
BORIS LYUBNER

*Buy Power, Sell Power*

# Trend Trigger Factor

*Whether you're trading short term or long term, the only way to make money in the market is to position yourself in the direction of the trend.*

**by M.H. Pee**

The markets are mostly random, but they do have a small trend component. It is this trend component that you should take advantage of if you want to make money in the markets. I don't mean you should buy at the bottom of a trend and sell at the top by predicting exactly when it will start and when it will end. What you should do is follow the trend and ride it along until you see weakness. The further the market moves from your entry price in your direction, the more you will make; the stronger the trend, the more opportunity you will have to make a larger profit.

## DEFINITION

To keep you trading with the trend, I designed an indicator called the *trend trigger factor* (TTF) that will help you be long in an uptrend and short in a downtrend. This indicator allows you to follow the trend and capitalize on that rare nonrandom trend component of the markets.

I will illustrate the calculation of the TTF by using a 15-day parameter. Before going any further, I will first define the TTF's signals: buy power and sell power. If you were to label today as day 1, yesterday as day 2, the day before yesterday as day 3, and so on, then the buy power and sell power are as follows:

***15-day buy power*** = Highest high of (day 1 to day 15 inclusive) – Lowest low of (day 16 to day 30 inclusive)

***15-day sell power*** = Highest high of (day 16 to day 30) – Lowest low of (day 1 to day 15)

After calculating these variables, you can move on to calculating the TTF:

***15-day TTF*** = ((Buy power – sell power)/(0.5*(Buy power + sell power))) * 100

The denominator of the TTF is actually the average range of two 15-day periods, in which the first period refers to day 1 through day 15 and the second period refers to day 16 through day 30, as shown below:

0.5*(Buy power + sell power)

=0.5*((Highest high of first period – Lowest low of second period) + (Highest high of second period – Lowest low of first period))

=0.5*((Highest high of first period – Lowest low of first period) + (Highest high of second period – Lowest low of second period))

=((Range of first period) + (Range of second period))/2

=Average of the ranges in the first and second periods

## THEORY BEHIND THE TTF

You now need to know exactly what values the 15-day TTF will generate during different market conditions, such as consolidations, uptrends, and downtrends. To help in the explanation, I have included three diagrams. Figure 1 shows the behavior of the indicator during consolidations, Figure 2 shows the TTF during uptrends, and Figure 3 shows its behavior during downtrends.

Note that the red line on the left of each of the three figures represents the movement of prices during the second period — from day 16 to day 30, inclusively. The connecting blue line depicts the movement of prices from the first period, which is from day 1 to day 15. Next, there are the two bars in black, each of which is a summarized representation of the movement of the prices for the two 15-day periods.

I will first look at a consolidating market. The values of buy power and sell power are indicated in Figure 1. By looking at Figure 1, you can see that both the buy power and sell power are virtually of the same magnitude during a consolidation. In addition, they have magnitudes that are very close to that of the average range of periods 1 and 2, which is actually the denominator of the TTF formula. This results in the numerator of the TTF formula having a small absolute value relative to the average range of the two 15-day periods. This is because the numerator is precisely the difference between the buy power and sell power, and they happen to be close in magnitude during a consolidation. Thus, the magnitude of the numerator of the TTF formula is very likely to be smaller than that of the denominator, resulting in the TTF having a value between -100 and 100 during a consolidation.

Basically, the numerator of the TTF (buy power – sell power) measures the degree of overlap between the two black 15-day bars. It has a small magnitude if the overlap is large and a large absolute value if the overlap is small. Confused? It becomes clearer when you refer to Figure 2, where the buy power and sell power are labeled. Since the overlap between the two bars is small during an uptrend, the buy power has a large magnitude and the sell power has a small magnitude relative to the average 15-day range. Because of this, the numerator of the TTF (buy power – sell power) will result in a value that is likely to be larger than the average range (denominator of the TTF). Thus, during strong uptrends, the TTF will tend to have values larger than 100.

By the same reasoning, during downtrends, the sell power

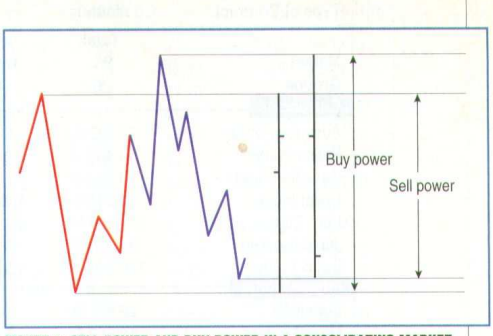


**FIGURE 1: SELL POWER AND BUY POWER IN A CONSOLIDATING MARKET.** The buy power and sell power are of similar magnitudes.

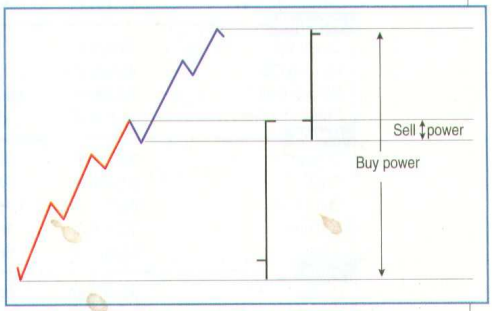


**FIGURE 2: SELL POWER AND BUY POWER IN AN UPTREND.** The buy power has a large magnitude, and the sell power has a small magnitude relative to the average 15-day range.

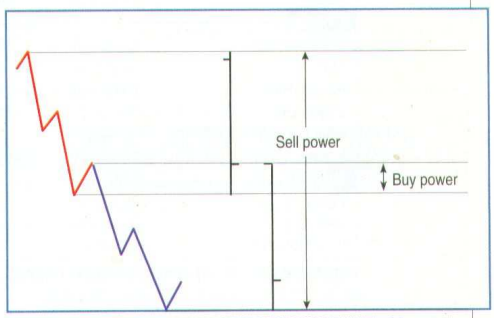


**FIGURE 3: SELL POWER AND BUY POWER IN A DOWNTREND.** In this case, the sell power has a large magnitude, whereas the buy power has a relatively small magnitude.

**HYPOTHETICAL TESTING RESULTS OF TTF ACROSS MARKETS**

Time Period Tested: 01/02/1980–04/30/2003
Commission/Slippage: $75.00
Type of Contract: Continuous

| Market Groups | Total P/L ($) | Avg Trade ($) | Max DrawDn ($) | Total Trades | Win (%) | P/L |
|---|---|---|---|---|---|---|
| **Currencies** | | | | | | |
| Australian Dollar | 40,335.00 | 683.64 | 14,225.00 | 59 | 49.15 | 1.80 |
| British Pound | 94,406.25 | 1,048.96 | 41,187.50 | 90 | 38.89 | 2.72 |
| Canadian Dollar | 8,950.00 | 89.50 | 7,600.00 | 100 | 39.00 | 1.82 |
| Dollar Index | 89,895.00 | 1,426.91 | 16,985.00 | 63 | 49.21 | 2.52 |
| Euro Currency-DM | 177,962.50 | 2,224.53 | 13,175.00 | 80 | 50.00 | 2.32 |
| Japanese Yen | 98,075.00 | 1,077.75 | 19,162.50 | 91 | 43.96 | 2.23 |
| Swiss Franc | 126,000.00 | 1,594.94 | 22,325.00 | 79 | 49.37 | 2.42 |
| **Interest Rates** | | | | | | |
| Eurodollar | 26,912.50 | 336.41 | 11,425.00 | 80 | 41.25 | 2.16 |
| Muni Bonds | -18,662.50 | -224.85 | 30,956.25 | 83 | 34.94 | 1.59 |
| T-Bonds | 20,925.00 | 207.18 | 38,825.00 | 101 | 37.62 | 1.90 |
| T-Notes (10 Yr) | 46,787.50 | 537.79 | 12,809.38 | 87 | 35.63 | 2.80 |
| T-Notes (5 Yr) | 22,756.25 | 367.04 | 7,918.75 | 62 | 35.48 | 2.84 |
| **Energies** | | | | | | |
| Crude Oil | 48,405.00 | 597.59 | 13,040.00 | 81 | 48.15 | 1.78 |
| Heating Oil | 42,577.20 | 421.56 | 13,279.80 | 101 | 39.60 | 2.22 |
| Natural Gas | 83,720.00 | 1,610.00 | 16,735.00 | 52 | 44.23 | 2.70 |
| Unleaded Gas | -1,553.40 | -16.88 | 33,053.40 | 92 | 36.96 | 1.68 |
| **Metals** | | | | | | |
| Copper | -30,137.50 | -279.05 | 20,012.50 | 108 | 33.33 | 1.47 |
| Gold | 24,845.00 | 241.21 | 15,725.00 | 103 | 39.81 | 1.94 |
| Palladium | 106,700.00 | 1,159.78 | 15,445.00 | 92 | 41.30 | 3.44 |
| Platinum | 17,140.00 | 166.41 | 19,485.00 | 103 | 42.72 | 1.66 |
| Silver | 156,820.00 | 1,668.30 | 28,390.00 | 94 | 31.91 | 5.38 |
| **Softs** | | | | | | |
| Coffee | 22,462.50 | 226.89 | 75,562.50 | 99 | 37.37 | 1.81 |
| Cotton | 59,935.00 | 696.92 | 20,435.00 | 86 | 40.70 | 2.50 |
| Lumber | 30,217.00 | 274.70 | 42,941.00 | 110 | 38.18 | 1.97 |
| Orange Juice | 9,487.50 | 95.83 | 26,527.50 | 99 | 34.34 | 2.13 |
| Sugar | 17,046.60 | 191.53 | 14,759.20 | 89 | 35.96 | 2.21 |
| **Grains** | | | | | | |
| Corn | 24,087.50 | 301.09 | 9,412.50 | 80 | 40.00 | 2.57 |
| Oats | 4,200.00 | 43.75 | 11,287.50 | 96 | 29.17 | 2.69 |
| Rough Rice | 53,095.00 | 816.85 | 8,245.00 | 65 | 47.69 | 2.75 |
| Soybeans | -39,350.00 | -371.23 | 52,187.50 | 106 | 31.13 | 1.44 |
| Soybean Oil | 2,598.00 | 24.51 | 18,057.00 | 106 | 37.74 | 1.73 |
| Wheat | 45,300.00 | 481.91 | 7,187.50 | 94 | 41.49 | 3.07 |
| **Meats** | | | | | | |
| Feeder Cattle | 38,722.50 | 430.25 | 13,485.00 | 90 | 42.22 | 2.28 |
| Live Hogs | 30,348.00 | 297.53 | 15,244.00 | 102 | 36.27 | 2.39 |
| Pork Bellies | -68,515.00 | -665.19 | 74,510.00 | 103 | 31.07 | 1.36 |

**FIGURE 4: RESULTS OF TTF ACROSS DIFFERENT MARKETS.** The markets have been categorized into seven major groups. You can see that the TTF is profitable in each of these groups and in 30 out of the 35 markets tested.

has a large magnitude, whereas the buy power has a small one relative to the average 15-day range (as indicated in Figure 3). Hence, the absolute difference between the buy power and sell power will be large relative to the range. In the case of a strong downtrend, the difference (numerator of the TTF) will probably be larger than the average range (denominator of the TTF), thus resulting in the TTF having a value smaller than -100.

The stronger the uptrend, the greater is the value of the TTF above 100. By the same token, for stronger downtrends, the value of the TTF will be further below -100. Finally, for higher degrees of consolidation in the markets, the value of the TTF will be closer to zero.

**HYPOTHETICAL TESTING RESULTS OF TTF ACROSS YEARS**

| Years | Total P/L ($) | Avg Trade ($) | Max DrawDn ($) | Total Trades | Win (%) | P/L | % Return |
|---|---|---|---|---|---|---|---|
| 1980 | 30,318.25 | 356.69 | 57,242.10 | 85 | 37.65 | 1.99 | 27.01 |
| 1981 | 182,597.50 | 2,282.47 | 27,984.40 | 80 | 40.00 | 4.08 | 220.04 |
| 1982 | 62,999.90 | 577.98 | 50,988.00 | 109 | 41.28 | 2.18 | 59.44 |
| 1983 | 31,899.10 | 287.38 | 26,906.85 | 111 | 41.44 | 1.88 | 38.95 |
| 1984 | 30,641.08 | 251.16 | 32,985.33 | 122 | 31.97 | 2.70 | 34.83 |
| 1985 | 66,285.68 | 526.08 | 26,129.25 | 126 | 46.03 | 2.01 | 81.70 |
| 1986 | 97,432.45 | 743.76 | 20,648.25 | 131 | 39.69 | 2.51 | 128.80 |
| 1987 | 46,708.30 | 326.63 | 35,850.68 | 143 | 33.57 | 2.61 | 51.41 |
| 1988 | 60,193.70 | 409.48 | 40,037.80 | 147 | 43.54 | 1.85 | 63.34 |
| 1989 | 49,552.15 | 375.40 | 41,923.75 | 132 | 35.61 | 2.44 | 51.12 |
| 1990 | 93,529.63 | 730.70 | 30,946.75 | 128 | 41.41 | 2.59 | 108.82 |
| 1991 | 45,515.35 | 297.49 | 30,676.30 | 153 | 34.64 | 2.47 | 53.12 |
| 1992 | 141,909.30 | 1,075.07 | 12,704.00 | 132 | 50.00 | 3.07 | 209.60 |
| 1993 | 44,834.80 | 307.09 | 31,685.30 | 146 | 37.67 | 2.20 | 51.72 |
| 1994 | 27,773.20 | 212.01 | 45,853.45 | 131 | 37.40 | 1.96 | 27.54 |
| 1995 | 49,202.80 | 323.70 | 32,692.33 | 152 | 38.16 | 2.16 | 56.11 |
| 1996 | -19,286.00 | -127.72 | 52,077.58 | 151 | 34.44 | 1.71 | -18.01 |
| 1997 | 44,033.35 | 289.69 | 38,421.40 | 152 | 35.53 | 2.33 | 47.13 |
| 1998 | 17,194.18 | 106.14 | 39,606.53 | 162 | 41.98 | 1.51 | 18.17 |
| 1999 | -50,960.10 | -349.04 | 63,041.23 | 146 | 33.56 | 1.41 | -43.17 |
| 2000 | 64,408.63 | 415.54 | 27,699.13 | 155 | 39.35 | 2.12 | 77.88 |
| 2001 | 161,579.80 | 1,272.28 | 26,298.75 | 127 | 43.31 | 2.98 | 198.75 |
| 2002–April 2003 | 134,130.40 | 654.29 | 21,132.30 | 205 | 41.46 | 2.44 | 176.18 |

**FIGURE 5: RESULTS OF TTF ACROSS DIFFERENT YEARS.** The results across different years are just as impressive. Only two out of the 23 years resulted in a loss.

## INTERPRETING THE TTF

Using the theory I have just explained, I will attempt to create a simple system that will keep you in the right direction of the trend most of the time. In the next section, I will test the system to show you its past performance.

*System rules:*

If the 15-day TTF is above 100 (indicating an uptrend), you will want to be in long positions. If the 15-day TTF is below -100, you will want to be short. Finally, if it is between -100 and 100, you should remain with the current position.

To summarize, if you are currently short and the value of the TTF goes above 100, reverse your position by entering long the next day at the open. Similarly, if you are holding long positions as of the close today and the value of the TTF happens to be below -100, then revert to short positions at the open the following trading day.

## HYPOTHETICAL TESTING RESULTS

I tested the TTF as a reversal system, meaning that at any particular time, I was either long or short but never flat. I tested it on a portfolio of 35 markets, from January 2, 1980, through April 30, 2003, a total of about 23 years. Only one contract was taken per trading signal, and a total of $75 was deducted from each trade to reflect slippage and commission. All open positions as of April 30, 2003, are arbitrarily closed, and the exit price is taken to be the close of that day. The testing was done on a continuous contract because of its ability to solve the rollover problem without vastly affecting the test results.

Figures 4 and 5 show the hypothetical testing results of the TTF using its default parameter value of 15 days. Figure 4 shows its performance across different markets, and Figure 5 shows its yearly results.

To convince you that the parameter value of 15 days is not curve-fitted, I will vary the parameter value of the TTF across

**HYPOTHETICAL TESTING RESULTS OF TTF ACROSS PARAMETERS**

| Parameter Values | 10 DAYS | 12 DAYS | 15 DAYS | 18 DAYS | 22 DAYS |
|---|---|---|---|---|---|
| Net Profit | 1,153,957.00 | 1,271,157.00 | 1,412,493.00 | 1,539,022.00 | 1,466,846.00 |
| Maximum Drawdn | 195,581.10 | 154,991.60 | 83,768.30 | 97,750.30 | 102,408.70 |
| Annual % Return | 20.02 | 26.32 | 44.26 | 43.81 | 40.52 |
| No. Of Profitable Markets Out of 35 | 30 | 27 | 30 | 28 | 32 |
| No. Of Profitable Years Out Of 23 | 17 | 19 | 21 | 21 | 18 |
| Average Trade | 246.73 | 327.62 | 451.85 | 587.86 | 701.84 |
| No. Of Trades | 4677 | 3880 | 3126 | 2618 | 2090 |
| % Winners | 37.27 | 38.12 | 39.06 | 39.61 | 39.86 |
| P/L Ratio | 2.14 | 2.17 | 2.25 | 2.34 | 2.36 |

**FIGURE 6: RESULTS OF TTF USING DIFFERENT PARAMETERS.** Using different parameters also showed impressive results. Using 10 days as the parameter value showed the worst results, which ended up being 74% of the years being profitable.

four other parameter values. The summarized results of this variation can be seen in Figure 6. Only the parameter value of the system is changed, with all the other factors remaining similar. The other four parameters are selected by varying the previous parameter value by 20%. For example, by increasing the default parameter value by 20%, you will get 18 days (1.2*15). Similarly, decreasing the default parameter by 20% results in 12 days (0.8*15).

## COMMENTS ON THE TEST RESULTS

Figure 4 shows the results of the 15-day TTF from January 2, 1980, to April 30, 2003, on each of the 35 markets. I have categorized the 35 markets into seven market groups, namely currencies, interest rates, energies, metals, softs, grains, and meats. By browsing through the seven market groups, note that the 15-day TTF is profitable in every one of them. The indicator is also profitable in 30 out of the 35 markets tested, which is equivalent to being profitable in 85% of the tested markets. The same parameter value of 15 days is used to test all 35 markets. This truly demonstrates the robustness of the TTF across markets.

From Figure 6 you can see that I do not specially choose the default parameter value of 15 days due to its superior performance, but the TTF in fact shows fairly consistent performance using different parameter values. At 22 days, the TTF is profitable in 32 out of the 35 markets, making $1,466,846 on a single contract basis. Even its worst parameter of 12 days managed to have 27 profitable markets, which is about 77% of the markets tested. This shows that the performance of the TTF is not the result of curve-fitting, and thus the probability of having similar performance in the future is in fact quite high.

Now take a look at Figure 5, which depicts the hypothetical testing results of the 15-day TTF across the 23 years. The statistics of the "% Return" column are obtained by dividing the yearly profits by the sum of the yearly maximum drawdown and the combined margins of the whole portfolio of 35 markets. The margin is taken to be approximately $55,000.

You can see that the indicator only produced two losing years, the worst being in 1999 with a loss of $50,000. However, look at what happened in the next three years. The combined profits for the three years totaled above $360,000, more than sufficient to recover the 1999 loss with an excess of about $300,000 in profits.

If you had concluded in 1999 that the system was no longer efficient due to the loss and quit trading the system, you not only would have missed the chance of recovering the loss but also the opportunity of making the $300,000 in profits. It is the nature of the markets to trick you into giving up trading a particular system when in fact it may be the best time to continue trading it. This explains why traders often have difficulty following a system, and end up with losses even though they *could* be making profits had they persevered. Remember that losses are part of the game, and as a trader you should learn to accept them.

This system was able to trade a portfolio of 35 markets in 21 out of the 23 years, which truly indicates the robustness of the TTF across time. If you look at Figure 6, you can see that other parameter values share similar results. For example, the parameter value of 18 days also has 21 profitable years; it was profitable for about 90% of the total number of years tested. The parameter value of 10 days has the worst performance in terms of the number of profitable years, with only 17 profit-

*Continued on page 36*


*"To put it succinctly, we should all flee to a country that has no extradition treaties."*

**The TTF successfully passed the three tests of robustness: across parameter values, across markets, and across time.**

*Continued from page 32*

able years out of the total of 23. This converts to 74% of the years being profitable, which is rather high.

You can now see that the TTF is robust across different parameter values, which basically tells you that the parameter values play a minimal role in determining the profitability of the indicator. The indicator is thus profitable across a range of parameter values, and their profitability differs only slightly.

To illustrate, the 18-day TTF produces the highest profit among the five parameters tested, with a net profit of $1,539,022. This represents an annual percentage return of about 44.26%, assuming the account size to be the sum of the largest drawdown and the portfolio margins of $55,000. The lowest is produced by the 10-day TTF, with $1,153,957 in profits and an annual return of 20.02%. The $1,153,957 in profits only represents a drop of about 25% from the maximum of $1,539,022, when in fact the parameter value varied by about 45% from 18 days to 10 days.

## CONCLUSION

The TTF successfully passed the three tests of robustness: across parameter values, across markets, and across time. When you perform these tests on your systems, make sure they are not curve-fitted to past data before you begin trading the system in real time. You may find that some of the systems out there may not even pass these three simple tests. These tests are one of the most effective ways of preventing curve-fitting that I know of, and I have performed them on every system I have developed over the years. Because of the excellent performance that the TTF shows in the three tests, I am highly confident it will be just as profitable in the future as it has been in the past 23 years.

You may use the TTF as a standalone tool, as I have shown, or use it to confirm your other indicators' signals. You may even change the rules and add in your own trailing and money management stops. Try testing the system by increasing the number of contracts traded as profits were accumulated. These slight changes may make a significant difference on overall profitability.

Whatever changes you make, remember to always test the system before trading. Similarly, test it across different markets. Do not assume that my indicator — or any other system, for that matter — will be profitable just because it is presented with excellent hypothetical testing results. Your performance is a result of your own efforts of proper hypothetical testing.

*M.H. Pee specializes in mechanical trading systems development and has developed several of his own indicators and systems. Some of his systems are currently being tracked by Futures Truth. He can be contacted via email at p6608136@magix.com.sg.*

## SUGGESTED READING

Pee, M.H. [2001]. "Trend Detection Index," *Technical Analysis of* STOCKS & COMMODITIES, Volume 19: October.
_____ [2002]. "Trend Continuation Factor," *Technical Analysis of* STOCKS & COMMODITIES, Volume 20: March.
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*See our Traders' Tips section beginning on page 86 for program code implementing M.H. Pee's technique.*

*†See Traders' Glossary for definition*

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