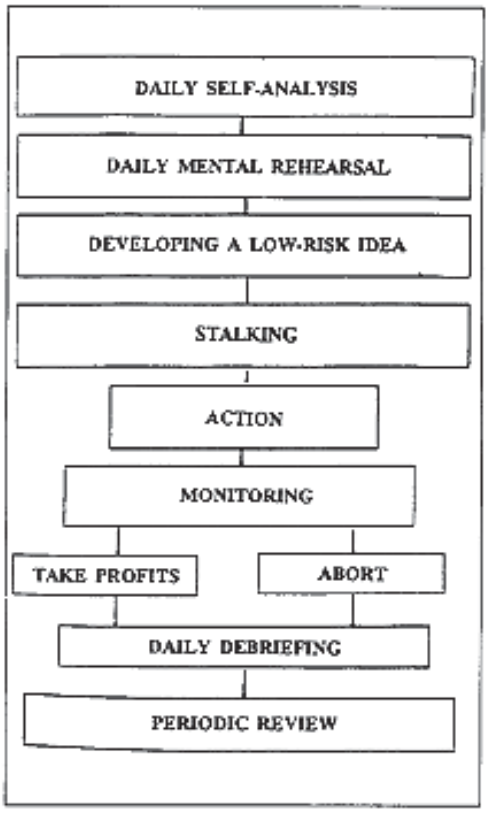

Figure 4

Summary

This article was divided into two major parts. The first part set the problems facing the modern analyst-trader-money manager as set forth in the book, THE (MIS)BEHAVIOR OF MARKETS, by Benoît B. Mandelbrot and Richard L. Hudson. The second part offered a partial solution to those problems via the 3-in-1 TRADER MODEL.

Mandelbrot goes directly to the nature of the non-linear, dynamic behavior that rules the true mathematical makeup of markets. While doing so he destroys the Efficient Market Hypothesis and its allies of orthodox finance. This is a brilliant *tour de force* by the award winning mathematician and father of fractal geometry. His varied and long-standing interests in the behavior of financial market are brought together into this important book that should be required reading for every serious student of finance.

Mandelbrot concludes that " 'Modern' financial theory is founded upon a few, shaky myths that lead us to underestimate the real risk of financial markets... Orthodox financial theory is riddled with false assumptions and wrong results."

Among other things, Mandelbrot observes that markets are ruled by "power curves," and not normal curves, and that there exists long-term dependence not independence in sequential price action. Financial markets are turbulent -like the wind or the flood - and thus fractal analysis applies. The behavior of markets, what the real data show in numerous markets over many different time frames, says Mandelbrot, is that "Market 'Timing' Matters Greatly. Big Gains and Losses Concentrate into Small Packages of Time." While underscoring the importance of market timing, Mandelbrot remains critical of most of what passes for the technical analysis approach to market timing, which he feels is too often done superficially and with erroneous interpretations of charts.

The Three-in-one Trader Model

Traders like to use analogies to explain their world and to help them capture a deeper understanding of what it takes to be a complete, high performer. A favorite field from which to draw analogies is competitive athletics. One attractive analogy for the three part skills of the complete trader is the "triple threat" notion in foot-ball. Applying this analogy to trading, Hank found the 3-in-1 Trader seeks to develop a "triple threat" skill set: technical analysis and

1.) Systems building
2.) Pattern recognition
3.) Mental state management

These three decision frameworks, illustrated in Figure 1, interact with each other and build on each other in a natural order of progression. A behavioral finance framework for system building provides the structure for integrating and interpreting indicators organized along the key dimensions of price, time, volume and sentiment.

A pattern recognition scheme for discretionary trading, such as the Wyckoff Method of chart reading and of technical analysis furnishes the trader with an almost ideal set of laws and principles that the trader can use as general guidelines to interpret chart patterns and to take action. A model of trader psychology for mental state control is needed for success in system or discretionary trading. Pruden's collaborative research with Dr. Van K. Tharp led to "The Ten Tasks of Top Trading," a series of discrete contexts for selecting appropriate mental states and providing a logical and comprehensive sequence of tasks for the successful trader to follow.

Conclusion: A Quest For The Three-in-one Trader

The most profound lesson I learned abroad while working with individuals and with groups during 2004-2005 was the essentialness of the Concept of The Composite Man for students of the Wyckoff Method.

At the same time I came to better appreciate how difficult it is for traders and analysts to really grasp and apply with ease the concept of The Composite Man. The upshot of this lesson learned abroad: we in San Francisco need to track down the Composite Man; we need to understand him and use him more thoroughly, more intimately, and more profoundly.

During the Academic Year 2005-06 I plan to dedicate myself to the quest for the Composite Man. I believe that this quest could be best accomplished as a group endeavour.

I wish to extend an INVITATION to both new and former students of Wyckoff to come join me in FI 354, Wyckoff I, at Golden Gate University this Fall 2005. A central theme of the FI 354 course will be the quest for the Composite Man; the research project for the term shall focus upon the Composite Man.

To commence this pursuit of the Composite Man, we can rely upon the fine starts made by Richard D. Wyckoff and his Associates. We can also turn to the captivating anecdotes found in the REMINISCENCES OF A STOCK OPERATOR.

To move forward, the Wyckoff Student can select any of several available routes. There is the historical route of studying the character, life and times of the legendary operators of Wall Street in the early 1900's or of other operators on earlier streets. Another route would be to conduct the quest using the most modern analytical tools available from the theories of behavioral finance. An interesting and creative approach would be to capture the Composite Man with allegories and metaphors. A challenging, and perhaps the most profound route, would be to collect an understanding of the Composite Man and increase our capacity to make profitable use of that Composite Man Concept through writing, especially fictional writing.

During the past year as I travelled about Europe and the Middle East, my awareness of the power of writing , particularly the power of writing fictional stories, became considerably enhanced. In Spain I found fruit in Washington Irving's *Tales of the Alhambra*. In Paris, I located a good guide in William H. Gass, *Fiction and Figures of Life*; then there was the inspiring visit to Winston Churchill's home in Chartwell, England. In Cairo, I was introduced to the fascinating short stories, in *The Time and the Place*, by Egyptian Nobel Prize Winner Naguib Mahfouz. Finally, in Prague, the Czech Republic, I visited an intriguing exposition of Franz Kafka, and then purchased and studied a book covering that exposition entitled *The City of K.: Franz Kafka and Prague*.

All of the foregoing routes and books instruct us to believe that we have powerful ways within our grasp that enable us to command a greater mastery of the concept of the Composite Man. For example, Kafka, who was the master at getting behind the scenes and exploring the essence of things, had the following to say about his craft of writing:

> *"The strange, mysterious, perhaps dangerous, perhaps saving comfort that there is in writing: it is a leap out of murderers' row; it is seeing of what is really taking place. This occurs by a higher type of observation, a higher, not a keener type, and the higher it is and the less within reach of the "row", the more independent it becomes, the more obedient to its own laws of motion, the more incalculable, the more joyful, the more ascendant its course."*
>
> *"Literature is a fiction that achieves its greatest power when it reveals, denounces, or dismantles the powerful fiction that governs the lives of men..."*

The Three-in-1 Trader Model contains an additional or fourth dimension, the person of the trader or technical-trader himself or herself. An image of this idealized trader is visible in the 3-in-1 Trader Model. The image of the 3-in-1 Trader appears in the center of the model, where it suggest the combination and unification of the three other dimensions or the three elements of behavioral finance, pattern recognition and mental discipline personified in one individual.

A fruitful future direction for case study research would be the pursuit of the "person" contained within the three-in-1 Trader Model. For a sense of proportion and direction in conducting such a pursuit, one can turn to the historical examples provided by Edwin Lefevre in The Reminiscences of a Stock Operator. Some observers have asserted that the book was based upon the persona and the exploits of Jesse Livermore, the famous trader of the 1920's era. Other observers believe that the numerous anecdotes were really fictional, that were inspired by the lives and accomplishments of real traders encountered by Lefevre during that epoch of the early 1900's on Wall Street.

The principal character found in the Lefevre book, Mr. Larry Livingstone, could well be a composite of many other men. In any respect, traders and analysts have discovered and re-discovered this book as a treasure chest. The Reminiscences can serve as a valuable means of rounding out the Three-in-One Trader. Readers will discover within that text numerous illustrations of the (MIS)BEHAVIOR OF MARKETS described by Mandelbrot.

A parallel study of the central role of the King-Pin trader was fashioned by Richard D. Wyckoff. This was Wyckoff's concept of the Composite Man. The Composite Man was the driving force behind the supply and demand as he exerted efforts to attract of to repel a following of investors into the security he was manipulating.

The Concept of the Composite Man can be fashioned into an abstraction, a fictional character, who works behind scenes. A useful guide for one to follow by reading the charts to interpret his/her intentions and then to act accordingly.

Although the Concept of the Composite Man is a valuable heuristic for grasping the essence of the 3-in-1 Trader, it is an elusive concept. It has been my experience that the Concept of The Composite Man is difficult for professional people who are active in the market to grasp and this to employ with ease. Therefore, a quest for the Concept of the Composite Man is an ongoing task of high priority."

Appendix 1
Models Of Market Behavior For Putting It All Together

**Theories are nets cast to catch what we call "the world;"
to rationalize, to explain, and to master it.
We endeavor to make the mesh ever finer and finer.
- Karl R. Popper, *The Logic of Scientific Discovery***

Philosophy, whether the thoughts of Karl Popper or anyone else, was not supposed to be a road map for making money in the real world.

Yet for George Soros, philosophy would serve just that purpose. In time, he would go from the abstract to the practical; he would develop theories of knowledge, of how and why people think in certain ways, and from those theories he would spin new theories about the way the financial markets functioned.

-Robert Slater, Soros*: The Life, Times & Trading Secrets of the World's Greatest Investor*

According to Mandelbrot:

"All models by necessity distort reality in one way or another. A sculptor, when modeling in stone or clay, does not try to clone Nature; he highlights some things, ignores others, idealizes or abstracts some more, to achieve an effect. Different sculptors will seek different effects. Likewise, a scientist must necessarily pick and choose among various aspects of reality to incorporate into a model. An economist makes assumptions about how markets work, how businesses operate, how people make financial decisions. Any one of these assumptions, considered alone, is absurd. Their is a rich vein of jokes about economists and their assumptions. Take the old one about the engineer, the physicist, and the economist. They find themselves shipwrecked on a desert island with nothing to eat but a sealed can of beans. How to get at them? The engineer proposes breaking the can open with a rock. The physicist suggests heating the can in the sun, until it bursts. The economist's approach: "First, assume we have a can opener..."

Thankfully the world of technical market analysis is observable, time dependent, quantitative and unambiguous, all of which help model building and testing. As for ideas, one can pursue the route followed by George Soros, who turned to first principles in human behavior and the philosophy of science to logically develop theories which he then tested in the real world.

In addition, an analyst can derive theories of technical analysis from direct personal observation of the technical world, or by deducing from a classic writing such as from the legendary Jesse Livermore in *Reminiscences of a Stock Operator*. In that book, the chapters on "manipulation" by the stock market operator could easily have given birth to modern-day "on-balanced volume." Finally, in my view, the new school of behavioral finance, which shares roots in psychology and sociology and with technical analysis, is a very promising source of conceptual schemes for "putting it all together."

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About the Author

Hank Pruden is a visiting scholar at Euromed Marseille Ecole de Management, Marseille, France during 2004-2005. Professor Pruden is a professor in the School of Business at Golden Gate University in San Francisco, California where he has been teaching for 20 years. Hank is more than a theoretician, he has actively traded his own account for the past 20 years. His personal involvement in the market ensures that what he teaches is practical for the trader, and not just abstract academic theory.

He is the Executive Director of the Institute of Technical Market Analysis (ITMA). At Golden Gate he developed the accredited courses in technical market analysis in 1976. Since then the curriculum has expanded to include advanced topics in technical analysis and trading. In his courses Hank emphasizes the psychology of trading and as well as the use of technical analysis methods. He has published extensively in both areas.

Hank has mentored individual and institutional traders in the field of technical analysis for many years. He is presently on the Board of Directors of the Technical Securities Analysts Association of San Francisco and is past president of that association. Hank was also on the Board of Directors of the Market Technicians Association (MTA). Hank has served as vice chair, Americas IFTA (International Federation of Technical Analysts): IFTA educates and certifies analysts worldwide. For eleven years Hank was the editor of The Market Technicians Association Journal, the premier publication of technical analysts. From 1982 to 1993 he was a member of the Board of Trustees of Golden Gate University.

The Power Point and Figure Method

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5

I. Power Point and Figure (PPF): Introduction

Point and Figure Charting provides an excellent mechanism for pinpointing precise buy/sell signals, as this charting method is solely concerned with plotting price movements in columns occupied by "X's" and "O's" to denote buying and selling pressure, respectively. Adds Thomas Dorsey in *Point & Figure Charting: The Essential Application for Forecasting and Tracking Market Prices*, "The beauty of this method is its ability to form simple chart patterns that record the battle between supply and demand." However, the shortcoming of this charting method is its total disregard for the importance that volume plays in the formation of a stock's pattern. As most market technicians acknowledge, volume often precedes price. To this end, I have devised the Power Point and Figure Method (PPF) as a way of incorporating volume into the Point and Figure method of charting as described in more depth below.

To assess the underlying strength/weakness of a given price move, technicians will often rely upon the total volume of shares traded to assist in this endeavor. For instance, by comparing the stock's volume to its average daily volume, we are able to determine if the stock attracted unusual buying demand or was the rally accompanied on light trade, which often is a precursor that the buying demand is withering and that a downturn in the stock is imminent. Consequently, the technician that relies solely on charting price movement is vulnerable to missing key red flags. By varying the color of the boxes, we are able to depict the degree of demand/supply or lack thereof of a security. In addition, by making the "X's" and "O's" case sensitive, we can gauge the magnitude of the move as described later in this report.

The mechanics of PPF charting is identical to the widely known method of Point and Figure charting. Namely, if you were in the "X" column, the technician would first look at the session high to determine if an "X" could be placed. If the stock did not advance, then a comparison of the session's low to the assigned box value and reversal value would determine if a crossover into the "O" column is necessary. At this point, the chart pattern under the enhanced version will be identical to the customary way of utilizing the Point and Figure chart. The difference takes place when comparing the stock's volume to its average daily volume. The two ways to accomplish this task is to compare the session's volume to the average daily volume on that day, this is called the "Snapshot" version, since you are looking only at that particular point in time. The second way entails accounting for all of the trading that took place since the last assignment of an "X" or "O." I refer to this method as the "Rolling" method since it encompasses all trading. Further discussions of these two methods, along with specific graphs, of each are depicted later in this report.

Box Colors

The method developed in this paper compares the stock's movement to its 20-day average daily volume. Because its length approximates one month of trading and often represents a complete trading cycle, traders commonly use the 20-day moving average. If an advance transpires on above average trading volume, the color of the box will be dark green indicating strong buying demand. However, if an advance takes place on below average trade, the color of the box will be light green, indicating tepid buying demand. On the other hand, the color of the box of a stock that has fallen in above average trade will be dark red, indicating strong selling pressure, while a stock that has fallen on below average trade will have a pink box.

Volume Speaks Volumes

It is widely accepted among technical analysts that the volume behind a stock's move is a vital piece of information presenting clues as to the sustainability of the movement. For example, a breakout accompanied by below average volume often is a telltale sign that demand is withering and an imminent reversal is on the horizon. According to market technician Stan Weinstein, "Never trust a breakout that isn't accompanied by a significant increase in volume…Volume most definitely must confirm the breakout." Highly regarded technician John Murphy wrote in *Charting Made Easy*, "Volume provides important secondary confirmation of price action on the chart and often gives advance warning of an impending shift in trend…Volume measures the pressure behind a given price move. As a rule, heavier volume should be present in the direction of the prevailing price trend." The fact that in virtually all other technical indicators/methodologies, volume plays a role in one form or another is evidence that this piece of the trading data should not be ignored.

The Power Behind the Move

As noted earlier, by making the "X's" and "O's" case sensitive, we can visually illustrate the robustness of the move. The capitals will denote the end of the move, while the lower case letters will be used to show the changes between the last movements.

Chart 1: Biosite, Inc. (BSTE)

Shares of BSTE experienced a sharp selling reversal, crossing over into the "O" column, as the stock plunged from $67 down to $53 in one swoop, hence the formation of thirteen uninterrupted lower case "O's." Furthermore, the dark red color of the boxes tells us the movement was accompanied on above average volume. By inserting color to the boxes and case sensitivity, the chart contains much more pertinent information to the technician in one simple graph than the user of the current Point and Figure methodology would detect. Conversely, if a stock grinds its way higher by adding a point every session, the boxes would consist of all capital "X's." If volume were light, the boxes would be colored light green to forewarn the technician of a slowdown in demand.

				68.00
		X		67.00
		X	o	66.00
		x	o	65.00
		x	o	64.00
		X	o	63.00
X		x	o	62.00
x	o	X	o	61.00
x	o	X	o	60.00
x	O	5	o	59.00
	O	x	o	58.00
	o	x	o	57.00
	O		o	56.00
			o	55.00
			o	54.00
			O	53.00
				52.00

Chart 1: Biosite, Inc. (BSTE)

Test Data

The daily high, close, and volume data of thirty stocks spanning December

26, 2003 through May 31, 2005 was used thoroughly to test the Power Point and Figure methodology. To ascertain whether the methodology favored one segment of the market or produced consistent results across a wide universe of stocks, the thirty stocks were divided equally among small, mid, and large-cap companies. The stocks included in the study were chosen randomly, though had to produce a minimum of seven trading signals during the timeframe. Overall, the test data pro-duced 356 trading signals, including 115 signals for the small cap stocks, 121 signals for the mid-cap stocks, and 120 signals for the large caps. In order to reference time, "X's" and "O's" were substituted with numbers or letters, denoting the first movement of every month.

In keeping with the Point and Figure standards, numbers referred to the respective month, while letters "A," "B" and "C" referred to October, November, and December, respectively. The letter or number was placed in the box marking the end of each move. I employed the three-box reversal criteria.

Trading Signals

A buy signal was generated when a column of "X's" exceed the prior column of "X's," while a sell signal was triggered when a column of "O's" fell below a prior column of "O's." The trade was closed when the stock completed its initial move following the breakout, making the closing price the last "X" or "O" plotted in the column that contained the buy or sell signal. In essence, I was interested in determining whether volume had a positive impact on the thrust of the breakout. In actuality, an investor may elect to close out positions based on a number of different disciplines and hence will experience different results than those found in this study.

Volume Filters

In setting out to incorporate volume into the Point and Figure method, two slightly different ways (Snapshot and Rolling) compare the degree of buying/selling pressure transpiring in a stock. Taking the analysis one-step further by utilizing a volume filter to generate signals only when the breakout transpired on volume above a pre-determined level as displayed in the following table improved performance:

	Volume Filter
Small-caps	50%
Mid-caps	40%
Large-caps	30%

Table 1: Volume Filters

As a result, each of the thirty stocks was tested under four different scenarios (Snapshot Method, Snapshot Method Utilizing a Volume Filter, Rolling Method, and Rolling Method Utilizing a Volume Filter).

A brief explanation and sample of each of the four methodologies follows.

II. The Power Point and Figure Methodologies

The Snapshot Method

The Snapshot method involves comparing the stock's volume ONLY on the day when the price movement dictates the placement of a new "X" or "O" in the box to its 20-day average daily volume. In effect, trading sessions that transpired whereby no change in the Point and Figure chart took place are not factored into the equation. For all intense and purposes the trading that transpires between the last plotted "X" or "O" and the most current is regarded as "noise."

In the example on the next page (Chart 3), on May 20, 2004, shares of AMZN swung over to the "O" column on volume of 5,927,816 shares, which was below the 20-day ADV of 7,822,342 shares. As a result, the box is colored light red. Subsequently, a rally resumed with the stock hitting a high of $45 during the May

Date	High	Low	Volume	20-dayADV
5/19/04	43.27	41.47	7,380,419	8,325,970
5/20/04	41.97	**40.80**	5,927,816	7,822,342
5/21/04	41.48	40.55	5,273,877	7,355,890
5/24/04	42.30	41.17	5,075,698	7,242,514
5/25/04	43.86	41.39	7,241,833	7,155,377
5/26/04	**45.00**	43.67	**7,425,793**	7,220,078
5/27/04	**47.83**	44.85	**14,176,889**	7,476,894
5/28/04	**48.68**	46.88	**10,629,278**	7,514,367
6/1/04	**50.45**	47.70	**12,942,455**	7,815,322
6/2/04	**51.21**	49.77	**12,475,866**	8,074,670
6/3/04	50.35	49.32	8,347,114	8,247,501
6/4/04	51.51	50.00	12,586,254	8,485,612
6/7/04	51.99	50.65	7,712,959	8,406,399
6/8/04	**52.12**	51.10	**5,995,694**	8,195,172
6/9/04	51.83	50.01	6,580,371	8,144,265
6/10/04	50.47	49.26	7,209,074	8,130,193
6/14/04	49.99	49.04	5,180,942	7,976,185
6/15/04	50.60	49.49	6,912,444	8,065,452
6/16/04	50.75	49.91	4,097,550	7,938,879
6/17/04	50.91	49.41	5,879,864	7,952,610
6/18/04	50.28	49.40	4,434,385	7,805,308
6/21/04	50.30	49.25	4,490,227	7,733,428
6/22/04	49.79	**48.24**	**8,160,409**	7,877,755

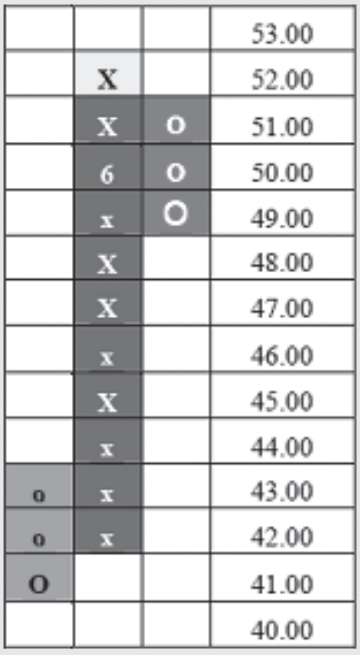


Chart 2: Snapshot Method – Amazon.com, Inc. (AMZN)

26, 2004 session on above average trading volume of 7,425,793 shares versus a 20-day ADV of 7,220,078 shares traded. As a result, the chartist would move to the right of the "O" column and place three lower case "X's" followed by a capital "X" in box 45 denoting the extent of the move. In addition, the color of the boxes would be dark green to indicate the rally transpired on above average volume. AMZN would climb to a high of $52 (which occurred on below average volume and thus was assigned a light green box) before sellers would regain control to push the stock down to $49 on above average volume (dark red boxes stretching from $51 to $49).

Charts of the Snapshot and Rolling Methods of all 12 stocks are contained in the Chart section of this report.

The Snapshot Method Utilizing a Volume Filter

The implementation of the Snapshot Method Utilizing a Volume Filter is identical to the Snapshot Method except that volume must be equal to or exceed the 20-day average daily volume by a preset minimum. As a result, I was only interested in acting on signals whereby the level of trading was noticeably heavier than usual. Consequently, employing a volume filter will result in less trades, and thus fewer false signals. Moreover, the signals that are generated are expected to be more robust, as the consensus is that the heavier the volume on a breakout, the more bullish/bearish the pattern.

Method Utilizing a Volume Filter, as the volume on the breakout failed to exceed the minimum 30% volume filter criteria.

Date	High	Low	Volume	20-ADV	30% Snapshot Volume Filter
3/30/04	**43.93**	42.56	5,457,722	6,916,745	
3/31/04	**44.00**	42.95	4,679,169	6,670,503	
4/1/04	44.84	43.30	6,511,622	6,627,038	
4/2/04	**46.25**	45.25	**8,149,754**	6,713,204	**21%**
4/5/04	**47.09**	45.59	5,939,397	6,679,596	
4/6/04	46.97	45.75	5,922,597	6,646,025	
4/7/04	46.80	45.39	4,560,165	6,527,345	
4/8/04	**48.15**	47.00	8,879,788	6,615,465	
4/12/04	48.37	47.57	4,346,828	6,521,467	

Table 2: Snapshot Method Utilizing a 30% Volume Filter – Amazon.com, Inc. (AMZN)

The Rolling Method

The Rolling method involves comparing the stock's average volume during the entire price movement to its 20-day average daily volume on the day that necessitated the movement. *As a result, this method takes into account all of the trading that transpired between the time of the last movement and the current change.*

An example of this charting method is presented in Chart 3.

Chart 3: Rolling Method - Biosite, Inc. (BSTE)

On January 18, 2005, shares of Biosite moved up to $62 from $61 on January 13, 2005, though average daily volume over the two-day trading period (since the stock's last movement occurred on January 13) came in at 254,573 shares versus the stock's 20-day ADV of 280,122 shares. Consequently, based on the Rolling Method, it required a light green "X" to be placed in the box. However, according to the Snapshot Method, the volume of 285,708 shares on the date of movement (January 18, 2005) exceeded the stock's 20-day ADV and thus would have meant the placement of a dark green "X."

Subsequently, the stock fell back to the $59 area, resulting in a cross over to the "O" column. Once again, the "rolling" activity took place on below average volume, resulting in the placement of three light red boxes. By January 27, 2005

Date	High	Low	Volume	20-dayADV	Rolling Method
1/12/05	60.21	58.50	224,037	288,515	
1/13/05	**61.72**	59.80	355,279	283,626	**269,892**
1/14/05	61.81	60.75	223,438	280,020	
1/18/05	**62.40**	61.30	285,708	280,122	**254,573**
1/19/05	61.75	60.61	195,197	274,952	
1/20/05	60.67	**58.53**	330,798	277,088	**262,998**
1/21/05	60.46	59.24	240,573	276,022	
1/24/05	59.48	58.59	191,749	278,541	
1/25/05	59.48	58.21	495,954	290,250	
1/26/05	59.49	58.30	629,969	314,251	
1/27/05	56.95	**53.41**	2,038,306	407,708	**719,310**
1/28/05	**57.47**	54.59	1,446,171	456,064	**1,446,171**
1/31/05	**59.29**	57.81	836,011	486,796	**836,011**
2/1/05	59.75	58.36	369,948	486,906	
2/2/05	**60.46**	58.41	494,606	494,285	**432,277**
2/3/05	**61.98**	60.46	448,897	494,484	**448,897**
2/4/05	**62.25**	60.84	264,034	492,041	**264,034**
2/7/05	**64.06**	62.50	631,820	511,884	**631,820**
2/8/05	64.09	62.20	359,150	514,377	

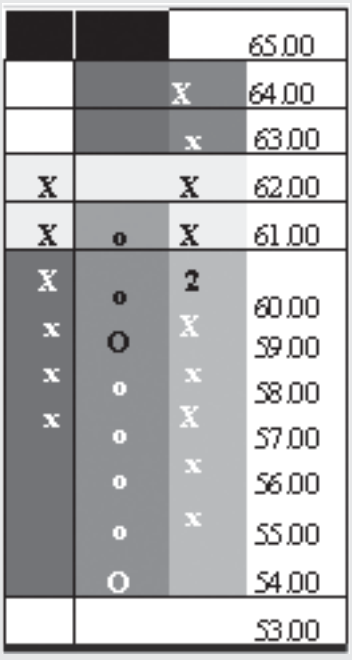


Chart 3: Rolling Method - Biosite, Inc. (BSTE)

Date	High	Low	Volume	20-day ADV	Rolling Method	30% Rolling Volume Filter
7/9/04	77.15	**74.50**	547,700	427,955	**547,700**	**28%**
7/12/04	76.42	75.05	321,000	424,655		
7/13/04	75.48	74.30	389,000	430,380		
7/14/04	**85.56**	79.94	2,905,000	565,270	**1,205,000**	**113%**
7/15/04	**86.38**	84.10	1,014,700	603,505	**1,014,700**	
7/16/04	**87.51**	85.48	851,500	625,380	**851,500**	
7/19/04	87.40	85.93	698,500	644,210		
7/20/04	86.60	85.45	332,200	636,470		
7/21/04	86.75	**83.96**	657,500	651,175	**562,733**	
7/22/04	84.00	**82.80**	857,800	671,235	**857,800**	
7/23/04	83.30	82.56	527,000	649,615		
7/26/04	83.40	**80.90**	591,700	654,220	**559,350**	
7/27/04	**84.15**	81.85	455,500	665,315	**455,500**	
7/28/04	83.75	81.13	715,100	668,875		
7/29/04	81.01	**76.11**	2,647,900	787,205	**1,681,500**	**114%**

Table 3: Rolling Method Utilizing a 30% Volume Filter – Alcon, Inc. (ACL)

the pace of selling accelerated with the average daily volume between January 20, 2005 and January 27, 2005 rising to 719,310 shares versus 20-day ADV of 407,708 shares. In addition, the column of "O's" exceed the prior column of "O's," triggering a sell signal (hence the bolding of the cells) and the plotting of four lower case "O's" and one capital "O."

Shortly thereafter, a rally resumed with the stock climbing back to the $62 mark before breaking out on above average trade to generate a volume confirmed buy signal.

The Rolling Method Utilizing a Volume Filter

The construction of the Rolling Method Utilizing a Volume Filter is identical to the Rolling Method discussed in the previous segment, except trading signals are generated only when the ADV from the last placement of an "X" or "O" is greater than the pre-determined filter. Once again, I was only interested in acting on signals whereby the level of trading was noticeably heavier than usual. Consequently, employing a volume filter will result in less trades, and thus fewer false signals. Moreover, the signals that are generated are expected to be more robust, as the consensus is that the heavier the volume on a breakout, the more bullish/bearish the pattern.

In the example (see Table 3), shares of Alcon triggered a sell signal on July 9, 2004 when it fell below $76 on rolling volume of 547,700 shares versus 20-day ADV of 427,955 shares. The 28% increase in volume compared to the stock's 20-day ADV fell short of the 30% rolling volume filter requirement, thereby generating a non-confirmed sell signal. On July 14, 2004, the stock soared to $85, and in the process set off a volume-confirmed buy signal at $82 (prior resistance at $81 not reflected in Table 3) as the rolling volume of 1,205,000 shares reflected a 113% increase over the stock's 20-day ADV. The stock would peak at $87 before swinging over the "O" column. A rally on July 27, 2004 on below average volume (light green box) briefly halted the decline before the downtrend resumed with a move below $80 as rolling volume swelled to 1,681,500 shares, representing a 114% spike above the stock's 20-day ADV.

Daily Stock Data

The daily stock data located in the Appendix A depicts each stock's high, low, volume, average daily volume, rolling volume, and volume percentage that the breakout is above/below the stock's ADV. When the volume percentage is greater than the stock's 20-day ADV by the amount of the preset filter, the color of the box will be dark to indicate a volume confirmed movement has taken place. Conversely, if the volume percentage is less than the 20-day ADV, the color of the box will be a light shade of green or red.

To highlight the buy/sell signals, the cells are outlined in boldfaced. An example with a brief description is presented in Table 4.

The Rolling Method column contains the average daily volume that transpired in HET's since the last placement of either an "X" or "O." In Table 4, the stock moved from the "X" column at $68 on May 4, 2005 to the "O" column at $65 on May 13, 2005. The average daily volume during May 5, 2005 through May 13, 2005 period amounted to 1,205,900 shares, which was less than the stock's 20-day ADV, thereby resulting in three light red boxes in the "O" column of the Rolling Method to reflect the movement from 68 down to 65.

Since the volume of 1,352,800 shares on the day of the actual placement of the "O" was also less than the 20-day ADV, the Snapshot Method would also contain three light red boxes.

Subsequently, the stock reversed course and swung back to the "X" column on May 18, 2005 with a rally to $69. This time the activity transpired on above average volume of 2,530,800 shares. Thus, the Snapshot Method would contain four dark green boxes moving from $65 to $69. The ADV during the period covering May 16, 2005 through May 18, 2005 totaled 1,521,667 shares, which is greater than the stock's 20-day ADV of 1,423,090 shares, thus permitting the Rolling Method to color four dark green boxes. **In addition, the row is bolded indicating that the movement of the stock triggered a trading signal.** In this case, the breakout occurred on above average volume for the Snapshot Method, Snapshot Method Utilizing a Volume Filter and Rolling Methods. However, the Rolling Method's average volume was a mere 7% above this mid-cap stock's 20-day ADV, thus falling well short of the required 40% necessary to trigger a volume confirmed buy signal for the Rolling Method Utiliz-ing a Volume Filter Method.

III. Power Point and Figure Results

The results in the tables above overwhelmingly prove that an investor utilizing any one of the four Power Point and Figure methods could achieve the best of both worlds (lower risk and higher profits) than an investor who traded without regard to the key role that volume plays.

The data presented in Table 5 illustrates the more attractive risk component

Date	High	Low	Volume	20-day ADV	Rolling Method	40% Rolling Volume Breakout Filter	40% Snapshot Volume Breakout Filter
5/4/05	**68.38**	65.00	1,604,000	1,987,195	**1,367,000**		
5/5/05	67.75	66.40	713,600	1,708,405			
5/6/05	67.65	66.99	1,125,200	1,659,045			
5/9/05	67.50	66.97	1,382,800	1,642,265			
5/10/05	67.81	66.15	1,113,300	1,567,055			
5/11/05	67.66	66.53	1,266,900	1,488,050			
5/12/05	67.79	66.00	1,486,700	1,466,960			
5/13/05	66.10	**64.30**	1,352,800	1,453,865	**1,205,900**		
5/16/05	66.38	64.78	1,120,500	1,439,625			
5/17/05	67.49	65.59	913,700	1,395,960			
5/18/05	**69.73**	67.41	2,530,800	1,423,090	**1,521,667**	**7%**	**78%**
5/19/05	**71.36**	68.98	2,283,800	1,473,290	**2,283,800**		
5/20/05	70.98	70.27	1,506,300	1,472,575			

Table 4: Excerpt of Harrah's Entertainment (HET) Daily Stock Price Data

Method	# of Profitable Trades	# of Non-Volume Confirmed Signals	% Profitable Trades	# of Profitable Trades	# of Volume Confirmed Signals	% Profitable Trades
Snapshot	46	69	67%	230	287	80%
Snapshot Volume Filter	115	154	75%	161	202	80%
Rolling Method	86	123	70%	190	233	82%
Rolling Method Volume Filter	178	240	74%	98	116	84%
Average	**106**	**147**	**72%**	**170**	**210**	**81%**

Table 5: Risk

Method	# of Non-Volume Confirmed Signals	Average Return	# of Volume Confirmed Signals	Average Return	Total Signals	%Return on All Signals
Snapshot	69	5.63%	287	7.48%	356	7.12%
Snapshot Volume Filter	154	7.01%	202	7.21%	356	7.12%
Rolling Method	123	5.15%	233	8.17%	356	7.12%
Rolling Method Volume Filter	240	6.22%	116	9.05%	356	7.12%
Average	**147**	**6.00%**	**210**	**7.98%**	**356**	**7.12%**

Table 6: Return

an investor would enjoy by implementing a system that traded solely based on volume confirma-tion breakouts. Clearly, the use of volume to confirm Point and Figure signals helps to eliminate further false signals and whipsaws, an occurrence highly cherished by traders. In fact, the risk profile of the four Power Point and Figure methodologies produced a profitable trade on average 81% of the time versus 72% for non-volume confirmed signals.

Naturally, the Rolling Method Utilizing a Volume Filter, which possesses the strictest criteria to trade, produced the least number of trading signals (116), but also boasted the highest percentage of profitable trades (84%). Of the 116 signals that were confirmed by volume, 84% were profitable based on the exit criteria and ignoring transaction costs. Of the 240 signals that were not confirmed by the volume filter, only 74% of the trades were profitable. Not only would a trader enjoy a better likelihood of profiting, but also exposure to the equity market would be substantially less, thus freeing up capital to be deployed in other fashions.

Table 6 clearly illustrates that by trading only volume-confirmed signals, an investor would have realized on average higher profits across the board regardless of the Power Point and Figure method selected. On average, the four Power Point and Figure methods yielded a return of 7.98%, representing a 33% improvement over the 6% average achieved trading non-volume confirmed signals.

By adhering to the Rolling Method with a Volume Filter system, an investor would have achieved a return of 9.05% by trading only the volume confirmed signals. In addition, the exposure to the market would have been limited to 116 signals. Whereas, an investor who traded based on non-confirmed signals would have made only 6.22% and would have had capital allocated to 240 trades.

A summary of results, grouped by market capitalization and arranged in alphabetical order, of each of the four methods is presented in the tables on the following three pages.

Conclusion

The results of PPF overwhelmingly proved that an investor could achieve the best of both worlds (lower risk and higher profits) than an investor who traded without regard to the key role that volume plays. Moreover, the results were consistent across the entire sample set, thereby making the methodology applicable to all stocks regardless of market capitalization. Furthermore, incorporating volume into the Point and Figure method reduced the number of false moves, resulted in lower trading costs, and better utilized available capital. As a result, traders implementing PPF are equipped to make better-informed trading decisions.

About the Author

Frank E. Testa joined Corporate Investor Communications, Inc. in 1990 and founded the firm's Market Surveillance Department. In 2001, CIC sold the division to CapitalBridge. He is presently a Vice President & Chief Technical Analyst of CapitalBridge and is responsible for advising clients in several industries, including companies in the technology, defense, finance and retailing sectors, regarding institutional investors and all aspects of market developments that may be impacting the trading activity in the clients' stock. Frank is a senior member of the market intelligence group with 15 years of market surveillance and investing experience. In addition, Frank is a regular contributor to CANSLIM.net, an online stock newsletter employing the growth-oriented investment methodology of Investor's Business Daily. From 1986 to 1988, he was employed as a mutual funds liaison at Dean Witter Reynolds where he successfully passed his series 7 and series 63 exams. Frank graduated William Patterson University in 1986 with a Bachelors of Arts degree in Business Administration and a minor in economics. He presently resides in Glen Rock, NJ and is married with two children. Frank can be reached at (201) 499-3526 and e-mailed at frank.testa@cap-bridge.com

Figure 1A: Snapshot Method

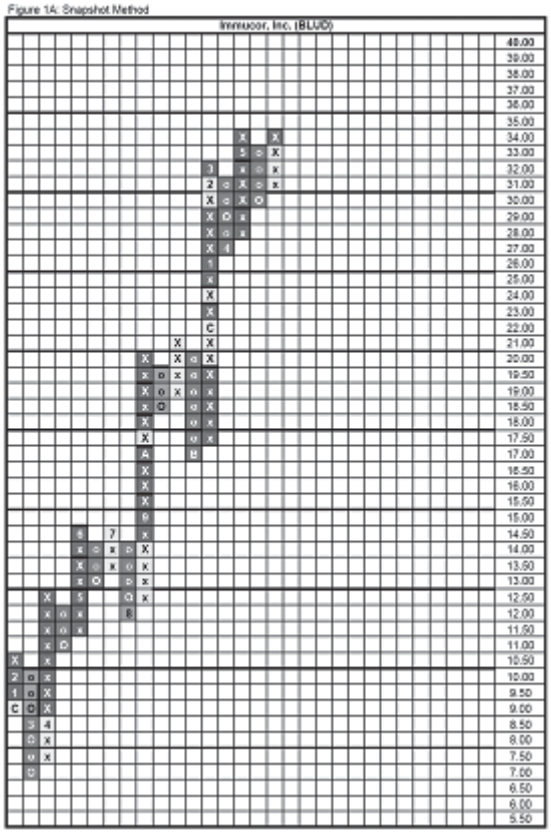


Figure 2A: Snapshot Method

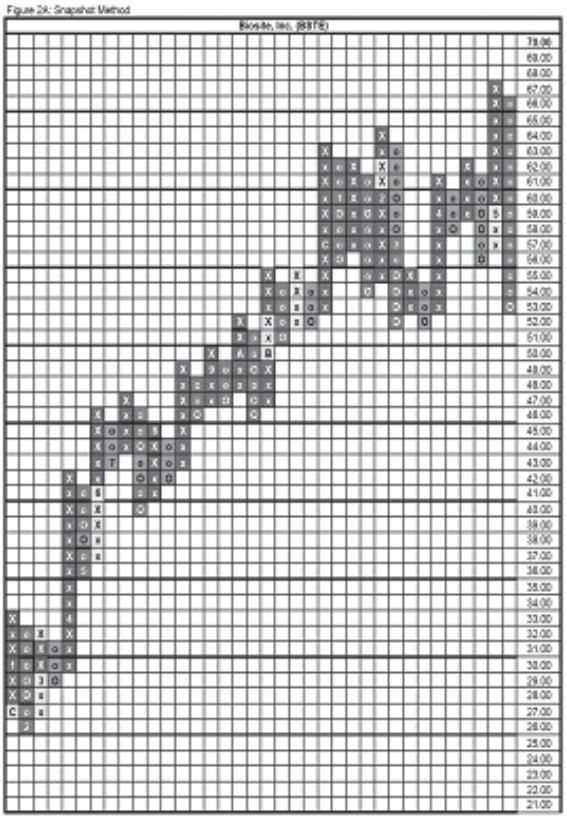


Figure 1B: Rolling Method

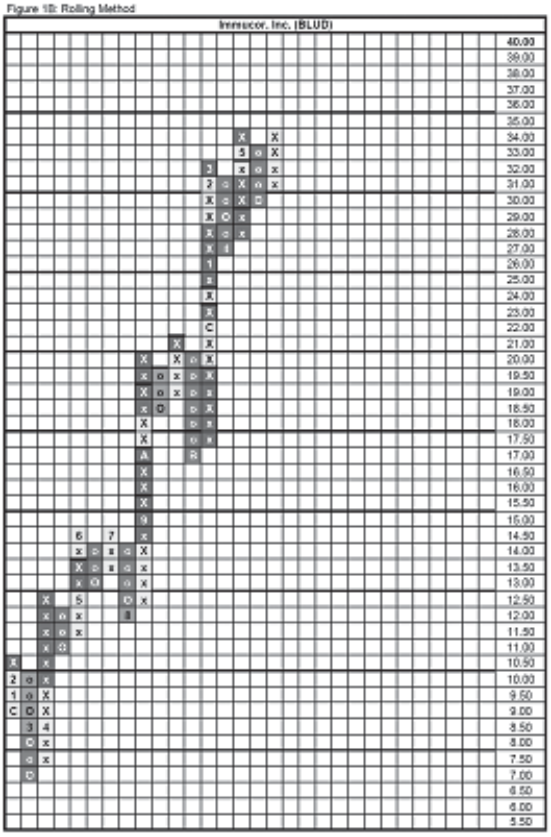


Figure 2B: Rolling Method

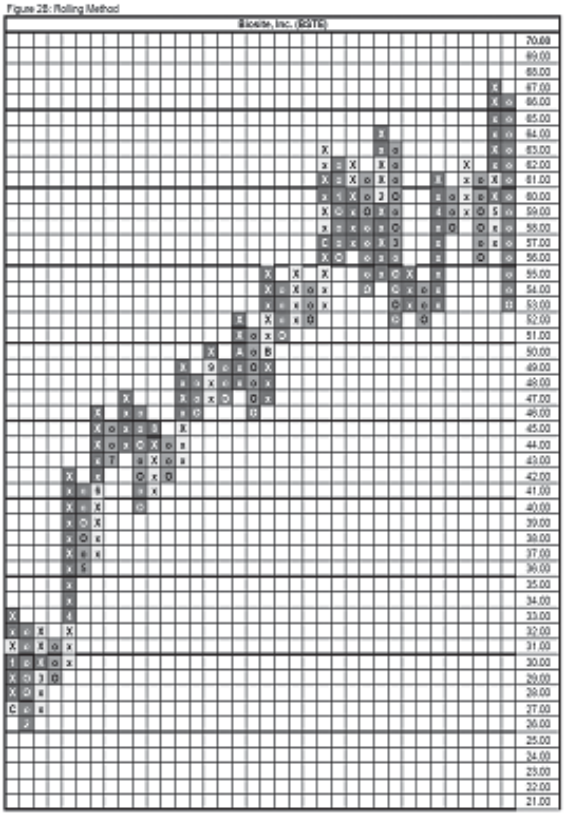


Figure 3A: Snapshot Method

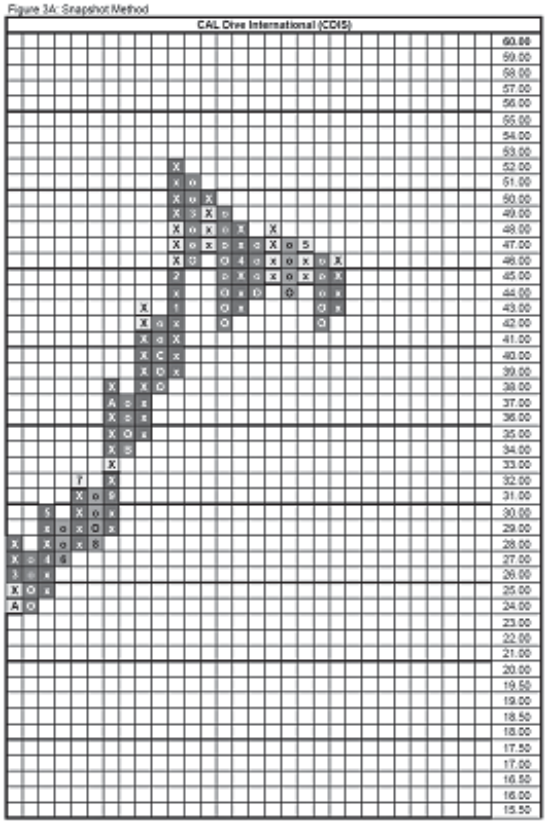


Figure 3B: Rolling Method

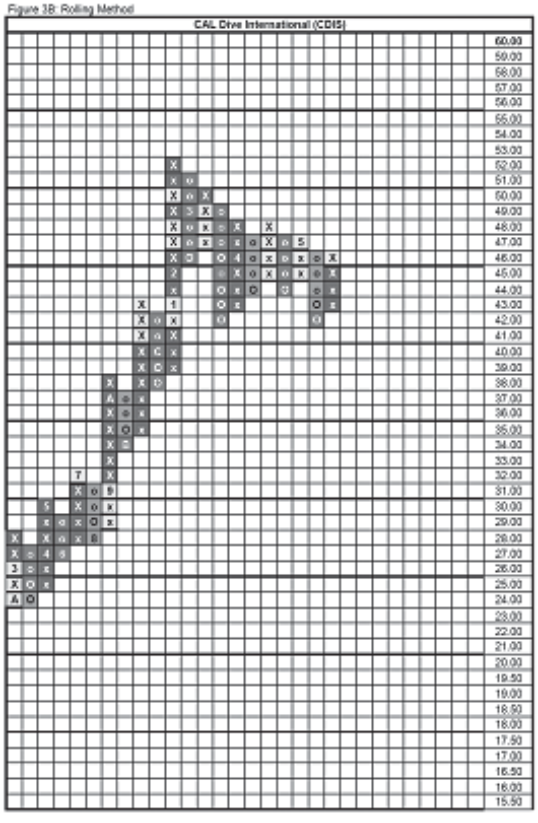


Figure 4A: Snapshot Method

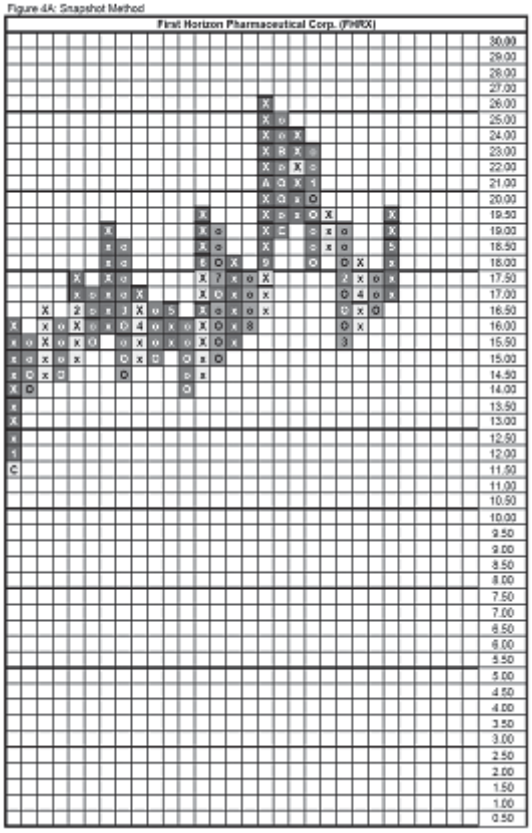


Figure 4B: Rolling Method

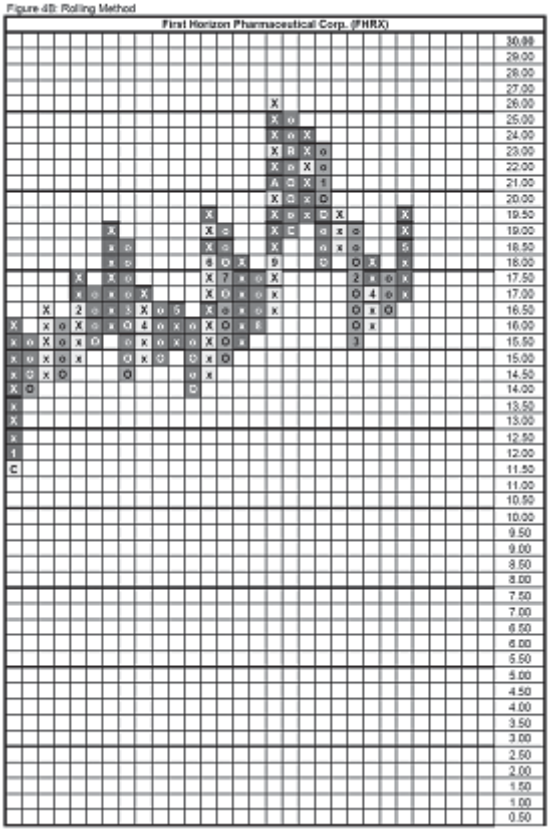


Figure 5A: Snapshot Method

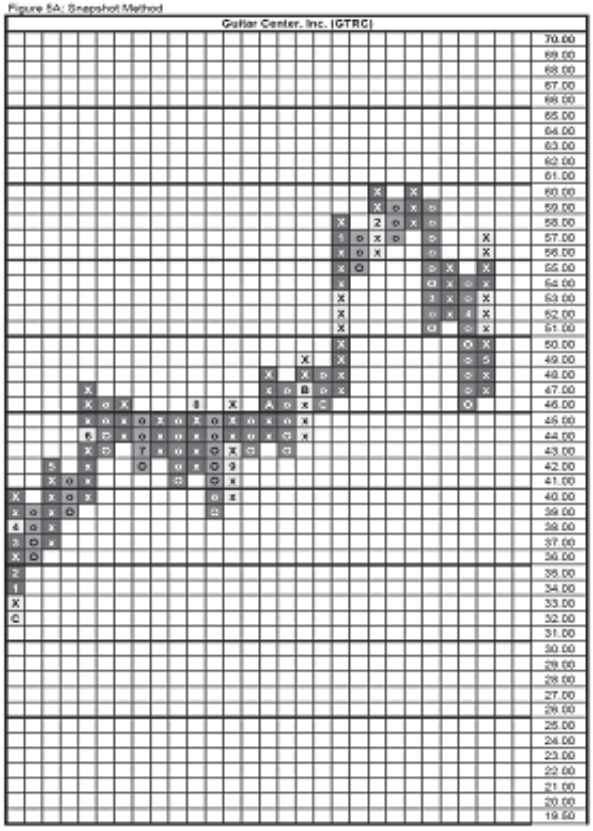


Figure 6A: Snapshot Method

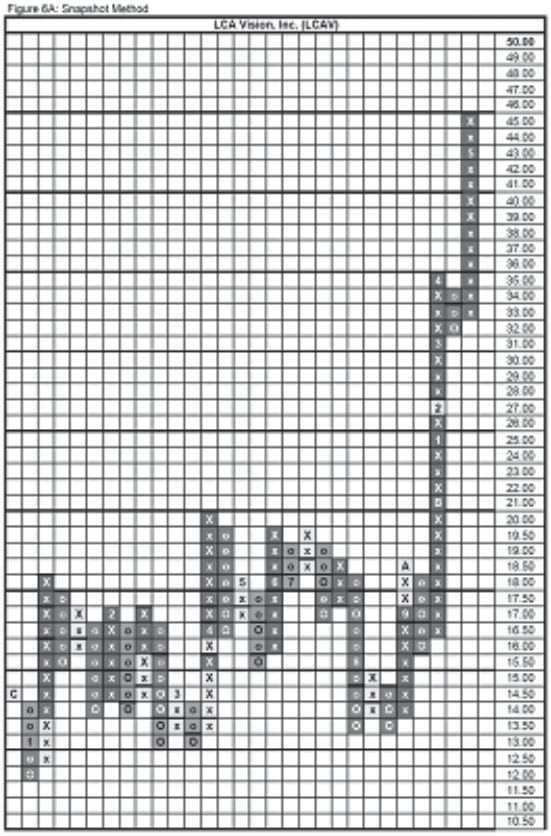
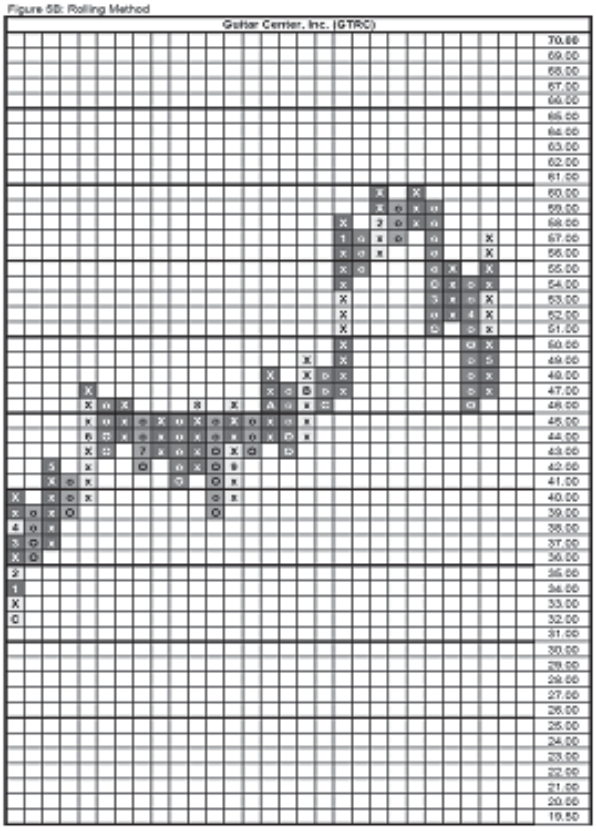
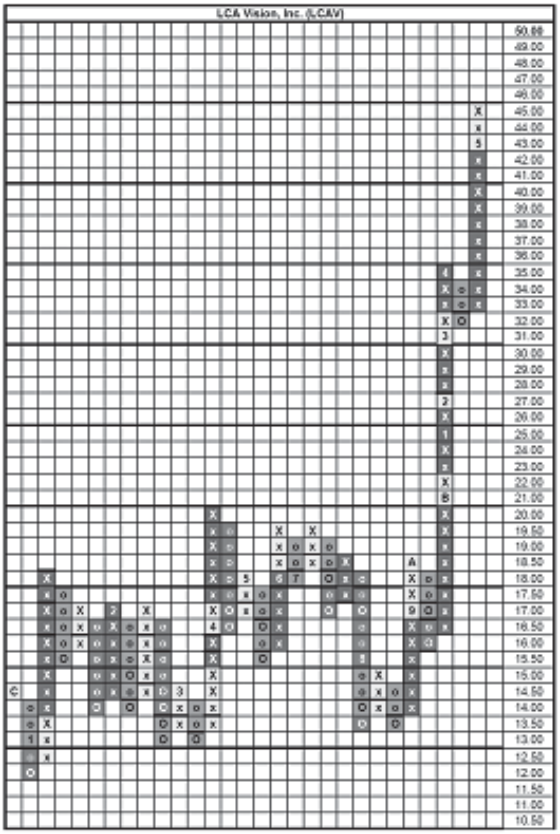


Figure 5B: Rolling Method





Who Wins the Trading Game?

Damir Tokic, Ph.D.

6

Abstract

This study suggests that momentum strategies, whether long or short, entered early before the clear trend emerges, assure high profits from trading. Conversely, contrarian strategies entered early, whether long or short, are definite prescription for large losses. As the momentum progresses, early contrarians are forced to exit their trades to meet margin calls, extending the momentum to what sometimes proves to be an irrational or "bubbly" level.

Article

This study a) classifies individual trades by their direction, trend, and relative timing; b) estimates potential profitability of each class; and c) validates the theoretical predictions with the sample of real trades from qualified individual investors. The objective is to isolate the winning trade, a finding of great interest to all traders.

Directionally, individual trades can be long or short. When entering the long position, a trader buys a security and closes the trade by selling the security, ideally at the higher price. A short position is entered by selling short a security and closed by buying-to-cover, ideally at a lower price. Trend-wise, long (short) position can be momentum play by buying (selling) when prices are increasing (decreasing), or contrarian play by buying (selling) when prices are decreasing (increasing). Each trade entry can be timed relatively early, before the trend emerges, or relatively late, once the trend becomes clear.

Combining these trade characteristics together, one can classify each trade by their direction, trend, and relative timing. As a result, the following classes or trading strategies emerge: early momentum long, late momentum long, early contrarian short, late contrarian short, early momentum short, late momentum short, early contrarian long and late contrarian long.

Brief Literature Review

Research on momentum and contrarian trading strategies has been very active during the last two decades. Empirical studies such as, Jegedeesh and Titman (1993) and Jegedeesh and Titman (2001), generally conclude that momentum-trading strategies generate excess returns. In addition, DeBondt and Thaler (1985) and Jegadeesh (1990) find that stock returns show reversals, giving the support to contrarian trading strategies. Recently, many studies have tried to ex-plain the momentum and contrarian effects using the behavioral models. For example, Daniel et al. (1998), Barberis et al. (1998), find that irrational decisions lead to systematic under and overreaction of prices relative to their fundamental value. According to Hong and Stein (1999), individual investor characteristics, such as news-followers or trend followers, can be one of reasons behind irrational decisions.

Trading Strategies

Early Momentum Long Strategy (EML)

Early momentum longs anticipate that market will increase over the specified period. Therefore, they buy early before the price starts the momentum upward.

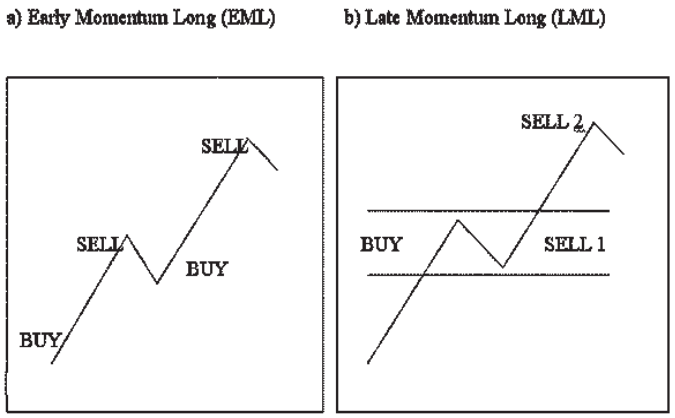


Exhibit 1: Momentum Long Strategy

Eventually, as prices increase, they take profits and sell. Profit taking causes the price to decrease. At certain level, early momentum longs buy again. A successful early momentum long must be a sophisticated investor understanding fundamentals and/or other market moving events, and preferably has an access to superior information.

Hedge funds managed by sophisticated individuals are most likely to enter the momentum early. Similarly, corporate managers in possession of superior information are likely to buy shares prior to increase in the share price. Exhibit 1 illustrates an early momentum long strategy.

Late Momentum Long Strategy (LML)

As stock prices increase, general level of optimism increases. Unsophisticated traders enter long positions to profit from momentum up. Additional buying pushes prices high enough to cause some profit taking by early momentum long traders. As a result, prices enter a consolidation stage where early momentum longs take profits and late momentum longs buy. Declining prices tempt late momentum longs to sell, either to break even, record small profits or admit small losses, depending on how late their entry was.

Individual investors are likely to be unsophisticated and enter the late momentum long position due to lack of knowledge/experience, lack of time to do research, or simply due to the "hype" at the top. Certain hedge funds managed by less experienced or less sophisticated managers are also likely buy at the top. Exhibit 1 illustrates a late momentum long strategy.

Incidentally, because market timing is difficult, sophisticated late momentum longs can choose to hold on to their positions and wait until next leg up to take their profits.

Early Contrarian Short Strategy (ECS)

Contrarian short investors believe that for any fundamental reason, prices are irrationally high and will inevitably decrease. Therefore, they short while market is going up. General optimism and entrance of late momentum longs causes prices to increase up to the point where early contrarian shorts must cover due to margin calls, or simply give up on their short positions and cover at deep losses. Early

contrarian short covering pushes prices even higher. Exhibit 2 illustrates an early contrarian short strategy.

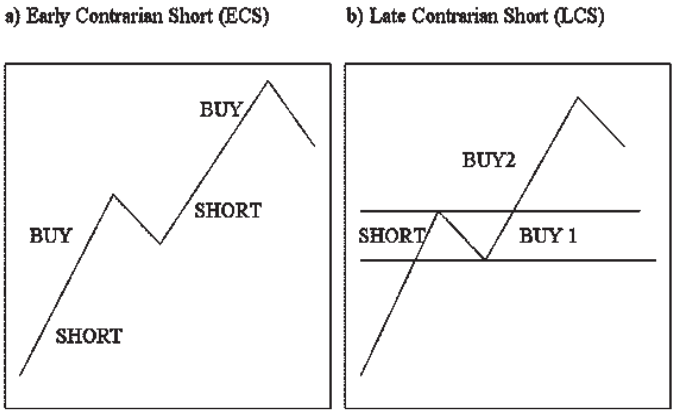


Exhibit 2: Contrarian Short Strategy

Late Contrarian Short Strategy (LCS)

As prices increase due to late momentum long buying and early contrarian short covering, early momentum longs start to take profits, bringing the price down. Contrarian shorts that were lucky enough to short late will have an opportunity to make small profits, break even, or record small losses if they cover within the trading range. However, if they do not cover, and early momentum longs reopen their positions and break the resistance, they will have to cover at deep losses.

Contrarian short is an extremely dangerous strategy because there is no way of telling whether the entrance is early or late. As long as late momentum longs are buying, contrarian shorts will have to cover at higher prices. Late contrarian short entry is most likely due to pure luck. If the contrarian trader is right and the momentum changes to down, the late contrarian short becomes early momentum short and yields potentially large profits.

Certain hedge funds and individual investors are likely to be contrarian shorts. However, it would be a mistake to classify these investors as unsophisticated because; eventually their models of market fall prove to be right. The only problem is that market exuberance can take prices irrationally high to the point where contrarian shorts are forced to cover at deep losses. Searching for a market top by timing the market behavior seems to be an impossible strategy. Exhibit 2 illustrates a late contrarian short strategy.

Early Momentum Short Strategy (EMS)

If there is a fundamental change in the market outlook, early momentum longs will not reopen their long positions once they take profits. Consequently, a momentum changes from upward to downward. Due to lack of buying at the initial support, early momentum shorts will enter with their short positions causing the price to break the resistance and continue its' fall. At certain point, early momentum shorts will take their profits and cover their shorts. Short covering combined with contrarian long buying is likely to cause market to increase. Eventually, early momentum shorts will reopen their short positions and the slide continues.

It is quite possible that the same sophisticated early momentum long traders turn into early momentum short traders. Once again, these traders are most likely sophisticated hedge funds managers or individuals with deep understanding of market moving events. Exhibit 3 illustrates an early momentum short strategy.

Late Momentum Short Strategy (LMS)

As market tumbles down, general environment becomes quite pessimistic. Unsophisticated traders attempt to profit from falling prices and short. However, it is very likely that this is the exact time when early momentum shorts take their profits and buy to cover. Consequently, prices will rebound causing late momentum shorts to cover to break even, record small profits or take small losses, depending on how late their entry was. Alternatively, late momentum short can choose to hold on to their position and wait until the next leg down to cover at large profits.

Late momentum shorts are most likely individual investors or unsophisticated/ inexperienced hedge fund managers. Exhibit 3 illustrates a late momentum short strategy.

Early Contrarian Long Strategy (ECL)

As prices fall, some traders believe that prices will rebound and buy. Unfortunately, these traders do not fully understand that the momentum up has changed due to changes in fundamentals (as indicated by lack of buying from sophisticated longs). Consequently, they are forced to sell at deep losses as prices continue to tumble, due to either margin calls or simply giving up. Early contrarian long sales push prices even lower. Exhibit 4 illustrates an early con-trarian long strategy.

Late Contrarian Long Strategy (LCL)

Declining market attracts contrarian traders looking for the bottom. Lucky contrarian longs who buy when early momentum shorts are covering their shorts will be able to make a small profit or at least break even (if not making a small loss), unless they fail to sell before new wave of early contrarian shorts selling sends prices tumbling next leg down.

Contrarian longs can be a quite diverse group. First, unsophisticated or inexperienced hedge funds managers make wrong bets that market will rebound. Second, individual investors are likely to buy prematurely as prices drop. Third, corporations are likely to buyback shares to slowdown the price depreciation. Finally, mutual funds continue buying for their clients, mostly working men and women unaware of momentum change and keeping their retirement strategy for

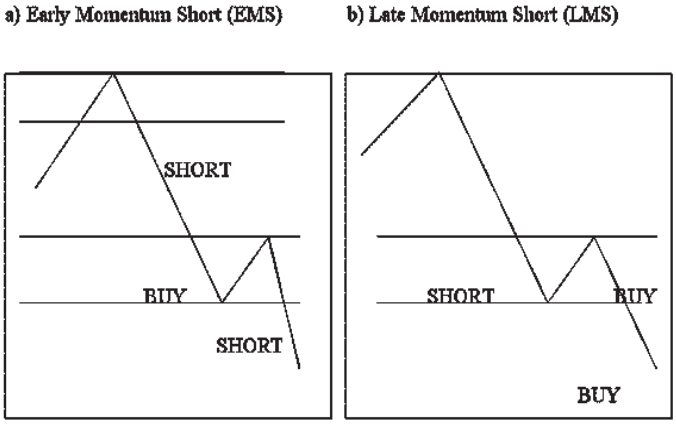


Exhibit 3: Momentum Short Strategy

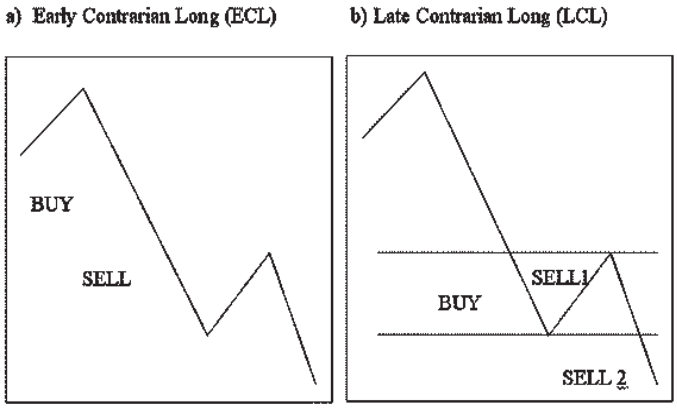


Exhibit 4: Contrarian Long Strategy

Strategy	Summary	Profit/Loss
EML	Buy low – Sell high	Large profit
LML	Buy high – Sell higher	Small profit
	Buy high – Sell at the same price	Break even
	Buy high – Sell lower	Small loss
	Buy high – Hold – Sell much higher	Large profit
ECS	Sell low – Buy high	Large loss
LCS	Sell high – Buy lower	Small profit
	Sell high – Buy at the same price	Break even
	Sell high – Buy higher	Small loss
	Sell high – Hold – Buy much higher	Large loss
EMS	Sell high – Buy low	Large profit
LMS	Sell low – Buy lower	Small profit
	Sell low – Buy at the same price	Break even
	Sell low – Buy higher	Small loss
	Sell low – Hold – Buy much lower	Large profit
ECL	Buy high – Sell low	Large loss
LCL	Buy low – Sell higher	Small profit
	Buy low – Sell at the same price	Break even
	Buy low – Sell lower	Small loss
	Buy low – Hold – Sell much lower	Large loss

Exhibit 5

the "long run" ignoring the short-term volatility. Some contrarian longs describe their strategy as simply "averaging down," assuming that market will inevitably rebound and increase over the intermediate or long run. Exhibit 4 illustrates a late contrarian long strategy.

Exhibit 5 summarizes the potential entry/exit combinations for each trading strategy and their respective profit/loss potential.

The effect of interaction of these strategies on broad market

Traders entering and exiting their respective trades affect the market by forming markets tops, market bottoms, and causing breakdowns and break-ups.

Market Top

When market is peaking, the last batch of early contrarian shorts (ECS) is covering and the last of late momentum longs (LML) are buying. At the same time early momentum longs (EML) are selling in addition to some late contrarian shorts (ECS). Eventually, all late momentum longs enter the market and all early contrarian shorts are covered. Consequently, buying power greatly diminishes. Selling pressure from early momentum longs and emerging late contrarian shorts (LCS) lowers the prices. Volume significantly decreases suggesting lack of buying interest from powerful early momentum longs and signaling the market top.

Break Down

Decreasing prices will come to an initial support where lack of buying interest signals change of momentum. Consequently, early momentum shorts (EMS) will sell brining the prices down bellow the support level. This will likely trigger severe selling pressure from most of late momentum longs (LML) exiting losing trades. The only buyers at this point will be early contrarian longs (ECL) hoping for a rebound. Heavy selling pressure and lack of significant buying interest leads to sharp and quick fall in prices with heavy volume.

Market Bottom

When market is bottoming, the last batch of early contrarian longs (ECL) is selling. Eventually all losing trades are liquidated and the only selling left is from some late momentum shorts (LMS). At the same time, early momentum shorts buy to cover for profits. Lack of selling pressure and short covering push prices up, attracting early contrarian longs (ECL) to buy and take advantage of increasing prices.

	Buys	Sells
Market Top	LML ECS	EML LCS
Break Down	ECL	EMS LML
Market Bottom	EMS LCL	LMS ECL
Break Up	EML LMS	ECS

Exhibit 6

Break Up

The true test comes at the resistance. The change in momentum requires heavy buying from early momentum longs (EML) to push the prices above the resistance. At this point late momentum shorts (LMS) cover their trades at loss, pushing the prices even higher. The only selling at these levels is from some early contrarian shorts (ECS), failing to realize that the momentum has shifted. Heavy buying pressure and lack of selling interest pushes prices up sharply and quickly on heavy volume.

Exhibit 6 summarizes which trading strategy potentially buys and sells at each market level.

Interviews with traders - analysis

To give some credibility to prior theoretical predictions about profit/loss potential for each respective trading strategy, the author interviewed 10 qualified individual traders. These traders have been actively trading stocks and futures for at least 5 years with minimum account value of $100,000. Each trader was asked to describe one large gain (at least 25%), one large loss (at least -25%), and one small gain (5%), small loss (-5%) or break-even trade (0%). Further, I asked each trader about the reason to enter each trade and the reason to exit the same trade. In addition, the author wanted to know the market direction during the period when trade was opened, and the subsequent price action after the trade was closed, ranging from 1 month to 2 years. Finally, the author described the strategies presented in this paper to each trader, and we together agreed on classification for each of their trades. The author did not asked specific ques-tions about the dollar amounts, exact percentages, and dates. Exhibits 7, 8, and 9, present the information about trades with large profits, large losses, and small profits, small losses and break-evens, respectively.

- 4 out of 10 large profit trades were early momentum long strategies
- 2 out of 10 large profit trades were early momentum short strategies
- 4 out of 10 large profit trades were late contrarian short strategies, which turned into momentum shorts.
- 4 out of 10 large loss trades were result of early contrarian short strategy
- 3 out of 10 large loss trades were result of late momentum long strategy
- 3 out of 10 large losses were result of late momentum short strategy
- 4 out of 10 small profit, small loss or break-even trades were late contrarian short strategies
- 3 out of 10 small profit, small loss or break-even trades were early momentum long strategies
- 2 out of 10 small profit, small loss or break-even trades were late momentum short strategies

Trade	Position	Reason	Entry Strategy	Exit	Profit/Loss	Market Direction	Price action after the exit
1	Buy REDF	Anticipate the price increase.	EML	Held through correction, bought more and sold at the top	Large Profit	Up	Went down below the average buying price
2	Buy SIFY	Anticipate the price increase.	EML	Held through correction, bought more and sold at the top	Large Profit	Up	Went down below the average buying price
3	Short YHOO	Market going down	EMS	Covered to take profits.	Large profit	Top Break Down	Went up beyond the short price
4	Short ASKJ	Market going down	EMS	Covered to take profits.	Large profit	Top Break Down	Went up beyond the short price
5	Short AMZN	Bad business model	LCS	Covered to take profits	Large profit	Top Break Down	Went down, well below the cover price
6	Short MNST	Bad business model	LCS	Covered to take profits	Large profit	Top Break Down	Went down more than bounced back beyond the short price
7	Buy AUO	Plasma TV play	EML	Sold at the top	Large profit	Up	Went well bellow the buy price
8	Short APOL	FBI investigation of for-profit education	LCS	Covered to take profit	Large profit	Down	Remained in the range at selling level
9	Buy SUNW	Anticipate price increase	EML	Sold at the top, after the earnings report	Large profit	Up	Went down bellow the buy price
10	Short DJ futures	Tail of end-of-year rally	LCS	Covered at the bottom	Large profit	Top	Market remained in trading range

Exhibit 7: Large Profits

Trade	Position	Reason	Entry Strategy	Exit	Profit/Loss	Market Direction	Price action after the exit
1	Buy NTES	Price going up, afraid it will be too late to buy later.	LML	Sold at bottom after price went down	Large loss	Up	Bounced back, but below the buying price
2	Short AAPL	Market going down, while APPL going up.	ECS	Margin call	Large loss	Bottom – Break Up	Continued momentum up
3	Short INSP	Market going down, while INSP going up.	ECS	Margin call	Large loss	Bottom – Break Up	Continued mo-mentum up, then went down, but above the short
4	Buy FWHT	Good earnings report, expect short term upside	LML	Went down, sold after the small bounce.	Large loss	Down	Eventually went above the buying price, than sharply went down.
5	Short COCO	FBI investigation for fraud	LMS	Covered after the initial bounce	Large loss	Down	Went down well beyond the short price
6	Short CTX	Real estate bubble	ECS	Margin call	Large loss	Up	Continued momentum up
7	Short DJ futures	Index too high, economy slowing	ECS	Margin call	Large loss	Up	Market remained in the trading range.
8	Short DJ futures	Economy slowing down	LMS	Margin call	Large loss	Bottom	Market remained in the trading range
9	Short Copper	China increases interest rates	LMS	Margin call	Large loss	Bottom	Momentum up, well above the sale price
10	Buy SAY	Outsourcing India play	LML	Sold when price went down	Large loss	Up	Went down well bellow the sale price

Exhibit 8: Large Losses

Trade	Position	Reason	Entry Strategy	Exit	Profit/Loss	Market Direction	Price action after the exit
1	Buy MSFT	Anticipate long-term price increase.	LML	Sold at the top	Break even	Up	Went down below the buying price
2	Short MCD	Mad cow	LCS	Covered after the bounce	Small loss	Up	Went up well beyond the short price
3	Short QQQQ	Market going down	LMS	Covered after the small decrease	Small profit	Down	Went up beyond the short price
4	Buy MACR	Good earnings report	EML	Held through minor correction, sold at initial bounce because other trades were losing.	Small profit	Down	Continued momentum up, well above the buy price
5	Short AMZN	Bad business model	LCS	Covered to take early profits	Small profit	Down	Continued momentum down
6	Buy SNDA	Growth in Chinese gaming sector	EML	Sold to take early profits	Small profit	Up	Continued momentum up
7	Short SOHU	Chinese government regulations	LMS	Covered to take profits	Small profit	Up	Went up above the short price
8	Short CTX	Real estate bubble	LCS	Covered went price went up	Small loss	Up	Continued momentum up
9	Short NFLX	Price irrationally high	LCS	Covered after price bounced from downturn	Small profit	Up	Went down well bellow the cover level
10	Buy SIRI	Satellite radio play	EML	Changed mind about future prospects.	Break even	Up	Continued momentum up

Exhibit 9: Small profits, small loses, and breakeven trades

- 1 out of 10 small profit, small loss or break-even trades was late momentum long strategies.

On large profit side, 6 out of 10 winning strategies were early momentum strategies. Surprisingly, trades were lucky enough to short on the top and anticipate the change of momentum, to make a large profit that was initiated with a contrarian short strategy that turned into momentum short strategy.

On the large loss side, 6 out of 10 losing strategies were late momentum strategies, where the momentum changed and trades were forced to exit due to a margin call or simply gave up on the trade. Four out of 10 losing strategies were early contrarians, where shorts were forced to cover at much higher prices to meet the margin calls.

Late contrarian trades were successful to assure a small profit, small loss, or break even in four of 10 trades. Late momentum trades were responsible for 3 out of 10 small gains, losses of break-evens. Surprisingly, 3 out of 10 small gains were early momentum long strategies, however, in each case traders admitted losses of confidence in their initial projections and cut their profits short.

Summary

Early momentum strategies appear to be superior in assuring large profits. Whether a long or short position is entered, the position must be initiated before the large move in price occurs. Intuitively, early momentum traders must be sophisticated investors with superior analytical skills and/or superior information.

Early contrarian strategies are definitely a prescription for a large loss. Buying (selling) when prices are falling (rising) in search for bottom (top) is an extremely difficult and dangerous strategy because prices can fall (rise) significantly bellow (above) what seems to be a reasonable level. These irrational price movements are likely product of margin calls liquidations and excess speculation.

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Translating Two Confirmation Tools (TMAC) Translated Moving Average Crossover (TRSI) Translated Relative Strength Indicator

Cory L. Venable CIM, FCSI, CFP

7

One of the most enduring complaints of trending methods such as the Moving Average Crossover is their propensity to trigger frequent signals at less than opportune times. Optimization of such systems has tended to be a tradeoff between filters that are too restrictive or too broad. By integrating a component of cycle analysis, trending methods may be made more effective.

Systems in nature and the properties of gravity as expressed by Isaac Newton[1] go to laying the foundation for why cycle translation should be considered during the creation and use of a robust trending method. This paper will illustrate a means of reducing the occurrence of whipsaws by adjusting for translation bias, as well as provide performance data to support the benefits of translating confirmation tools.

Systems in Nature

Much of the complex systems in use today have at their roots, fundamental building blocks borrowed from nature. Our understanding of nature and its systems is reinforced by our increasing reliance on the power and the efficiency of evolutionary change. Systems in nature are not only found to be efficient and streamlined, but bear little evidence of over-optimization.

In nature, successful species seem able to adapt to gradual changes in their surroundings i.e., food source, proximity to population etc., while unsuccessful species are found to be less robust and unable to cope with change. Many non-adaptable species share a list of similar traits. The state of Utah's Natural Resources Department recently released a "sensitive species" list of over 50 species on the verge of being extinct if present conditions persist.

The "sensitive species" list is compiled by evaluating four broad categories. Of interest to this paper is the first of the four criteria entitled, "Biology/ Life History." Under this first criteria there are three sub-headings; the second, "Genetic uniqueness," suggests that excessive optimization contributes to a species extinction.

If extinction is the result of over-optimization, and trending methods are a trade-off between too broad and too restrictive filter parameters, (i.e., under or over-optimization), it may prove beneficial to select filter parameters based on the frictional bias within a market cycle.

Elements of Translation Bias

Many trending systems pay particular attention to Nature's physical laws. Newton's first law of motion has long been used to illustrate why trending methods in technical analysis have validity. As Newton[2] imparted, "an object in motion continues in motion until an equal or greater force acts upon it." Dow's theory[3] asserts that, "a trend is assumed to be in effect until it gives definite signals that it has reversed."

Newton's influence is also present in William P. Hamilton's[4] interpretation of Dow's work. Hamilton notes that Dow's three movements, primary trend, secondary reaction and daily fluctuations, resemble tides, waves and ripples. The investment community often refers to Hamilton's analogy when characterizing money flow in securities markets. On the surface, the analogy seems straightforward, investment capital ebbs and flows as market participants attempt to realize value. On a closer view, Hamilton's tides and waves description supports the existence of bias in market cycles.

A closer look at Newton, Dow, and Hamilton reveals the unifying element of friction. At low tide (Dow's accumulation phase) inflows of water and/or capital are slower because of friction. As the inflows overlap velocity increases and friction dissipates. The friction at the root of bias in securities markets comes from one source, investor expectation. It is exacerbated by the use of differing valuation metrics and the ceaseless requirement to remeasure based on new inputs. Price friction can take many forms: behavioral, (as in investor fear of loss or greed) - qualitative, quantitative and technical. Adding to Hamilton's analogy, the shallow water effects of a tidal bore exemplify the hydrological parallel to the market-pricing struggle.

A tidal bore created by inbound tidal flows, requires a large rise of tide (inflows) at the mouth of a river. A sandbar or other frictional elements at the entrance impede the initial advance of the tide. As inflows occur, the water is unable to spread uniformly over the vast shallow interior area fast enough to match the rapid rise at the entrance. While friction is prevalent at the base of the advancing front, the resistance from the last ebb flow still draining into the basin compounds it. The combination of these competing elements causes the top of the advance to tumble forward revealing bias.

What is evident in the physical characteristics of a tidal bore is the similarity in which capital market inflows behave - investor uncertainty and subsequent selling clash against the weight of buying inflows. The struggle to confirm direction is a major contributor to trending system whipsaws. The competing forces of a tidal bore illustrates why it is difficult to determine price direction. They also suggest a means of improving trend methods by accounting for translation bias.

In environments (a breaking wave and/or financial markets), the formation and degradation of their respective cycles illustrate the presence of friction, a change in velocity due friction and the subsequent translation bias that results.

To illustrate translation bias in real market terms, the S&P 500 is used as the representation of "the Market." The Dimensional Fund[5] data, shown in Chart 1, illustrates the duration of Expansion and Contraction Phases of the S&P 500 over the past 77 years, January 1926 to September 2002.

The market duration data suggests that over the last seventy-seven years, the typical expansion phase or "up market" has taken 3 times longer to complete than its contraction counterpart, 31 months versus 10 months.

Given the bias in the data, it would seem beneficial to incorporate a change of filter sensitivity to address the durational differences of the two market phases (expansion/contraction). First, we must have a basic tool to help us determine phase.

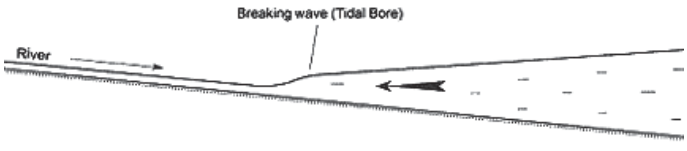

Figure 1: Example of a tidal bore

"Up Markets" Expansion Phase			"Down Markets" Contraction Phase		
Dates	No. of Months	S&P 500	Dates	No. of Months	S&P 500
Jan. 1926–Aug. 1929	44 mons.	193%	Sept. 1929–Nov. 1929	3 mons.	-33%
Dec. 1929–Mar. 1930	4 mons.	21%	Apr. 1930–Jun. 1932	27 mons.	-80%
Jul. 1932–Aug. 1932	2 mons.	92%	Sept. 1932–Feb. 1933	6 mons.	-30%
Mar. 1933–Jan. 1934	11 mons.	105%	Feb. 1934–Jul. 1934	6 mons.	-21%
Aug. 1934–Feb 1937	31 mons.	135%	Mar. 1937–Mar. 1938	13 mons.	-50%
Apr. 1939–Dec. 1938	9 mons.	61%	Jan. 1939–Apr. 1939	4 mons.	-16%
May 1939–Sept. 1939	5 mons.	22%	Oct. 1939–May 1940	8 mons.	-26%
Jun. 1940–Oct. 1940	5 mons.	22%	Nov. 1940–Apr. 1941	6 mons.	-13%
May 1941–Aug 1941	4 mons.	14%	Sept. 1941–Apr. 1942	8 mons.	-22%
May 1942–May 1946	49 mons.	49%	Jun. 1946–Apr. 1947	11 mons.	21%
May 1947–Oct 1948	18 mons.	23%	Nov. 1948–June 1949	8 mons.	-10%
Jul. 1949–Jul. 1957	97 mons.	429%	Aug. 1957–Dec. 1957	5 mons.	-15%
Jan. 1958–Dec. 1961	48 mons.	105%	Jan. 1962–Jun. 1962	6 mons.	-22%
Jul. 1962–Jan. 1966	43 mons	90%	Feb. 1966–Sept. 1966	8 mons.	-16%
Oct. 1966–Nov. 1968	26 mons.	52%	Dec. 1968–Jun. 1970	19 mons.	-29%
Jul. 1970–Dec. 1972	30 mons.	76%	Jan. 1973–Sept. 1974	21 mons.	-43%
Oct. 1974–Dec. 1976	27 mons.	86%	Jan. 1977–Feb. 1978	14 mons.	-14%
Mar. 1978–Nov. 1980	33 mons.	86%	Dec. 1980–Jul. 1982	20 mons.	-17%
Aug. 1982–Aug. 1987	61 mons.	282%	Sept. 1987–Nov. 1987	3 mons.	-30%
Dec. 1987–May 1990	30 mons.	71%	Jun. 1990–Oct. 1990	5 mons.	-15%
Nov. 1990–Apr. 1988	90 mons.	345%	May 1998–Aug. 1998	4 mons.	-13%
Sept. 1998–Aug. 2000	24 mons.	63%	Sept. 2000–Sept. 2002	25 mons.	-45%
Expansion Phase Averages			**Contraction Phase Averages**		
22 "Up Markets" 1926–2000 Average length 31 months Average 117% gain per cycle			22 "Down Markets" 1929-2002 Average length 10 months. Average 26 % loss per cycle		
"Up Markets" defined as lowest open up month to highest closing up month. "Down Markets" defined as highest open down month to lowest closing down month.					

Chart 1: Market Cycles defined by the S&P 500 | Total Returns (%)

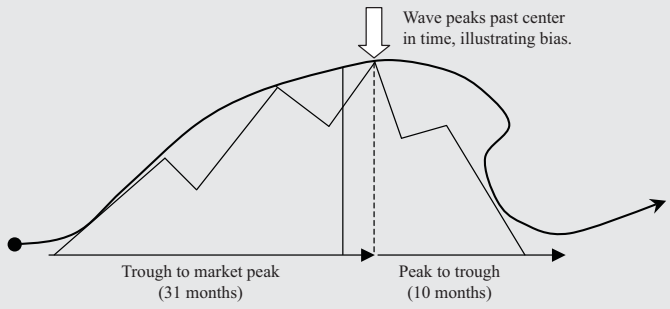

Figure 2: Market Defined by S&P 500 Jan. 1926 to September 2002

Translated Moving Average Crossover (TMAC)

If confirmation indicators are not adjusted to account for bias, the trending method being used may be out of phase with the market. The result of this is an unnecessary number of false signals, and a subsequent increase in friction costs and investment risk.

Basic construction and rationale

In translating a confirmation tool, it is necessary first to determine the trend and timing cycles to be used. The timing cycle (trading cycle) should be one half to one-third the duration of the trend cycle. The rationale for the trend and trading cycle length is the principle of harmonics in cyclic analysis. Harmonics[6] suggests that each cycle is related to its neighboring cycle (longer or shorter by 2) for instance 40 week ma/2 = 20/2= 10.

The rationale for the specific use of a 10-week timing cycle and 40-week trend cycle is their effectiveness in smoothing out and uncovering the overall trend and secondary counter-trend. The preference of a weekly moving average over a daily moving average is further to reduce price volatility. Weekly closing price is considered to hold greater significance, as investors must hold their positions over the weekend.

The Role of the Averages

The aim of the moving averages in the TMAC is to signal either an expansion or a contraction phase as they cross. As the 10-week moving average breaks above the 40 an "expansion" phase is considered in place. This signals the use of specific buy and sell rules.

The "expansion" phase buy and sell rules are unique in their right to account for bias. The inherent bias during this phase suggests a greater sensitivity to purchase and a reduced sensitivity to sell. This is to account for both Newton's and Dow's related theory that a trend is considered to be in place until it gives definite signs of change.

The "contraction" phase is signaled by the 10-week moving average falling below the 40-week. The contraction phases triggers its set of buy and sell criteria. The bias being translated during the contraction part of the cycle is for the tendency of accelerated price declines. As such, sell filters are more sensitive, while buy confirmations take longer.

The benefits of the TMAC are simplicity and objectivity. It provides a concise indication of the particular phase, as well as which buy/sell filters to use.

TRSI (Translated Relative Strength Indicator)

Welles Wilder Jr's counter-trend indicator[7] is a tool for confirming the alert signals given by the translated MA Crossover.

The construction goals of the TMAC (Translated Moving Average Crossover) are similar to those of the TRSI (Translated Relative Strength Indicator). Both indicators must be set to account for the fact that markets take longer to form and complete their expansion phase than they do their contraction phase.

The TRSI receives the same count rule as the moving average weekly price breach, and this adjusts the RSI for translation. When RSI 14 period readings are below 30 and above 70, using different period sensitivities refines entry and exit points. The quicker degradation of market peaks is filtered using a smaller period 9 RSI that increases sensitivity to price movements. At market troughs, (i.e., when the 14 period RSI is below a reading of 30), utilizing an RSI 20 period helps to reduce price sensitivity. This allows more time for the trend to continue or reverse.

During the expansion phase (10w above 40w), and the successful upside breach of the RSI 14 period 70 reading, the objective becomes retention of capital gains and risk management, since risk and price rise are commensurate.

Rule set for TMAC and TRSI Test Period of 20.5 Years Using S&P 500 Weekly

The following rule set is a result of optimization, observation and fitting over a 10-year period from January 1993 to January 2003 with an out of sample test performed from January 1985 to January 1993. The rule set for the 20.5-year period is as follows:

Expansion phase = 10-week above 40-week
Contraction phase = 10-week below 40-week

- Expansion phase buy signals occur on the second consecutive 1% close above the 10-week moving average confirmed by the second cumulative minimum 2-pt rise in RSI with price above 10-week. (Each increase in RSI must be minimum 1 pt.)
- The count begins with the first up/downside weekly closing 1% price breach of the 10-week average. If the price falls below/above the 10-week moving average by 1% before count is complete, the count begins again.
- Expansion phase sell signals occur on the third consecutive price decline below the 10-week confirmed by three cumulative point declines in RSI w/price below 10w.
- Contraction-phase buy signals occur on the second consecutive rise above the 10-week confirmed by the second cumulative rise in RSI with price minimum 1% above 10w moving average.
- Contraction-phase sell signal occurs on first 1% breach of 10-week moving average.
- All price breaches of moving averages must be minimum 1% +/- on a consecutive count basis.
- All RSI readings must be one full point on a cumulative basis. (The cumulative count helps to reduce noise and permits greater time for trend resumption by creating a support or resistance line depending on signal given.)
- Nine-period RSI default occurs when the 14-period has read 70+ for minimum two periods.

Phase Specific Rules

- **Expansion Phase only**: RSI nine-period sell signal occurs on the first 1% breach of the 10-week moving average. If the breach of the moving average does not occur by the third cumulative period, default to regular sell rule count. (i.e., third consecutive close below 10w moving average confirmed by the cumulative count in RSI.)
- **Expansion Phase only**: when the third cumulative decline below 70 RSI triggers a sell signal and a 10-week moving average breach does not occur, buy signal is triggered with default buy rules, as price is already above 10-week confirmation for repurchase occurs with 2 cumulative increases in the RSI (ea.min.1pt.)
- **Expansion Phase only**: 40-week moving average support rule: if during a decline below the 10-week moving average, the third price plot is within 1% of the 40-week; omit count and hold until 40-week is breached by 1% or trend reversal occurs.
- **Moving Average intersect rule**: weekly price plots that intersect both moving averages are omitted from count, unless the intersect is a result of severe price decline from over-bought conditions based on RSI 9 period sell criteria. (The intent of the M.A intersect rule is to allow the price trend to reassert.)

Postscript

The aim of this paper was to revisit the physical characteristics of price change (bias and friction) in an effort to institute a clear and objective set of buy and sell rules for an intermediate-term trending system. The goal at the outset was capital preservation. Implementing the rule set provided a secondary benefit in improved dollar-weighted returns. (See Appendix one for performance data.)

The test period was deliberately long to show the robustness of the methodology. The risk-adjusted performance of a simple trending system has seen additional benefits in the lower drawdown and significant increase in the Sharpe ratio. The translated version's standard deviation data shows an undesirable 4.2% increase from the non-translated version; however, a closer look at the data shows the increase in standard deviation has a positive skew.

Over the years many references have been made to filtering for price sensitivity, Gerald Appel[8] has suggested it may prove beneficial to alter the sensitivity of the MACD indicator depending on the reading above or below equilibrium "0." Appel also suggests that penetration filtered systems showed superior results when used in conjunction with an intermediate cycle of 40-50 days. (10 wks.) Although he does not address the overall issue of translation bias, he does hint at the rationale for filtering penetrations of the moving average.

Appendix 1 - Performance Data & Buy/Sell Chronology

	Non-Translated	Translated Version
	(E = 2/2 C=2/2)	(E= 2/3 C=2/1)
Annualized Return	8.29%	10.84%
$ Weighted Return	7.40%	9.91%
Standard Deviation	13.57%	14.14%
Sharpe Ratio	0.3427	0.5064
Profit Ratios		
Avg. gain per trade	13.39%	18.81%
Largest % gain	37.35%	67.38%
Avg. drawdown per trade	-4.35%	-3.62%
Largest drawdown	-8.05%	5.48%
% of Trades Prof.	57.14%	60.87%
% Unprofitable	42.86%	39.13%
* # of signals per year	2.73	2.24

** Translation alone does not make for a complete trading system. Other indicators must be utilized to confirm buy and sell signals. (i.e., Volume indicators, etc.) Do not attempt to trade with this system as a stand-alone platform.*

Annual Percentage gain and loss per trade

	Gain	Loss	Gain	Loss
1	8.63%	-4.07%	9.78%	-4.52%
2	23.39%	-2.03%	49.75%	-5.48%
3	12.56%	-5.10%	4.20%	-2.17%
4	4.41%	-1.09%	3.33%	-3.84%
5	0.36%	-5.66%	22.88%	-4.52%
6	9.13%	-6.56%	20.27%	-2.16%
7	0.14%	-3.58%	8.50%	-3.01%
8	25.23%	-5.16%	67.38%	-3.13%
9	10.01%	-8.05%	8.96%	-3.82%
10	37.35%	-4.98%	12.88%	
11	11.37%	-2.15%	19.74%	
12	28.85%	-3.78%	0.58%	
13	20.82%	27.33%		
14	19.32%	7.83%		
15	1.66%			
16	1.03%			

Appendix 2 - Performance Data Comparison

- **Annualized Return Differential**: 10.84% : 30.76% increase in the translated version's annualized return.
- **$ Weighted Return Differential**: 9.91% : 33.92% increase in translated version's dollar weighted return.
- **Standard Deviation**: "translated" version increased volatility by 4.2% with positive skewness.
- **Sharpe Ratio**: "translated" version saw Sharpe Ratio increase by 47.7%.
- **Average gain per signal**: "translated" version saw profitability per trade increase by 40.48%.
- **Average drawdown**: "translated" version reduced average drawdown 20.17%.
- **Trade count**: translated version reduced trade count 17.81% from 28 trades to 23 trades.
- **End Value differential** of 60.39% @ 20.5 yr. Mark (non-translated value @ $43,240 vs. translated value at $6,9351.38).

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Endnotes

1 Isaac Newton, the Principia, a New Translation by Bernard I. Cohen and Anne Whitman, pgs. 416-417

2 Isaac Newton, The Principia, A New Translation and Guide L. Bernard Cohen and Anne Whitman

3 John Murphy, Technical Analysis of Financial Markets, chap.2, pg.28

4 Robert Rhea, The Dow Theory, chap. 6, pg. 33

5 Dimensional Matrix Book 2003, exhibit 4, pg.3

6 John Murphy, Technical Analysis of Financial Markets, Chap. #9, pg. 212.

7 J. Welles Wilder, Jr., New Concepts in Technical Trading Systems (Trend Research, Greensboro, NC, 1978).

8 Appel & Hitschler, Stock Market Trading Systems, Chap.3, pg. 23-24.