The Turtle system: Forex performance analysis

The Turtle rules were much more than breakout signals. These tests on a currency portfolio incorporate the volatility-adjusted position-sizing rules that were integral to the approach.

BY DANIEL FERNANDEZ

One of the most popular trading strategies of the past 30 years is the "Turtle" trading system Richard Dennis and his partner Bill Eckhardt designed to discover whether virtually anyone could be trained to trade profitably by following a set of systematic rules that determined position sizing as well as trade entry and exit points (see "Turtle tales"). It has been the subject of much debate and a great deal of misinterpretation and misinformation over the years.

The system, which was developed in the 1980s and intended to be traded across a broad portfolio of futures (which originally included the Swiss franc, French franc, Deutsche mark, British pound, Canadian dollar, and Japanese yen contracts), was designed to capture intermediate and longer-term trends.

How well it does in today's spot forex market is the subject of the following analysis. We'll test the original Turtle rules on seven currency pairs over nine years of recent price data and see how the system holds up.

The basic Turtle rules

A detailed description of the Turtle trading system appeared in a 37-page document titled "The Original Turtle Trading Rules" (OriginalTurtles.org, 2003) published free of charge on the Internet by former Turtle Curtis Faith in response to what he saw as the unethical sale of the Turtle trading methods by another former Turtle and also "on a Web site by a non-trader." The system tested here is System 2 from that document. He also discussed these rules in his book *The Way of the Turtle* (McGraw-Hill, 2007; see "Related reading"). The Turtle system is a breakout trend-following method, and there were shorter-term and longer-term versions of the system.

In this case, we'll experiment with the longer-term version, which enters in the direction of a 55-day high/low breakout (i.e., above the highest close of the past 55 days or below the lowest

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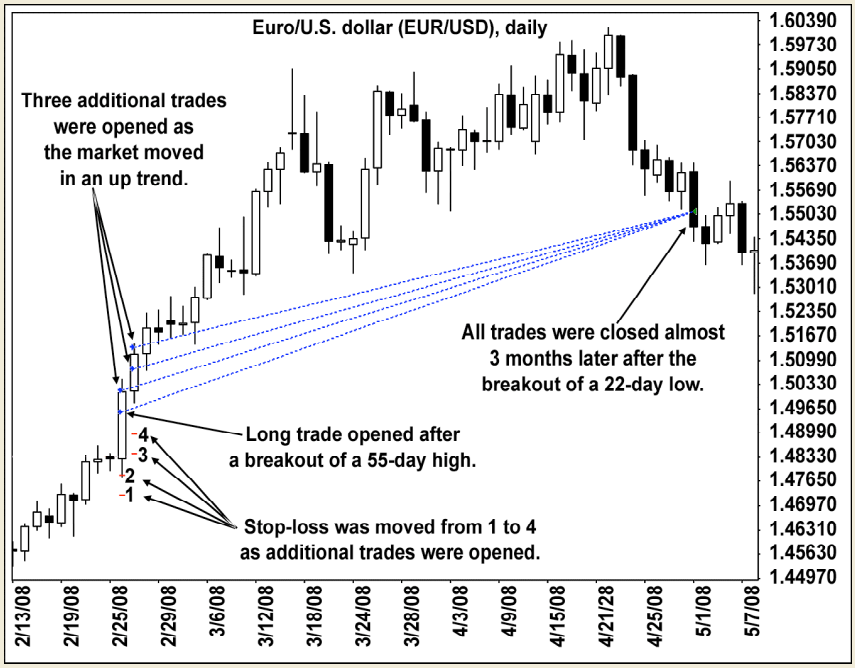
FIGURE 1 — TURTLE TRADE

The longer-term Turtle system tested here enters on a 55-day breakout and exits on a 20-day breakout.



Source: MetaTrader

TABLE 1 — SPREAD CHARGES

Trading costs are reflected in the different per-trade spreads charged to each currency pair.

Pair	Spread
EUR/USD	2
GBP/USD	3
USD/JPY	3
NZD/USD	5
AUD/USD	5
USD/CHF	3
EUR/JPY	4

Turtle tales

This excerpt from "Curtis Faith: Turtle tales" (Active Trader, June 2007) recounts the origins of the Turtles and some of the observations of one of the group's original members, Curtis Faith.

Richard Dennis and William Eckhardt had already made millions in the markets when they got the idea for the Turtle experiment. The two disagreed about whether great traders were the product of nature or nurture, with Eckhardt believing successful traders had inherent skills and Dennis arguing that anyone could be taught to outperform in the markets.

The pair decided to launch a trading program to settle the debate. They would teach a group of neophytes their system and then give real trading accounts to those who successfully completed the training. As legend has it, the group's moniker stemmed from Dennis' visit to a turtle farm outside Singapore; he claimed he and Eckhardt would be able to "grow" traders like turtles.

AT: *You wrote in your book (The Way of the Turtle, McGraw-Hill, 2007) the initial training period was only two weeks, and then you were given a small account to trade during a kind of probationary period. What was the trading process like?*
CF: We put on our positions in chunks called "units." Normally, the size of the unit would depend on the volatility of the market, so in a low-volatility market we might have a lot of contracts on, while in a high-volatility market, we'd have fewer contracts on. For the probationary period, our unit size was three contracts in every market, just to make things simple. By comparison, later on we'd have unit sizes of 20, 30, or 50 contracts, in some cases.

The system's entry and exit rules were things I'd seen before. The normalization of volatility across markets and the idea of adjusting the quantity you traded based on the volatility of particular markets was a new concept at that time.

AT: *You're talking about adjusting the number of contracts so the dollar value of the positions is kept constant in different markets, right?*
CF: Right. So, assuming everything else was equal, our positions tended to go up and down about the same [dollar] amount every day. That was an innovative concept.

I'd run many, many [system] tests before, but it was always a matter of considering the profits in, say, corn, soybeans, gold, and silver separately, whereas Rich [Dennis] really looked at things from a total portfolio perspective. You get completely different answers if you look at trading from a portfolio perspective; you come to different conclusions about whether you should be trading a particular market.

AT: *What kind of freedom were you given?*
CF: We could do whatever we wanted within the framework of what we'd been taught. With respect to markets, we were essentially told, "Pick your markets and be consistent with them — don't pick and choose trades."

We could decide, say, we weren't comfortable trading one of the thinner markets, such as coffee. In my case, I didn't like the S&P 500 because I didn't think it trended well for the type of short-term systems we were trading. So I never traded it. But we weren't supposed to pick and choose trades, and that's where people got into trouble. They would decide a particular trade in a particular market was too risky — and that would be the one that would end up making 50 percent on the year.

— Currency Trader Staff

close of the past 55 days) and exits on a 20-day high/low breakout in the opposite direction. The system attempts to capture trends of medium- to long-term duration, with the average profitable position lasting more than two months. Figure 1 shows a sample trade in the EUR/USD pair.

More important than the entry and exit signals, the system has a series of rules dictating trade size and stop placement. Positions are "normalized" according to volatility so dollar risk is the same from trade to trade and market to market — an approach, Faith noted, that enhances the benefits of diversification. To see detailed examples of the volatility-adjusted position-sizing rules, click here between Jan. 6 and Jan. 31.

Also, the system pyramids trade entries, adding to positions when a market moves in a trade's favor. After an initial entry signal, the system adds up to three additional positions (referred to as "units") if a market moves favorably by half the 20-day average true range (ATR). For example, if a long trade is entered in a market at a price of 100.00 and the 20-day ATR at the time is 5 points, another long entry would be executed if price reaches 102.50.

The system's stop-loss is two times the 20-day ATR, adjusted to the most recent trade when the market is moving in the position's favor. In the previous trade example, the stop-loss would have initially been placed at 90.00. If the 20-day ATR at the time of the second trade entry (at 102.50) was 4.00, the stop for both open positions would become 102.50 - (2*4.00) = 94.50.

Historical testing

All tests were performed on daily data from June 1, 2000 to June 1, 2009 using Metatrader 4. The rules were applied to seven currency pairs: Euro/U.S. dollar (EUR/USD), British pound/U.S. dollar (GBP/USD), U.S. dollar/Japanese yen (USD/JPY), New Zealand dollar/U.S. dollar

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TABLE 2 — INITIAL TEST RESULTS

Although five of seven pairs had positive average annual returns, overall average was 11 percent — compared to an average maximum drawdown of 47 percent.

Currency pair	Avg. yearly return	Max. drawdown	No. trades	Win %	Avg profit/avg. loss ratio
EUR/USD	27%	23%	147	47%	2.44
GBP/USD	8%	34%	151	34%	2.73
USD/CHF	-1%	40%	185	26%	2.58
USD/JPY	3%	33%	141	37%	2.02
NZD/USD	22%	66%	168	30%	3.63
AUD/USD	20%	64%	154	32%	3.47
EUR/JPY	-1%	67%	157	37%	2.50
Median:	**8%**	**40%**	**154**	**34%**	**2.58**
Average:	**11%**	**47%**	**158**	**35%**	**2.49**

(NZD/USD), Australian dollar/U.S. dollar (AUD/USD), U.S. dollar/Swiss franc (USD/CHF), and Euro/Japanese yen (EUR/JPY). Table 1 shows the spreads that were assessed per trade for each pair in the testing process.

The initial account equity was $100,000. The strategy was also tested in paper trading on the EUR/USD from January 2009 to June 2009; the results matched those of the test.

Test results

Table 2 shows the tests results. The system did not perform well on all the currencies. Five of seven pairs had positive average annual returns (and three of those were above 20 percent), but the average for the entire portfolio was 11 percent. Four of the pairs had mediocre to poor results, with some, including the NZD/USD and the AUD/USD, producing very high drawdowns (in excess of -60 percent). The average maximum drawdown was 47 percent.

Figures 2 and 3 reveal substantial differences in the equity curves for EUR/USD and NZD/USD, respectively. The EUR/USD pair made new equity highs at least every two years while the NZD/USD had an extremely profitable period between 2002 and 2005 followed by a drawdown that lasted until mid-2008 — nearly three years.

Like any trend-following system, the Turtle trading system generates highly profitable trades when the market moves aggressively, such as when the economic crisis started to fuel strong rallies in 2008. During this period, the EUR/USD pair had a single trade that produced a profit of nearly 70 percent of the initial account equity. Winning trades are the exception to the rule — all the pairs had winning percentages below 50 percent, and all but one were below 40 percent. However, the average profit/average loss ratio shows the average winning trade was two-and-half times the size of the average losing trade for portfolio as a whole.

The Turtle system's drawdowns are mostly the result of whipsaw trades — i.e., false breakouts, when a trade is triggered in one direction but price quickly reverses, stopping out the trade (a process that can repeat many times in non-trending market conditions, resulting in a long series of losing trades). This was the case

FIGURE 2 — EUR/USD EQUITY CURVE

The EUR/USD pair made a new equity high at least every two years.

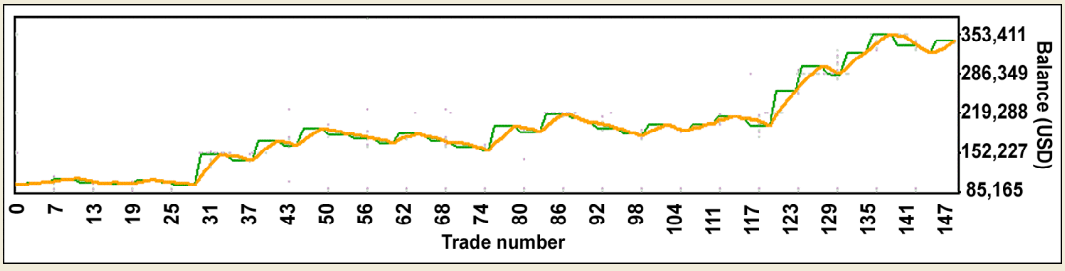
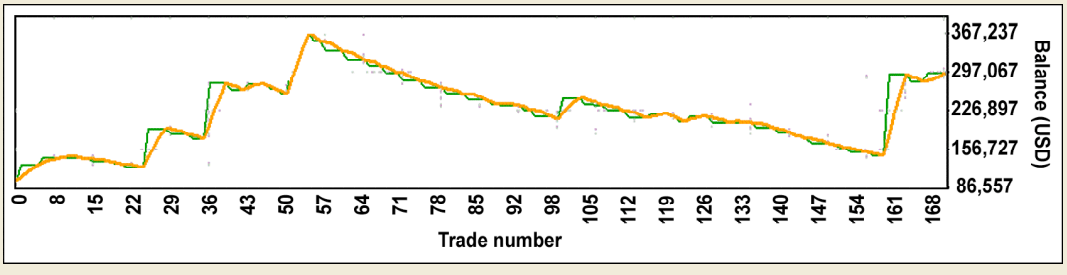


FIGURE 3 — NZD/USD EQUITY CURVE

The NZD/USD equity curve was much different from the EUR/USD's: The pair's extremely profitable 2002-2005 period was followed by a nearly three-year drawdown.



Related reading

Daniel Fernandez articles:

"Adaptive FX money management"
Currency Trader, November 2009
Historical tests illustrate the impact of a dynamic money-management regime on strategy performance.

Other articles:

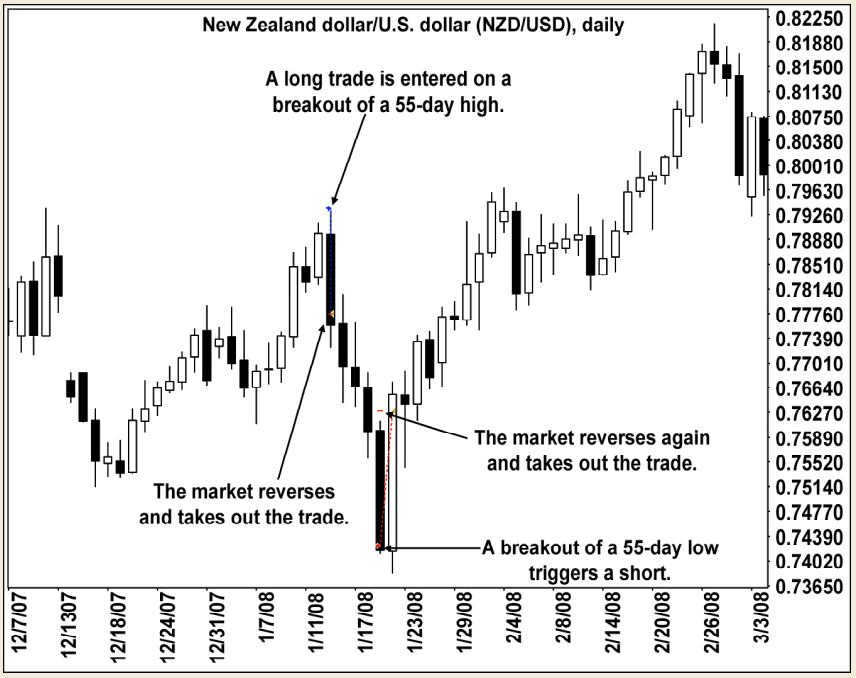
"Curtis Faith: Turtle tales"
Active Trader, June 2007
Nearly 20 years after the famous trading experiment ended, a graduate of the original "Turtle" class of 1983 talks about his experiences (*Active Trader* interview).

"Modified turtle soup"
Active Trader, December 2009
A Trading System Lab analysis of an inversion of the shorter-term Turtle signals.

between 2005 and 2008 in AUD/USD and NZD/USD. Figure 4 shows examples of these losing trades in the NZD/USD.

FIGURE 4 — WHIPSAWS

Like any trend-following system, the Turtle approach is subject to repeated whip-saw trades.



Source: MetaTrader

TABLE 3 — USING A QUICKER EXIT

Shortening the exit breakout threshold to 10 days improved the strategy's reward-risk characteristics.

Currency pair	Avg. yearly return	Max. drawdown	No. trades	Win %	Avg profit/avg. loss ratio
EUR/USD	43%	17%	165	50%	2.6
GBP/USD	11%	35%	173	39%	2.37
USD/CHF	3%	31%	191	33%	2.44
USD/JPY	13%	31%	149	44%	2.18
NZD/USD	6%	58%	196	38%	1.94
AUD/USD	15%	39%	188	44%	2.05
EUR/JPY	6%	57%	168	33%	2.52
Median:	**11%**	**35%**	**173**	**39%**	**2.37**
Average:	**14%**	**38%**	**176**	**40%**	**2.30**

Making adjustments

The test results indicated it might be possible to increase the system's profitability simply shortening the exit breakout threshold, which would liquidate trades more quickly and give back less when a retracement occurs. Rather than optimize values for each currency pair, Table 3 shows the results using a 10-day exit rule across the board.

This change reduced the average maximum drawdown by 9 percent while increasing the average and median yearly profits by 3 percent. Aside from this overall improvement in the strategy's reward-risk profile, closing positions faster also increased the average winning rate by 4 percent; fewer trades reached the stop-loss point. The average profit/average loss ratio was minimally impacted, with the median declining from 2.58 to 2.37. However, this change also resulted in a higher number of trades. These additional entry opportunities often occurred in the middle of long-term trends, and are one of the main reasons for the increase in profitability.

It's worth noting that all the currency pairs became net profitable with the reduction of the exit period. The EUR/USD, USD/JPY, and EUR/JPY pairs benefited the most from this modification, while AUD/USD and NZD/USD suffered the most adverse in terms of profitability. However, these pairs also saw their maximum drawdowns shrink 25 and 8 percent, respectively.

Trading the Turtle system

Because the big trend moves the Turtle system relies on don't happen frequently, traders must be prepared to weather extended drawdown periods — up to two years — before being rewarded with substantial profits.

The original Turtle system didn't perform terribly in this currency portfolio, but making a simple, unoptimized adjustment of cutting the exit threshold in half improved results notably, shrinking the drawdown and boosting profits. Further modifications may reveal additional insights.

For information on the author see p. 6.