Just How Long Will A Trend Go On?

Trend Continuation Factor

Yes, trends are important: They help you make money and *they help you recover your losses.*

by M.H. Pee

Because trends are an important component of the market, it is imperative you can detect them. However, it's not enough to just identify a trend. It's also crucial to be able to tell the direction of the current trend. Although trends can make you the most money in the shortest time when you are in sync with them, they can also cause you to sustain heavy losses if your position is in the opposite direction. To avoid getting caught in such a situation, I created the *trend continuation factor* (TCF), an indicator that identifies the trend and its direction.

CALCULATING IT

Calculating the TCF involves the difference between the closing prices of the last two days. (See sidebar "Excel codes for the TCF" for a detailed explanation.) In this example, the TCF for 35 days is calculated. You must first obtain the change in two consecutive closes: the difference between today's close and yesterday's close.

Next, separate these changes into two groups, namely the positive changes (+change) and the negative ones (-change). If today's close is greater than yesterday's close, you will have a +change value equal to the difference and a -change value of zero. In the same way, if today's close is lower than yesterday's close, it will result in a -change value equal to their difference and a +change value equal to zero.

The next step is to find the positive continuation factor (+CF) and the negative continuation factor (-CF). If the +change today is zero, the +CF is also zero. If not, the +CF today equals the value of the sum of today's +change and yesterday's value of +CF. As for the -CF, its value is zero if the value of -change today is zero. Otherwise, its value is the sum of today's value of -change and yesterday's -CF value.

After calculating both the continuation factors you can calculate the TCF. The positive trend continuation factor

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FIGURE 1: TESTING RESULTS. These results were generated when the TCF was applied to these 15 markets.

MARKETS	NET PROFIT	MAXIMUM DRAWDOWN	AVERAGE TRADE	NO. OF TRADES	% WINNERS	P/L RATIO
T-BONDS	40,762.55	25,712.50	831.89	49	38.78	2.36
BRITISH POUNDS	12,250.00	46,450.00	222.73	55	32.73	2.30
COFFEE	63,941.25	51,918.75	1,332.11	48	41.67	1.94
CRUDE OIL	35,235.00	8,535.00	819.42	43	44.19	2.53
COPPER	37,687.50	7,262.50	819.29	46	41.30	2.85
COTTON	57,320.00	15,060.00	1,398.05	41	41.46	3.36
DEUTSCHEMARKS	49,952.50	7,187.50	1,062.82	47	38.30	3.35
EURODOLLARS	29,475.00	8,350.00	526.34	56	48.21	2.16
GOLD	19,945.00	8,870.00	369.35	54	35.19	2.69
HEATING OIL	31,353.40	20,455.40	627.07	50	42.00	2.28
YEN	157,300.00	6,337.50	4,626.47	34	64.71	3.12
OATS	-2,550.00	10,462.50	-43.22	59	27.12	2.45
ORANGE JUICE	40,147.50	11,137.50	933.66	43	44.19	2.59
SWISS FRANCS	72,637.50	19,712.50	1,545.48	47	44.68	2.51
SILVER	18,430.00	26,445.00	354.42	52	42.31	1.74

(+TCF) is used to detect uptrends, while the negative trend continuation factor (-TCF) is used to determine downtrends. Their formulas are as follows:

35-day + TCF = Sum of (+change) for the last 35 days – sum of (-CF) for the last 35 days

35-day – TCF = Sum of (-change) for the last 35 days – sum of (+CF) of the last 35 days

INTERPRETING THE TCF

The TCF is used to detect the presence of a strong trend so you can position a trade in the direction of the trend. Positive values of both the +TCF and -TCF indicate the presence of a strong trend, with the +TCF signaling an uptrend and the -TCF a downtrend. Both TCFs cannot be positive at the same time, since an uptrend and a downtrend cannot occur simultaneously.

Both can, however, be negative at the same time, indicating the absence of trends and the existence of a consolidation in the market. In order to trade in the direction of the trend, initiate your long positions at tomorrow's open if today's +TCF value is positive. Enter short positions at tomorrow's open if the -TCF is positive today.

THE THEORY BEHIND TCF

Both the +CF and -CF have magnitudes that are greater than or equal to their respective values of +change and -change. How *much* greater the magnitude is depends on factors such as the frequency of the prices closing in the same direction.

Prices tend to close higher during uptrends and lower during downtrends. During consolidations, there is an equal chance for prices to close up or down. In such situations, the sum of the +change for the past 35 days will have a magnitude that is close to that of the sum of the -change for the past 35 days. Since the +CF is equal to or greater than the +change, the sum of the +CF for the last 35 days will have a larger magnitude than the sum of the +change for the same period.

Since the sum of the +change is more or less equivalent to the sum of the -change during a consolidation, we can conclude that the sum of the -change is smaller than the sum of the +CF for the last 35 days. This in turn will produce a negative value for the -TCF, which indicates the absence of a downtrend. The same reasoning can be applied to explain the +TCF being negative during a consolidation.

During an uptrend, prices will close higher each day, resulting in the sum of the +change being significantly greater than the sum of the -change over the past 35 days. The -CF will only be greater than the -change when the market closes down consecutively. Hence, in a strong uptrend, where the market seldom closes down consecutively, the sum of the -CF should be approximately the same as the sum of the -change for the last 35 days. This will result in the sum of the +change being larger than the sum of the -CF in the last 35 days. Thus, the +TCF will be positive and indicate an uptrend.

The -TCF will be negative at this time for the following reasons: The +CF will at least be equal to the +change, and since the sum of the +change is greater than the sum of the -change, the sum of the +CF will be greater than the sum of the -change for the last 35 days as well. For a downtrend, the reverse will still apply.

HYPOTHETICAL TESTING RESULTS

Following the rules of going long at tomorrow's open if today's +TCF is positive and going short at tomorrow's open if today's -TCF is positive, the TCF is tested as a reversal system; once a position is initiated, you will stay with it until a signal to enter in the opposite is issued. I tested the TCF from January 4, 1982, to December 31, 1998, taking only one contract per trading signal, and with a total of $75 deducted from each trade to take into account the effects of commission and slippage.

For easy evaluation of the results, all positions that are still open at the end of the testing period are involuntarily closed out at the closing price of that day. To prevent falling into the trap of curve-fitting, I have used identical parameters to test the 15 markets displayed in Figure 1. Historical testing on continuous contracts solves the problem of rollovers, while still retaining the accuracy of the testing results. Figure 1 presents the results with statistics corrected to two decimal places.

If the 15 markets were traded as a portfolio, its combined

EXCEL CODES FOR THE TCF

Here I have provided the computerized version of the trend continuation factor (TCF) in Excel format for ease of calculation. The spreadsheet in sidebar Figure 1 displays the historical data for yen between September 23, 1998, and December 31, 1998. Columns A, B, C, D, and E (A and B not shown) represent the date, open, high, low, and close, respectively, with each row containing the data for a specific day. The prices in columns B through E may not tally with the actual price because they are for continuous contracts, but they should be similar. Note the date is shown using six digits, with the initial two representing the year, the middle two the month, and the final two the day. As an example, the number 980928 indicates September 28, 1998.

To obtain the 35-day TCF, you need the value of the +change. You can find this by subtracting yesterday's close from today's close, if the market closed up. If the market closed down, the +change today would be zero. The +change value is listed in column F, and the Excel code for its calculation is given below. Enter the code in cell F3 and copy it down the bottom of the spreadsheet:

$$=If(E3>E2,E3-E2,0)$$

Column G indicates the -change. It is calculated by subtracting today's close from yesterday's close if the market closed down today. If today's close is higher than yesterday's, the -change today is zero. Enter the formula below in cell G3 and copy it down the bottom of the spreadsheet:

$$=If(E3<E2,E2-E3,0)$$

Column H represents the +CF. It is derived by summing the +change today and the +CF value yesterday if the +change today is greater than zero. If the +change today is zero, the +CF today is also zero. Enter the line below in cell H3 and copy it to the end of the spreadsheet:

$$=If(F3=0,0,F3+H2)$$

Column I displays the values for -CF. If the -change today is greater than zero, simply add today's -change value to yesterday's -CF value. If today's -change equals zero, then today's -CF will also have the value of zero. Key the following formula in cell I3 and copy it down the bottom of the spreadsheet:

$$=If(G3=0,0,G3+I2)$$

The 35-day +TCF is displayed in column J. It is obtained by summing the +change in column F for the last 35 days and subtracting the sum of the -CF in column I for the last 35 days

SIDEBAR FIGURE 1: EXCEL. The spreadsheet here displays the historical data for yen between September 23, 1998, and December 31, 1998.

	C	D	E	F	G	H	I	J	K	L	M	N	O
	High	Low	Close	+change	-change	+CF	-CF	35-day +TCF	35-day -TCF	Position	Trading signal for next day		
2	75.81	75.03	75.66										
3	76.22	74.95	75.92	0.26	0	0.26	0						
4	76.69	75.1	75.28	0	0.64	0	0.64						
5	75.82	75	75.47	0.19	0	0.19	0						
6	76.72	75.97	76.37	0.9	0	1.09	0						
7	75.67	74.9	74.97	0	1.4	0	1.4						
8	75.71	75.31	75.54	0.57	0	0.57	0						
9	76.57	75.47	75.54	0	0	0	0						
10	76.41	75.84	76.29	0.75	0	0.75	0						
11	78.53	76.98	78.28	1.99	0	2.74	0						
12	86.07	82.07	84.94	6.66	0	9.4	0						
13	88.77	84.67	85.69	0.75	0	10.15	0						
14	87.72	86.32	87.67	1.98	0	12.13	0						
15	86.25	84.83	85.81	0	1.86	0	1.86						
16	86.32	85.36	86.03	0.22	0	0.22	0						
17	87.27	86.54	86.74	0.71	0	0.93	0						
18	89.62	87.57	88.52	1.78	0	2.71	0						
69	87.6	87.89	0.52	0	0.92	0	-8.52	-14.06	0				
70	88.74	88.84	0.95	0	1.87	0	-1.82	-16.67	0	Remain with current position			

L50 = =IF(J50>0,1,IF(K50>0,-1,L49))

from the previous sum. Enter the formula below in cell J37 and copy it to the bottom of the spreadsheet:

$$=Sum(F3:F37)-sum\ (I3:I37)$$

Column K lists the values of the 35-day -TCF. It is derived by subtracting the sum of the +CF (column H) for the last 35 days from the total of the recent 35 values of -change in column G. Enter the following formula in cell K37 and copy it to the final row of the spreadsheet:

$$=Sum(G3:G37)-sum(H3:H37)$$

Column L indicates the position you should be having the following day. A long position is indicated by the number 1, a short position by "-1" and no positions by zero. Enter the following formula in cell L37 and copy it down the bottom of the spreadsheet:

$$=If(J37>0,1,if(K37>0,-1,L36))$$

Column M displays the entry price for your trade on the following day. If the cell is blank — as all are in this example — it means no trade is going to take place tomorrow. Enter the following formula in cell M37 and copy it to the last row of your spreadsheet:

$$=If(L36=L37,"",B38)$$

Column N indicates trading signals for the next day. A trading signal will only appear in the last row of the data input. All other cells will be blank. Enter the following code in cell N37 and copy it to the last row of the spreadsheet.

$$=If(A38="",if(A37="","",if(L37=L36,"remain\ with\ current\ position",if(L37=1,"go\ long\ at\ open\ tomorrow","go\ short\ at\ open\ tomorrow"))),"")$$

—*MHP*

FIGURE 2: PERFORMANCE RESULTS. This method is profitable in at least 13 of the 15 markets tested.

	25 DAYS	30 DAYS	35 DAYS	40 DAYS	45 DAYS
NET PROFIT ($)	517,167.00	556,722.20	663,887.20	520,080.50	524,551.80
MAXIMUM DRAWDOWN ($)	56,613.35	49,616.45	72,388.70	72,919.60	42,131.65
% RETURN	37.56	44.02	40.75	31.76	45.81
NO. OF PROFITABLE MARKETS OUT OF 15	13	13	14	14	13
AVERAGE TRADE	439.77	631.20	916.97	886.00	1,061.85
NO. OF TRADES	1,176	882	724	587	494
% WINNERS	40.14	40.14	41.02	40.20	42.91
P/L RATIO	2.09	2.29	2.53	2.41	2.25

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accuracy was 41.02% on a total of 724 trades, having $916.97 as the average trade, $663,887.20 as total net profit, 2.53 as profit/loss ratio, and finally $72,388.70 as the maximum closed trade drawdown. An annual compounding rate of return of about 40.75% is achieved, provided the account size required to trade the portfolio is taken as the sum of the maximum closed trade drawdown and the total desirable margin of $29,433 for the 15 markets in the portfolio.

ROBUSTNESS OF THE TCF

The robustness of the TCF is demonstrated by its ability to trade a variety of markets profitably. For example, it is profitable trading 14 out of 15 markets using the same parameter for each and every market.

Let's now use different parameter values for the index to have a feel of its performance across other values. This will provide a clue as to whether the default parameter value of 35 is the result of overoptimization of the past data. Following are the results of trading the portfolio of the 15 markets using the parameter values of 25, 30, 40, and 45 days. All the other rules of the indicator remain unchanged.

The consistency of the results when using other parameter values convinces us that the default value of 35 days is not an overfitted value. It also shows the robustness of the TCF and its high probability of success. If you do not use the optimal parameter value for trading, it won't make much of a difference, since the indicator itself is profitable over a range of values.

Now, let's turn our attention to the number of markets out of 15 where the TCF is profitable (see Figure 2). At its best, it is profitable on 14 markets. Even if the optimal parameter value is not used, you are still profitable on 13 markets — not really much of a difference; it's about 87% of the markets traded.

CONCLUSION

Given the TCF is tested without the use of any protective trailing stops, the hypothetical testing results that it generates are surprisingly good. To further improve the results, stops and money management strategies may be employed. Its profitability is parallel to, if not better than, the trend detection index (TDI) previously discussed in October. For ease of comparison, I have deliberately tested the two indicators over the same time period on 15 similar markets and provided the usual testing statistics. Good luck!

M.H. Pee resides in Singapore. He specializes in mechanical trading and has developed several indicators and systems. Some of his systems are currently being tracked by Futures Truth (www.futurestruth.com).

SUGGESTED READING

Pee, M.H. [2001]. "Trend Detection Index," *Technical Analysis of* STOCKS & COMMODITIES, Volume 19: October.

†See Traders' Glossary for definition

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