

The “DonHahn” Indicator

Introduction

For the advanced or experienced analysts of technical indicators, reading articles on technical indicator methodologies, price and cycle analysis is a good way to finely hone skills at interpreting market data. However, this is time intensive and not all who trade the financial markets want to delve that deeply. Therefore, this paper will consider and develop a different approach to analyze advance/decline data and identify low-risk entries in the stock market. For beginners there are the basics about indicator definitions, what patterns/behavior are important, (what to look for) and how to react to these patterns. For intermediate technical watchers, there are moderately detailed explanations of how to analyze the movement of various indicators and how they relate to each other. For the more experienced analysts and researchers, underlying methodologies are explained in basic terms followed by detailed references and footnotes included.

In addition, this analysis provides supplemental data on estimation methodologies with the latest publication citations for technical indicator methodologies and analysis.

The stock market is for trading publicly company held shares and associated financial instruments - including stock options, convertibles and stock index futures. Traditionally such markets were open-outcry where trading occurred on the floor of an exchange. Today, the markets are cyber-markets with buying and selling occurring via online real-time matching of orders placed by buyers and sellers.

Years ago, worldwide buyers and sellers were individual investors and businessmen; today, markets have generally become "institutionalized"; that is, most buyers and sellers are large institutions: pension funds, insurance companies, mutual funds or banks. This ascent of the institutional investor has generated a growing professionalism in all areas of the market.

The movements of the prices in a market or section of a market are captured in price indices called Stock Market Indices, of which there are many, e.g. the Standard and Poors in the U.S. and the Topix in Japan, etc. Such indices are usually market-capitalization weighted.

The Dow Theory

According to Hurst, J. M. (1977), the Dow Theory is a theory about how to build wealth given the nature of movements of the U.S. stock market. The theory originally derived from the editorials of Charles H. Dow (1851-1902), journalist, first editor of the Wall Street Journal and co-founder of Dow Jones and Company. It was refined after his death by William P. Hamilton, Charles Rhea and E. George Schaefer. Dow himself never used the term "Dow Theory."

According to J. Murphy (1986) the Dow Theory asserts that bull markets are characterized by a primary trend that consists of three major upward thrusts (of the major indices) interrupted by two pull-backs (i.e. periods of weakness). During the whole movement, it is expected that predecessors and declining bottoms (each lower than it's predecessor) with the whole bear movement depicted are usually consisting of a few intermediate (medium-term) declines and rallies.

Originally, the Dow Theory was focused on using general stock market trends as a barometer for general business conditions, not on forecasting stock prices. Many pages have been written on the subject and the researcher let others carry on the passionate debate that continues, after so many years, about the validity of the Dow Theory. However, there is at least one single most important observation that emerges from these assumptions: prices move in trends.

Accepting this statement bring forth two major conclusions: First, the emergence of an evident order when analyzing the apparent chaos of price distribution, which leads to the second, that is the ability offered to the trader to identify a major trend, and then play any retracement until this trend ends. In Wall Street words: "Stay in the trend ... until it bends!" That is for the theory. However, the reality is far more complicated, mainly because of the second part of the adage: how to distinguish a retracement from a reversal? The difference might be subtle when quantified, but central when trading for profit is considered, since that is what this is all about, right?

Forecasting

Data classified on the basis of intervals of time (bar charts or candlestick charts for example) constitute vital information in the control of supply/demand, since it is among the most effective method of showing the changes that are taking place in a single issue, an industry or in a total market activity. Closely related to the problem of measuring changes in market activity is the making of forecast of future activity. Market timing requires a continual decision making

regarding the future, and the basis for such a forecast is the record of the past performance.

The future is, by definition, impossible to predict simply because there is an infinite number of possible outcomes that the analyst must process to form a conclusion. Yet, this is the dilemma that every investor faces on a day-to-day basis. And, so far, one of the best tool available to forecast the future is a careful analysis of the past. This is even true for fundamentalists that use historical valuations as a benchmark for assessing the current value of an asset. While history cannot predict the future by itself, it brings an important dimension to the art of forecasting, which is: working with odds through statistics.

The researcher will use an analogy here to illustrate the above statement. Think about weather forecasts: we all know that if the sky is blue and the sun is brightly shining above our heads, there is an obvious lower probability that our barbecue will be ruined by the rain than if dark clouds are already rolling in the horizon. While things can change rapidly with the wind starting to blow in the wrong direction and the rain pouring in a matter of minutes, a sunny sky clearly skews the odds in favor of pleasant weather, because history tells us that clouds bring rain, not the sun. Weather forecasters use a lot of "indicators" and powerful computers to make the required calculations to predict the weather. They never know "for sure," but they do get close enough to make their work indispensable to most of us. Therefore, when carefully studied, historical patterns are satisfying enough to obtain an adequate level of confidence in order to project the future. In Mark Twain's plain English: "The past may not repeat itself, but it sure does rhyme..."

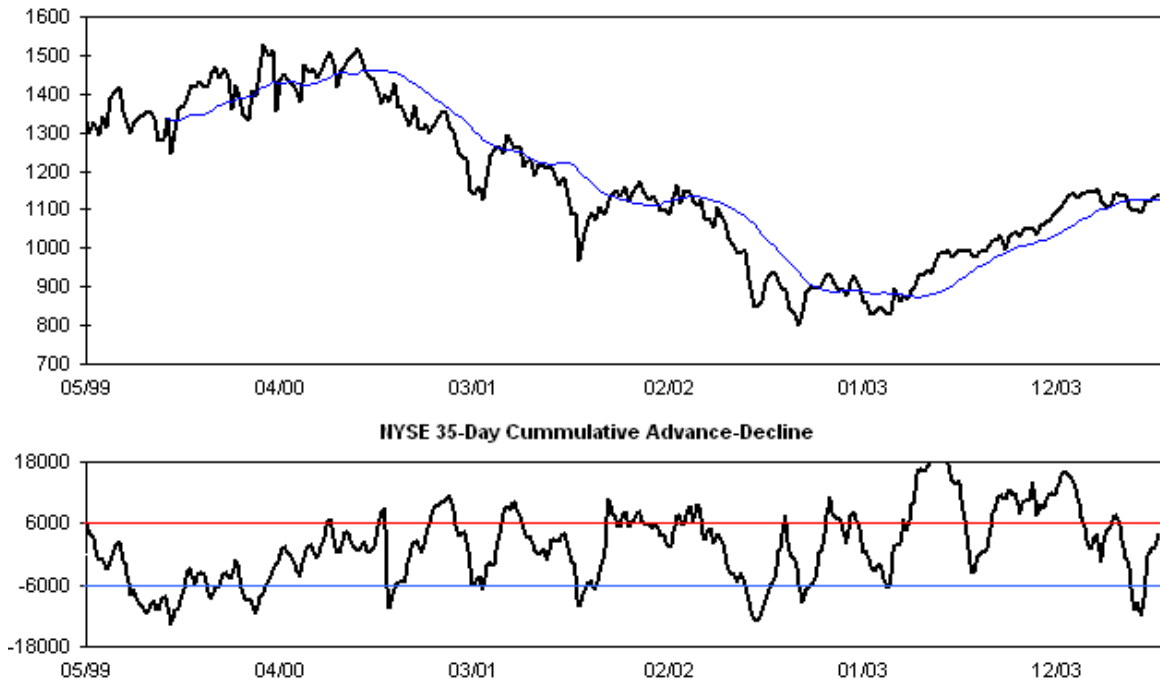
Analysis and Discussion

The following is an attempt to develop a “confidence-builder” indicator. It is not designed to identify major turning points (i.e. an overbought/oversold–type of indicator or a trend following, momentum-based indicator), but rather built to spot “low-risk” entries in the stock market. While most indicators are based on price (open, high, low, close) and/or volume data, the researcher will focus on what is commonly called the “breadth” of the market.

In 1884, Charles Dow developed two broad market averages i.e. the Dow Jones Industrial Average and the Dow Jones Transportation Average. After more than 100 years, and minor modifications, these two indices, among many others, continue to do a wonderful job picturing the overall direction of the market. This is a critical observation because most of the individual issues traded in an exchange tend to mirror the path pointed by the major averages. Still, there are exceptions: for example, prior to the bear market of 1973-1974, the Nifty Fifty (a term given to fifty blue chip stocks), were so popular that their prices were temporarily driven up to ridiculous levels. Their lofty market capitalization hushed the decline of the price of most of the smaller issues that had already begun in the broader-based bear move at that time. On a more current basis, the weekly cumulative advance-decline (NYSE and NASDAQ) peaked in early 1998, two years before the stock market (measured by the Wilshire 5000) topped and began one of the most pronounced bear legs in its history (see the attached chart, courtesy of Mesirow Financial, Chicago).



Traditionally, the Advance/Decline Line ("A/D Line") is most widely used as cumulative total of the Advancing minus Declining Issues indicator. When compared to the movement of a market index (e.g., Dow Jones Industrials, S&P-500, etc) the A/D Line is an established indicator and an effective gauge of the stock market's strength. Below is an example of a 35-day Cumulative Advance/Decline Line of the NYSE, an indicator that has been used very successfully for many years by Mr. Don Hahn (CFA) from Mesirov Financial in Chicago. Other commonly used periods are the 10- and the 21-day for example. On the top of the chart, the weekly close of the S&P-500 and its 20-week simple moving average. On the bottom half of the chart, the 35-day cumulative advance-decline line of the New York stock exchange becomes bullish when it reverses from below its oversold line (-6000) and bearish when it reverses from above its overbought line (+6000).



In the following discussion, however, the researcher tried to evaluate another possible approach: the “n-period absolute summation of advances minus declines,” that is, advances minus declines, regardless of the sign produced by the subtraction. The product of this calculation is the “DonHahn” oscillator that the researcher named in homage of Mr. Donald Hahn, one of the researcher’s “technical mentors,” whom patiently, and generously mentored the researcher a myriad of new “technical horizons.” One of the basic ideas behind this indicator is the different underlying price (and in this case “breadth”) structure displayed, depending upon which “phase” the markets are evolving (or are about to evolve), namely a bull- or bear- leg. Because the markets spend more time going up (hopefully) than down, bear-legs are usually quicker and sharper than up-moves. Also, major tops are very often associated with euphoria, but important bottoms are (almost) always formed when fear can be seen in the eyes of the market participants. There is a psychological inclination to “dump” assets at any prices at the end of the cycle, because of the “indifference-hope-greed-fear” stages most

markets usually go through. Furthermore, while prices may easily fall under their own weight, a lot of “fuel” is usually required to make them take-off. Therefore, the acceptance of these critical assumptions make it possible to disregard the sign of the subtraction of the “declines” from the “advances” when calculating the “DonHahn” oscillator.

In a nutshell, we are looking for extreme breadth, to help us identify a market where 1) sellers are exhausted after a down-leg or 2) buyers are in control and holding enough powder to make the cannonball fly much higher after the initial lift off the mortar. Below are the “DonHahn” calculations using the same inputs as in a “traditional” 5-day Cumulative Advance-Dcline example. As one can see, the Adv-Dcl column is always positive. This simple change produces a “5-day Sum” (the “DonHahn” oscillator) that is very different from the previous computations. Remember, the researcher’s initial goal in developing this oscillator was to find “low-risk” entries rather than major turning points. By that, the “DonHahn” should be used in conjunction with another indicator, such as a typical overbought-oversold type of oscillator (like the RSI or the Stochastics for example) and act like a “confidence-builder,” by confirming the extreme condition of the market, when the actual buy signal is generated by the “main” indicator.

“Traditional Cumulative” A/D Line

“DonHahn Summation” A/D Line

	Advances	Declines	Adv-Dcl	5-Day Sum		Advances	Declines	Adv-Dcl	5-Day Sum
Day-01	10	15	-5		Day-01	10	15	5	
Day-02	15	20	-5		Day-02	15	20	5	
Day-03	20	25	-5		Day-03	20	25	5	
Day-04	25	10	15		Day-04	25	10	15	
Day-05	20	5	15	15	Day-05	20	5	15	45
Day-06	10	10	0	20	Day-06	10	10	0	40
Day-07	5	15	-10	15	Day-07	5	15	10	45
Day-08	10	20	-10	10	Day-08	10	20	10	50
Day-09	10	25	-15	-20	Day-09	10	25	15	50
Day-10	15	30	-15	-50	Day-10	15	30	15	50
Day-11	20	35	-15	-65	Day-11	20	35	15	65
Day-12	25	10	15	-40	Day-12	25	10	15	70
Day-13	30	5	25	-5	Day-13	30	5	25	85
Day-14	25	5	20	30	Day-14	25	5	20	90
Day-15	10	5	5	50	Day-15	10	5	5	80

The next step after defining the initial formula when constructing an oscillator is to set the variables that will affect the results of the calculations. In this particular case, the only variable in the formula is the number of days used for the summation (the “n-period” part of the formula). But there is another very important variable to deal with: the “signal-line,” i.e. the level the “DonHahn” should reach in order to actually trigger the signal. A possible approach when delineating the “signal line” is to set an arbitrary level, back-test it, and then adjust it accordingly depending on the result produced by the historical testing.

In this particular case, however, there is another problem, because the number of stocks traded on the New York Stock Exchange (or any other market data upon which this indicator would be computed) varies over time. That, in turn, obviously affects what can be considered as an extreme reading of the advances minus declines absolute summation. To overcome this problem, the researcher decided that the best “signal-line” would be a multiple of an average of the “advance plus declines plus unchanged” issues because it would reflect the variations of the total number of shares listed on a particular exchange. That is, the “signal-line” would be a “floating” line that would increase or decrease as more companies would be added or subtracted from that exchange.

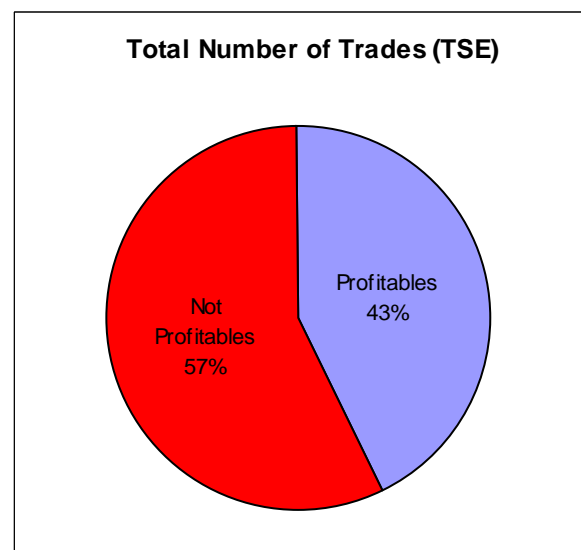
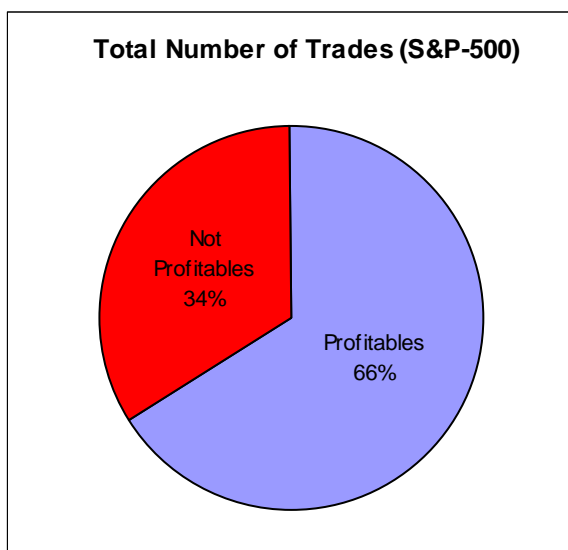
For this second variable, it is suggested to simply multiply the 89-day average by two, because 1) the researcher felt a fairly long average is needed to smooth the data, and more importantly 2) the researcher always tries to use Fibonacci numbers when testing the variables affecting an indicator. The second criteria is a simple rule derived from the widespread tendency displayed by most market technicians to apply to trading and price forecasting one of the most amazing mathematical discoveries of all times: the Fibonacci sequence. The

Fibonacci series is a mathematical number progression with several unique properties. The sequence, first explained by Leonardo of Pisa, also known as Fibonacci (ca. 1200), to describe the growth of a rabbit population, begins with the whole numbers 1 and 2 and then progresses in such a way that the next number in the series is always the sum of the two most recent numbers – e.g. 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233 and so on. As the series advances, the ratio of a number in the series to the number immediately after it comes increasingly closer to .618, or 61.8 percent. This ratio, a derivative of the Fibonacci series, is known as the “Golden Ratio,” which is pervasive throughout nature and has been used in a variety of ways for market and price forecasting, especially for price retracement calculations and target projection purposes.

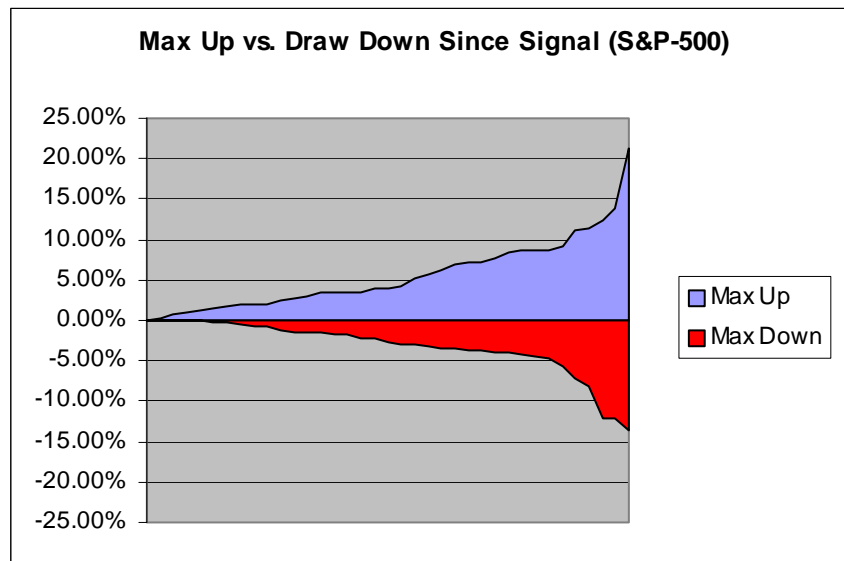
Possible explanations of the widespread acceptance and use of the Fibonacci series and “Golden Ratio” by many chartists and technicians, including the researcher are: 1) The series and its ratio occur so frequently in nature such as the number and arrangement of petals on a flower, the seed patterns in sunflowers, pineapples scales etc., that the phenomenon is often referred to as a “law of nature.” Therefore, if one assumes the markets are “living organisms” mostly driven by the emotions of the human nature rooted in the subconscious of the market participants, one can state that most “laws of nature” can be applied to the financial markets, and 2) if one agrees with Thomas of Aquinas’ description of one of the basic rules of aesthetics: man’s senses enjoy objects that are properly proportioned (and therefore referred to the direct relationship between beauty and mathematics) and that man instinctively reacts positively to clear geometrical forms, in both his natural environment and in objects created by him, (such as paintings, the Pyramid of Gizeh, the Mexican Pyramids among others), it is

therefore reasonable to expect market participants to look for price patterns, retracement and objectives that follow the proprieties of the Fibonacci series and its Golden Ratio.

Back to the subject, here are the details of the variables used for the in-sample test: the researcher first worked on the U.S. market, using the New York Stock Exchange data. The calculations were as follow: A) For the “DonHahn” oscillator: 1) daily advances minus declines 2) 5-day summation of the absolute number of this subtraction. B) For the “Signal-Line” 1) 89-day average of advances plus declines plus unchanged 2) this average multiplied by two. The in-sample tested period was the daily data from October 1965 until August 2003. The system generated a total of 38 long signals, of which 66% were profitable after the pre-defined 20-day exit period. The trades were defined as follow: entry at the open of the session following the signal, exit on the at the open of the 21st session following the entry. The average overall performance was a 2.21% gain per signal, where the average gain was 5.55% for the profitable trades, while the average loss registered on the losing trades was 4.22%. More importantly, the average Draw-Down recorded during the 20-day “holding period” was 6.64%.

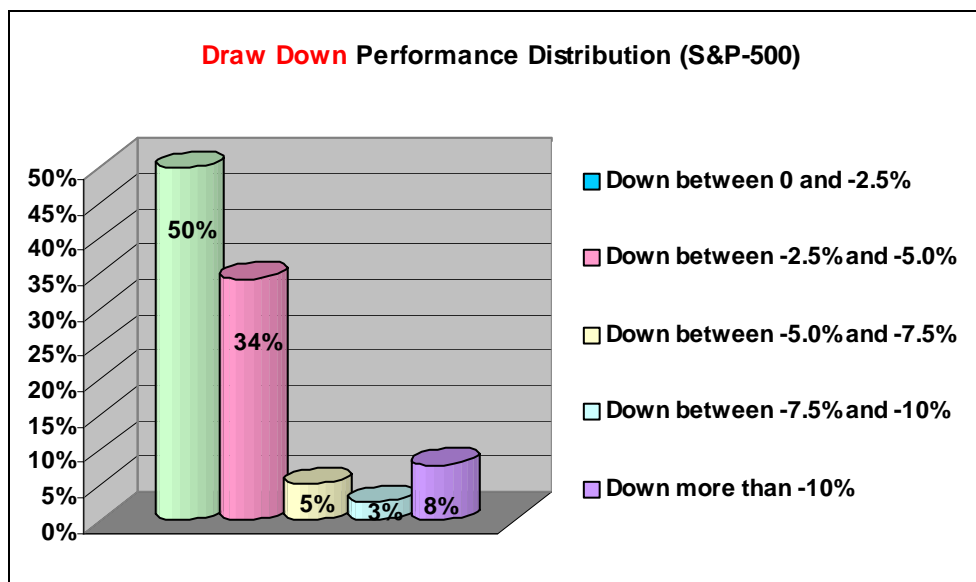


Below, is a chart of the price distribution, that is the Maximum Run-Up versus the Maximum Draw-Down calculated on the closing price during the “holding period” of 20-day after the signals have been triggered. Encouragingly, most of the variations were comprised within a plus 7.5% minus 5% range.



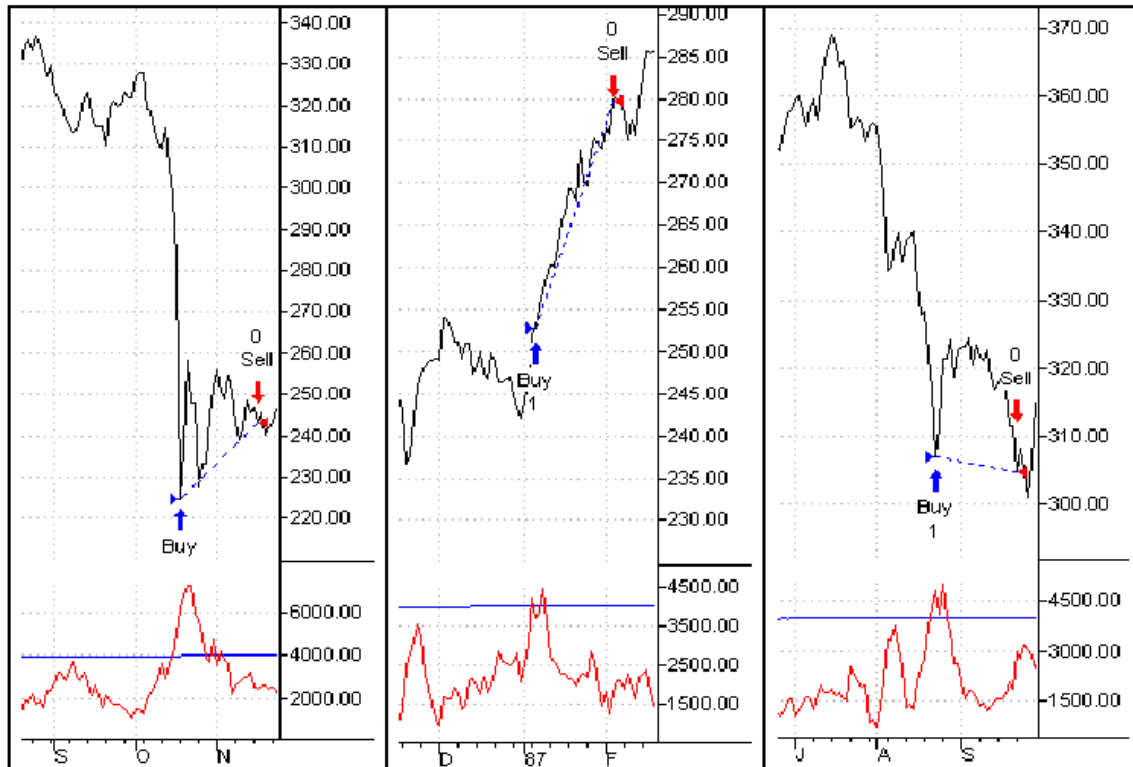
The positive outliers were a 19.57% profit on the S&P-500, registered from the signal generated on 07/24/02 at 794.11 to the exit, 20 days later on 08/22/02 at 949.52, an 11.17% profit on the S&P-500 from the signal generated on 01/07/1975 at 71.02 to the exit of 78.95 on 02/05/1975. Another signal generated more than 10% gain on the S&P-500, specifically 10.63% from the 252.77 entry price of the 01/06/1987 to the 02/04/1987 exit of 279.63. When considering the maximum Draw-Down during the holding period, the outliers were: A 15.09% maximum loss from the 04/28/1970 entry of 80.27 to 69.29 low registered during the 20-day holding period used for the test, another loss of 13.75% from the 09/05/74 entry of 70.87 to a 62.68 low during the same 20-day

holding period and lastly a loss of 13.56% from the 11/06/73 entry of 104.96 to the 92.16 low that was subsequently registered within the next 20 days. Here is a chart that illustrates the initial focus, that is, the Maximum Draw-Down of the S&P-500 during the 20-day holding period (about one month of trading) that was set at the beginning of the testing. Furthermore, beside the three outliers mentioned above, most of the price distribution remained within 0% and -5% band from the day the signal was generated.



Below are three examples of signals triggered by the indicator: on the top half of the charts, the daily S&P-500, on the bottom half, the “DonHahn” in red and the signal line in blue. The presented signals are textbook examples chosen from the many signals set by the indicator. We all know that reality is, more often, far from perfect. The researcher tried to illustrate the effect of the “sellers’ exhaustion” and the “buyers’ power” mentioned earlier in this text. As indicated on

the left and right charts, the market bottomed after the signal because of sellers' exhaustion, while the chart in the center is an example of "buyers' power".



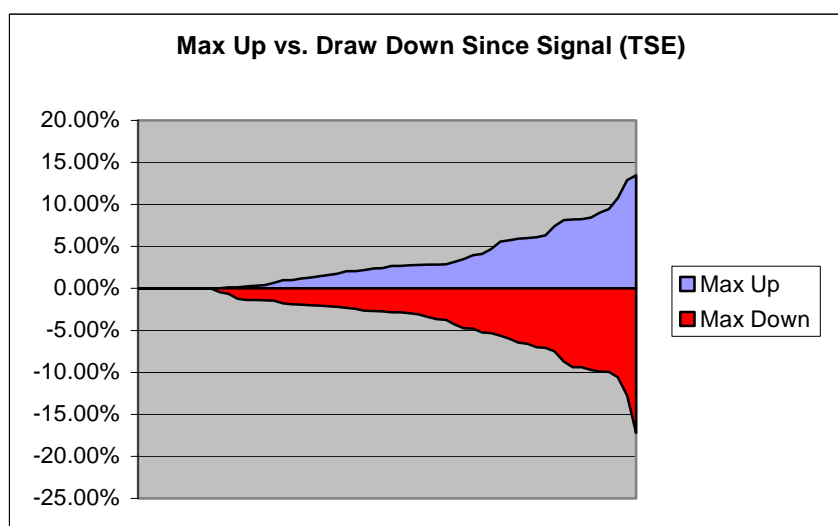
On the other hand, let's turn our attention to Japan. For the in-sample test, The researcher used exactly the same variables that were set for the test on the S&P-500. This is critical in order to avoid falling in the trap of too much optimization. The only restriction in order to effectively test the "DonHahn" indicator was to choose a big enough, active enough and volatile enough market. Japan was an ideal candidate even though the historical data available on advance-decline issues was much shorter than in the U.S. Japan, however, presented the advantage of having endured its own bear market, which was a clear plus when considering the need of testing a "long-only" system designed to spot "low-risk" entries.

Concurrently, the data used for this test goes back to July 1992 and is based on the advance-decline data from the Tokyo Stock Exchange, the TOPIX Index (TSE). Interestingly, a larger number of signals were generated during a much shorter period: a total of 56, of which 43% were profitable and 57% were not profitable after the 20-day “holding period.” There are two reasons to explain this phenomena: First, the prolonged period this index spent in a bear-leg increased the number of “sellers’ exhaustion” type of signals. Second, the Japanese market is more volatile than the U.S. one, hence there was an increase in the range of price distribution recorded after a signal. All in all, if one agrees to the above-proposed statements, then these results seem to be acceptable. But the overall average performance is also far below the outcomes of the test generated on the U.S. market: a disappointing -0.27% . The average gain on profitable signals is 4.79% , where the average loss recorded on unprofitable trades is -4.07% . Oddly, the most important data, the average Draw-Down, is very close to the average loss recorded on unprofitable trades, this is, however, a much *better* result than the test that was run in the U.S. Remember, and this is an important point, this indicator was initially designed to be used in conjunction with another “timing” indicator, the “DonHahn” being used to confirm or not, if the reversal signal had been generated in a “high-risk” or “low-risk” market environment. Considering this, a 4% average loss from the point identified as “low-risk” is a fairly good result, in the researcher’s opinion. Especially bearing in mind that the Japanese market has been sharply trending downward during most of the time the test was processed.

Date of Entry	Entry Price	"Max Up" Price	In Percent
08/21/92	1,251.70	1,420.38	13.48%
04/11/97	1,493.45	1,509.13	12.91%
03/29/93	1,452.54	1,535.77	10.75%

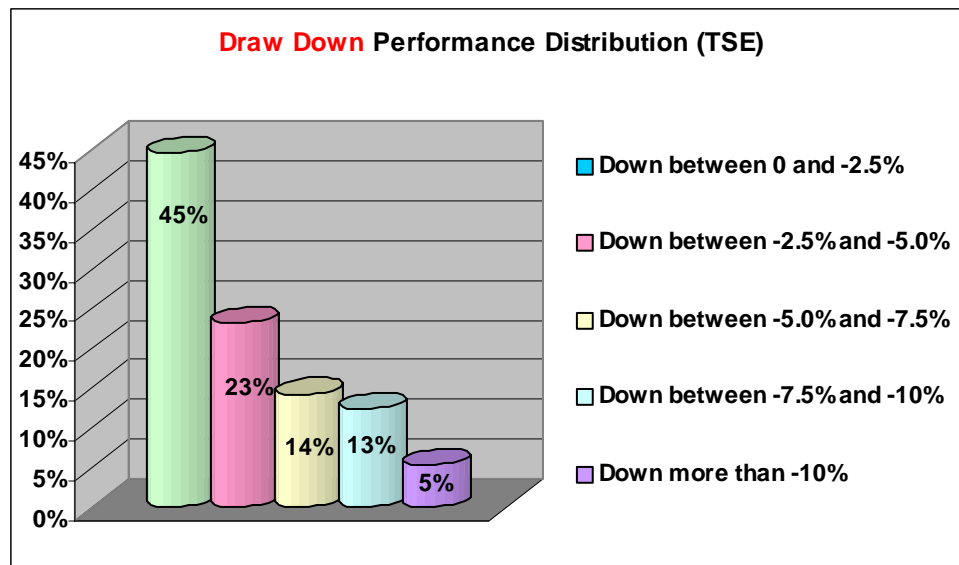
Date of Entry	Entry Price	"Max Down" Price	In Percent
10/29/93	1,630.59	1,350.48	-17.18%
12/09/96	1,532.77	1,337.03	-12.77%
12/27/94	1,555.05	1,390.68	-10.57%

Like the U.S. market, most of the Maximum Run up and the Maximum Draw-Down price distribution was comprised within a plus 5%, minus 5% range (for the S&P-500, the range was plus 7.5%, minus-5%). But here again, there were some differences. First, more "Japanese" signals were triggered at the actual top or bottom of the range and secondly (and more importantly) there were more outliers registered in Japan than in the U.S. Again, one possible explanation is that the higher volatility of the TOPIX relative to the S&P-500 during this period. Below is a table analyzing the outliers of the Maximum Run-Ups and the Maximum Draw-Downs generated during the 20-day holding period.



As in the U.S., there were only 6 trades that generated a price distribution greater than 10% during the 20-day holding period. But the time cycle of the test was

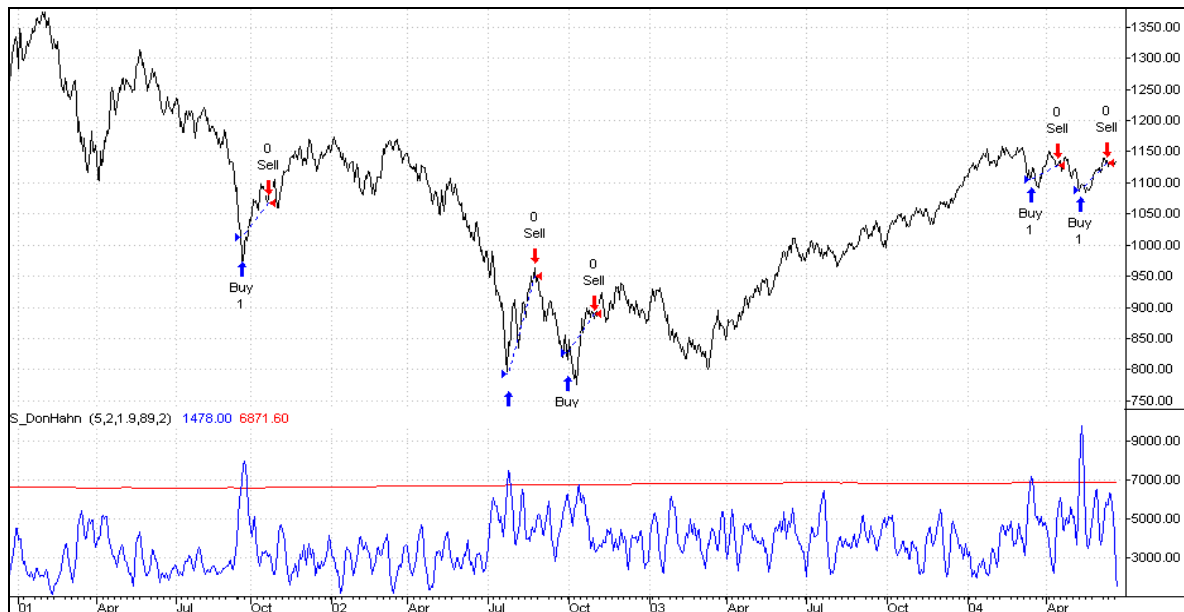
much shorter in Japan (about 11 year) than in the U.S. (about 38 years!). Also seen on the below-pictured chart, the TOPIX Draw-Down Performance Distribution was less concentrated in the 0% and -5% range than in the U.S. A worrying outlier, however, is the -17.18% Draw-Down generated after the 10/29/93 entry. This is too much for a “low-risk” entry! This is why the researcher advocate using this indicator in combination with another overbought/oversold-type of indicator or a setup based on pure price action like two consecutive higher highs for example or any other kind of reversal combination.



Out-of-Sample Signals

There have been two out-of-sample signals on the U.S. market (using the S&P-500) since the end of the in-sample testing, that is: one buy on 03/16/04 at 1105.87 close 20 trading days later at 1128.10 for a 2.01% and another buy on 05/11/04 at 1,088.14 closed at 1,131.33 20 days later for a 3.96% gain. Maximum draw-downs were -1.70% and -0.81%.

In Japan, there were also two out-of-sample signals since the end of the in-sample testing, that is: one buy signal on 03/02/04 at 1,116.75, closed at 1,179.17 for a 5.59% gain and another one on 05/11/04 at 1088.89, closed 20 trade days later at 1151.67 for a 5.77% gain. Maximum draw-down was zero on both trades.



Summary and Conclusion

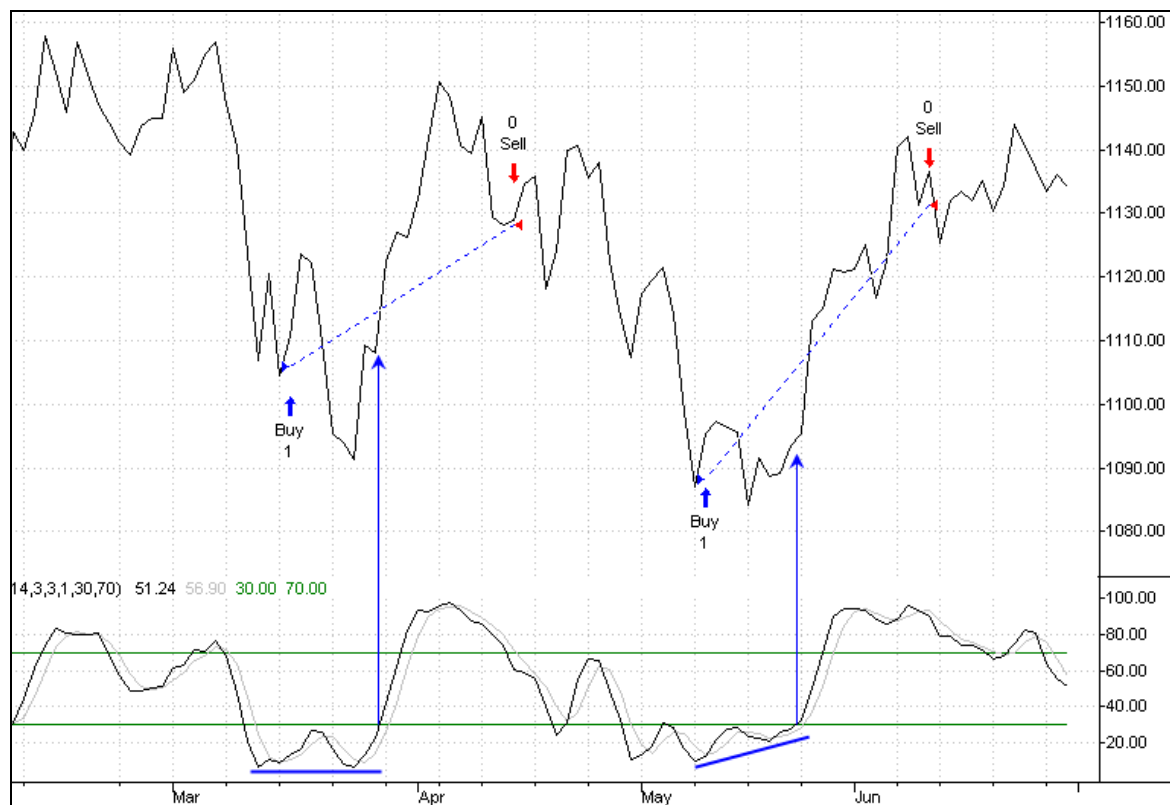
In this paper, the researcher tried to describe one among the many possible paths an analyst should follow to develop an indicator. The researcher first had to set an objective for the indicator, namely spotting “low-risk” areas where he could use a “genuine” overbought-oversold indicator to identify market reversals. Next, he formed beliefs based on his observations and understanding of the equity markets. The researcher then came up with a simple formula that would attempt to capture the essence of this initial scheme. Subsequent to the development phase, he had to set the variables that would affect the outcome of the formula and actually trigger the signals. In this particular case, the researcher

had to use a little variation and design a “floating” signal line that would reflect changes in the number of issues traded in a particular exchange. Then the back testing, using historical data from two different exchanges, but with the same variables, in an attempt to increase the validity of the outcomes and the comparability of the results. Finally, the analysis of the data, a very key step in order to obtain a level of confidence high enough that will enable the trader or the analyst to use his indicator in the ever changing real world, not in the static matrix of the study of the past. In order to support this argument, real-time, out-of-sample signals were also included. And while their statistical significance is obviously limited (a total of four signals only), their outcome is encouraging and support the researcher in his stated conclusions.

Potentially Viable Application

The researcher used the chart below to picture examples of a possible application of what this indicator was initially developed for: he just added a slow stochastic indicator and used it to trigger potential reversal points within the 20-day “holding period.” While most know that an overbought-oversold indicator can lead to disappointing outcomes when used in isolation, the results of a simple strategy such as “buy-when-reversing-from-below-20” can be greatly improved when combined with a “confidence-builder” oscillator such as the “DonHahn” indicator. The two instances are the out-of-sample signals generated after the end of the testing period. The first setup starts with the DonHahn Indicator registering extreme readings on 03/16/04 at 1110.70, and therefore suggesting high probability of a low-risk entry in the immediate subsequent period. The index then weakened to a new closing low in the cycle 1087.06 (or -2.13%). In the

meantime, the 14, 3, 3, Slow Stochastic refused to confirm the lows by displaying a positive divergence (or convergence) with prices. The entry was generated by the Slow Stochastic crossing back above the 30% line on 03/29/04 at 1127.00. Subsequent closing high was 1150.57 (or +2.10%). The second setup was very similar with the DonHahn registering extreme readings, the Slow Stochastic showing a convergence with prices, followed by its move back above the 30% level on 05/24/04 at 1094.84. Subsequent closing high was 1142.18 (or +4.32%).



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