



Keltner Channel volatility breakouts

Keltner Channels provide an alternative basis for a volatility breakout system.

BY DANIEL FERNANDEZ

Volatility breakout systems are momentum strategies that go long or short when price makes a forceful move up or down, the idea being that the market is likely to continue for at least a while in the direction of the breakout. The techniques used to define such forceful momentum moves are varied. “FX Bollinger bandit” (*Currency Trader*, February 2011) explored a breakout technique based on [Bollinger Bands](#). The strategy’s overall success led to the idea of experimenting with related tools to develop similar strategies.

The following strategy uses a [Keltner Channel](#)-based breakout technique to determine if this indicator, which is similar to Bollinger Bands, is better or worse at capturing trends on the daily time frame.

Keltner Channels

Chester W. Keltner created the channels named after him in the late 1950s. The indicator originally consisted of a [simple moving average](#) (SMA) of each bar’s “typical price” ($\text{high} + \text{low} + \text{close} / 3$), with the upper and lower channel lines set at fixed distances above and below the SMA.

However, the indicator has been modified significantly over the past 40 years, with the most common application setting the channel lines a multiple of the [average true range](#) (ATR) above and below the central moving average. The indicator has several modifiable parameters: the central moving average length, moving average type (e.g., sometimes an [exponential moving average](#) is used instead of an SMA), ATR length, and the ATR multiple.

Keltner Channels have been typically used as a trend-following tool: a breakout of the upper or lower channel lines implies strong momentum in that direction. For example, if price pushes above the upper channel line that is two times the 14-day ATR above a 50-day SMA of

the typical price, it means the market has moved at least twice the average daily volatility of the past 14 days above the “consensus” price of the past 50 days. The longer the moving average used for the central line, the longer the trend the Keltner Channels reflect. A smaller ATR multiple causes the channel to be broken more easily, since less movement is needed to push price outside the channel.

The following system enters trades using Keltner Channels in “classic” trend-following fashion — using a very long-term indicator length — and adds a volatility adjusted stop-loss and alternate exit rule.

Keltner Channel breakout system

The strategy enters trades when price breaks out above or below the upper or lower channel lines, and exits when price penetrates (in the opposite direction) a separate 175-day SMA “exit” moving average. The Keltner Channel settings are:

1. Central indicator line: 250-day SMA of the typical price.
2. ATR length: 10 days.
3. ATR multiple: 2.5.

The strategy trade rules are:

1. Go long if yesterday’s close is above the upper Keltner Channel band and price is above the 175-day SMA.
2. Go short if yesterday’s close is below the lower Keltner Channel band and price is below a 175-day SMA.
3. Exit long if yesterday’s close is below the 175-day SMA.
4. Cover short if yesterday’s close is above a 175-day SMA.

TABLE 1: PERFORMANCE BREAKDOWN

	AUD/USD	GBP/USD	EUR/USD	NZD/USD	USD/JPY	USD/CAD	USD/CHF	Portfolio
Avg. yearly profit	4.32%	4.40%	5.13%	5.58%	0.83%	4.75%	0.79%	30.49%
Max. drawdown	17.40%	9.91%	13.39%	14.26%	11.58%	8.65%	17.98%	46.06%
Reward:risk	4.58	5.49	4.51	6.32	3.79	4.32	4.87	5.39
Win %	28%	26%	32%	24%	24%	38%	19%	26%
Profit factor	1.76	1.98	2.09	1.93	1.19	2.64	1.15	1.95
No. of trades	36	34	41	47	42	29	42	271
Ulcer Index	9.73	4.32	6.85	8.72	6.58	3.71	8.94	18.5
Trade cost (pips)	3.5	3.5	2	8	2.5	4	3.5	-

Currency pairs that produced extended trends, such as GBP/USD, NZD/USD and AUD/USD, performed best, while choppier pairs, such as USD/JPY and USD/CHF pairs, performed worst.

- Place a stop-loss order two times the 14-day ATR below the entry price (for long trades) or above the entry price (for short trades).

Trade size is determined by the following equation:

$$\text{Trade size} = (0.01 * \text{account balance in } \$\text{US}) / (\text{contract size} * 14 * \text{ATR})$$

The same parameter values will be used for all currency pairs in the back-test.

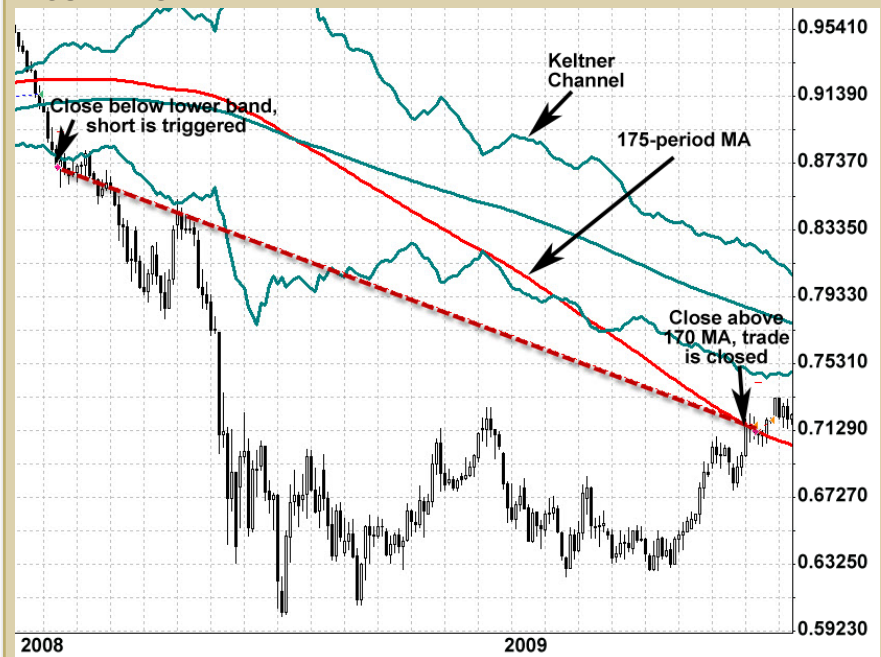
Figure 1 shows a sample trade in the Australian dollar / U.S. dollar pair (AUD/USD). A short trade is entered when price breaks down below the lower Keltner Channel line, and is exited more than six months later when price closes above the 175-day SMA. The position was triggered at .8712 (when the 14-day ATR was 0.0104), with a stop-loss set at .8920 (.8712 - 2*0.0104). If the account size at the time of the trade was \$100,000 and the contract size per standard lot was \$100,000, the trade size would be 0.96 lots (\$96,000).

The strategy was tested on daily price data from June 6, 2000 to Jan. 1, 2011 (10.5 years) in the following seven currency pairs: Euro / U.S. dollar (EUR/USD), British pound / U.S. dollar (GBP/USD), U.S. dollar / Japanese yen (USD/JPY), Australian dollar / U.S. dollar (AUD/USD), U.S. dollar / Canadian dollar (USD/CAD) and New Zealand dollar / U.S. dollar (NZD/USD). Trade costs were set in terms of the bid-ask spreads of the various pairs, and are shown at the end of Table 1. The strategy was tested on the MetaTrader 4 platform.

Test results

The system was net profitable on all the portfolio components; Table 1 breaks down the performance statistics for each pair. The best-performing pairs were the GBP/USD, NZD/USD and AUD/USD, while the EUR/USD — which is typically the best pair for

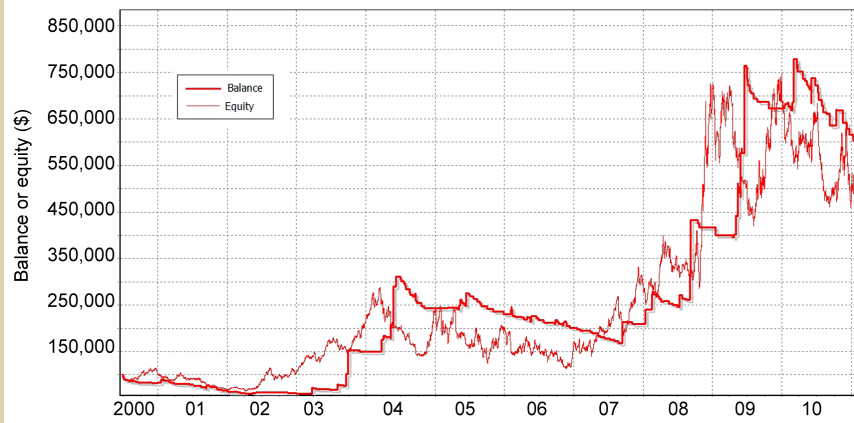
FIGURE 1: SAMPLE TRADE



The system captures longer-term trends. A short trade was triggered when price pushed below the lower Keltner Channel line. Exited occurred six months later when price closed above the 175-day SMA.

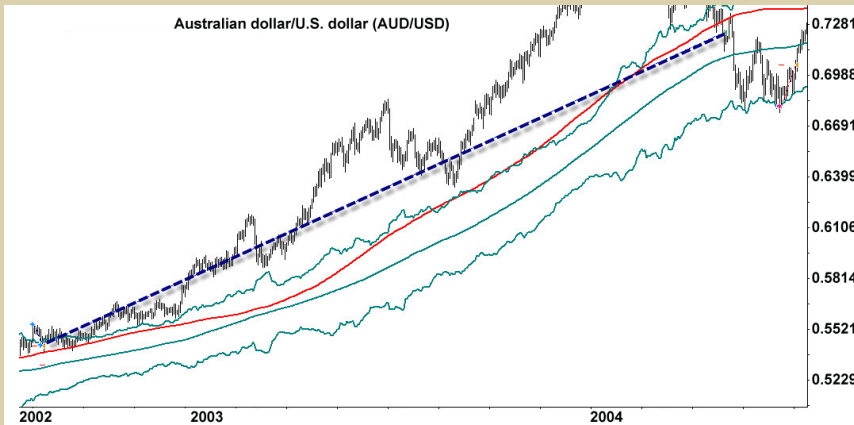


FIGURE 2: EQUITY GROWTH



The chart shows both open-trade equity (“equity,” thinner line) and closed-trade profits (“balance,” heavier line). Trade equity slowly accumulates, while the actual account balance increases sharply only when profitable trades are finally closed.

FIGURE 3: SYSTEM STRENGTH



In 2003, the system captures an almost two-year long trend on the AUD/USD.

this type of systems — performed slightly worse. The strategy had its worst results on the USD/JPY and USD/CHF pairs, both of which were in drawdowns for a good portion of the past decade and recovered only in the last few months of the test. Figure 2 shows the system’s equity growth for the entire portfolio.

Overall, the strategy was great at capturing the test period’s the very long-term trends, such as the one that unfolded in the AUD/USD pair in Figure 3. However, it failed in pairs that tend not to produce such clear and extended moves, such as the USD/JPY (Figure 4). Just as Figure 3 shows an ideal setup for the system, Figure 4 illustrates what happens when the system is confronted with choppy conditions and suffers repeated losses: It flounders when price is predominantly range-bound and tends to oscillate between the upper and lower bands.

The Keltner Channel strategy is successful in that it exploits a broad market inefficiency that appears present in these highly liquid currency pairs. The portfolio results indicate the system is characterized by very large, infrequent episodes of profit-taking (when successful trades are closed), which are explained by the fact that open-trade profits accumulate over long time periods. This is especially

TABLE 2: TEST RESULTS

	EUR/USD	USD/CHF	USD/JPY	GBP/USD	AUD/USD	NZD/USD	USD/CAD	Portfolio
Avg. compound annual profit	5.0%	1.7%	0.7%	1.8%	0.9%	3.5%	2.8%	18.8%
Max. drawdown	8.5%	8.2%	14.4%	8.6%	17.1%	12.1%	8.2%	26.1%
No. of trades	38	42	40	38	42	51	39	290
Win %	42%	40%	37%	45%	36%	43%	41%	40%
Profit factor	2.7	1.6	1.1	1.6	1.2	1.7	1.9	1.7
Reward/risk ratio	3.7	2.4	1.9	2.0	2.1	2.3	2.7	2.4

Pairs with stronger trends (EUR/USD) fared better than those prone to choppy trading or extended ranges (USD/JPY, USD/CAD).

evident in Figure 5's distribution of monthly returns; dramatic profit-taking scenarios occur approximately every three to five years. Figure 2 shows the difference between account balance (reflecting closed-trade profits) and open-trade equity (which grows as open positions evolve): Trade equity slowly accumulates, while the actual **account** balance levels increase sharply only when profitable trades are finally closed.

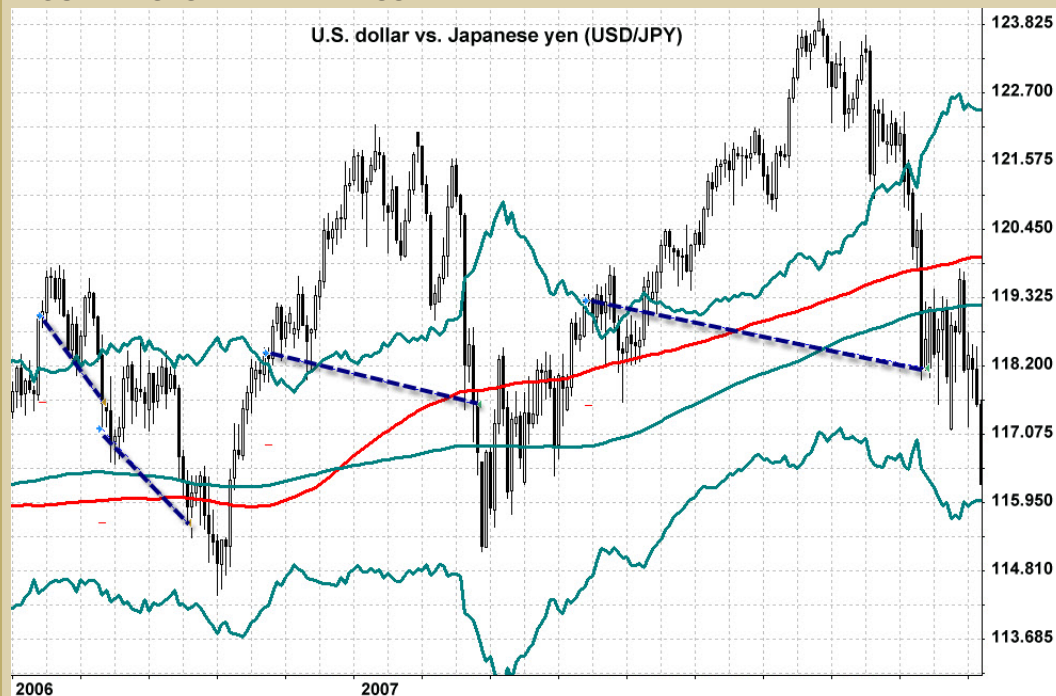
Balance and potential

Based on this test, this Keltner Channel strategy is a solid long-term trend following approach that is likely applicable to a much larger basket of forex currency pairs, or even other markets. Developed with a single parameter set, the system is intrinsically robust.

Also, the Keltner strategy's performance results are more balanced than those of related strategies, such as the Bollinger Bandit, achieving comparable performance across the different pairs in the portfolio. Finally, certain aspects of the strategy, such as its performance during ranging market conditions, could undoubtedly be improved, and its profits might be augmented by the addition of pyramiding techniques. ☒

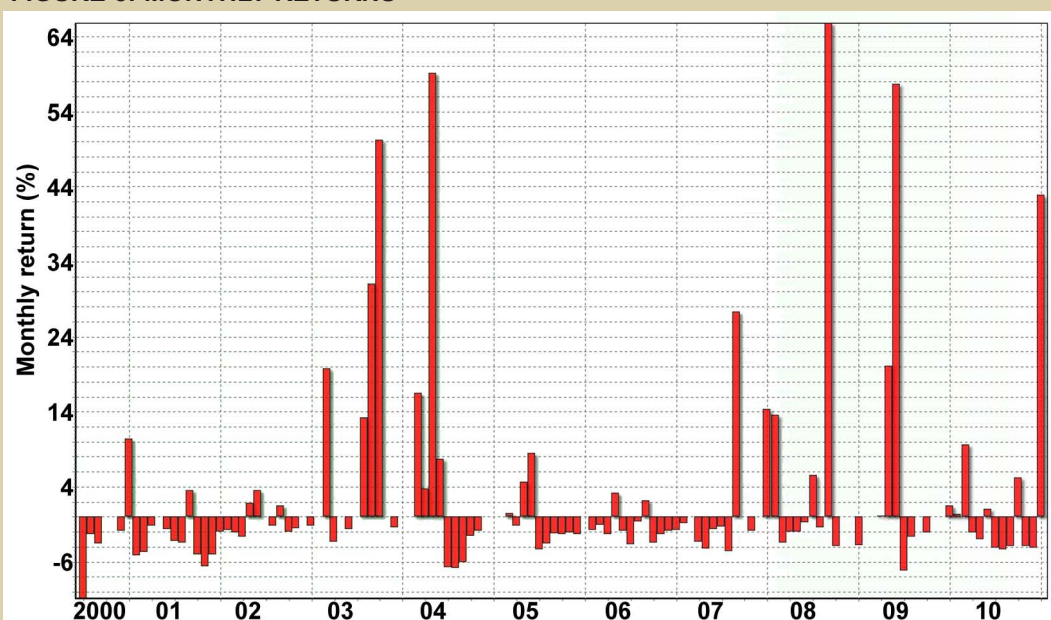
For information on the author, see p. 4.

FIGURE 4: SYSTEM WEAKNESS



On pairs like the USD/JPY, constant ranging between the bands prevents the development of significant profitable trades, causing a lot of losses as the system attempts to capture reversals.

FIGURE 5: MONTHLY RETURNS



The system offset the majority of small losing months with a minority of huge winning months.