PRICE PATTERNS

With (And Without) A Trend Filter

A Fresh Look At Short-Term Patterns

You may be familiar with some of the most popular short-term patterns, but do you know which work best? These test results may help you find out.

I have always liked short-term price patterns. The simplest, such as an island reversal, seem intuitively correct. The best study of chart patterns I've seen is by Thomas Bulkowski, who ranked the three top bullish patterns as follows:

1. Upward breakout of a rectangular top (this is the same as a breakout above a horizontal resistance line)
2. Upward breakout from a falling wedge
3. Upward breakout from an ascending triangle

and the three best bearish patterns as:

1. Descending scallop (a series of failed attempts at recovery)
2. Downward breakout of a symmetric triangle in a downtrend
3. Downward breakout of a broadening top

Patterns can range from simple to complex. The most complex one that I know of can take 22 days to produce a signal. But most traders, including myself, want something faster. The question is, "Are there short-term patterns that work?"

A SELECTION OF SHORT-TERM PATTERNS

Most of us are familiar with the popular short-term patterns, but not necessarily which are better and which are worse. In this article, I'll take a look at the following patterns:

- ***Key reversals***, a higher high followed by a lower close. We sell the lower close. The opposite for buy signals.
- ***Island reversals***, a gap higher followed by a lower close, but not filling the gap. We sell the lower close. The opposite for buy signals.
- ***Outside days***, a higher high and a lower low, but the close in the upper or lower 25% of the range. We buy if upper, sell if lower.
- ***Wide-ranging days***, the same as outside days, but the true range must exceed 1.5 × 20-day average true range.
- ***Compression***, the most recent 3 days must each have a true range smaller than the 4th previous day. We buy a breakout above the highest high of the last 3 days and sell a breakout below the lowest low of the past 3 days.
- ***Gap openings***, must be larger than 0.5 × 20-day ATR. We buy or sell the close of the gap day in the direction of the opening gap.

All of these require no more than three days to identify and generate a trading signal. That fits my idea of instant gratification.

THE TEST

I will select a small set of ETFs and stocks that I think are a representative sample and of interest to investors: SPY (S&P 500), QQQ (Nasdaq), IWM (Russell small caps), AAPL (Apple), AMZN (Amazon), GE (General Electric), WMT (Walmart), and TSLA (Tesla). Hopefully, we can draw some valid conclusions. One problem with testing a large number of stocks is that the averages hide many of the good results.

I will test from January 2000 through July 2020, a sample that includes a wide variety of trends, price

LISA HANEY

by Perry J. Kaufman

	KEY REVERSAL BULL MOVES					
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
SPY	96	(1,324)	(864)	(218)	(47)	(1,753)
TSLA	54	2,972	14,717	17,221	16,650	15,192
	KEY REVERSAL BEAR MOVES					
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
SPY	131	(173)	362	(927)	(2,279)	(1,301)
TSLA	38	3,012	5,422	5,511	7,342	2,923

FIGURE 1: KEY REVERSAL PATTERN. In this example, cumulative returns following a key reversal day are shown.

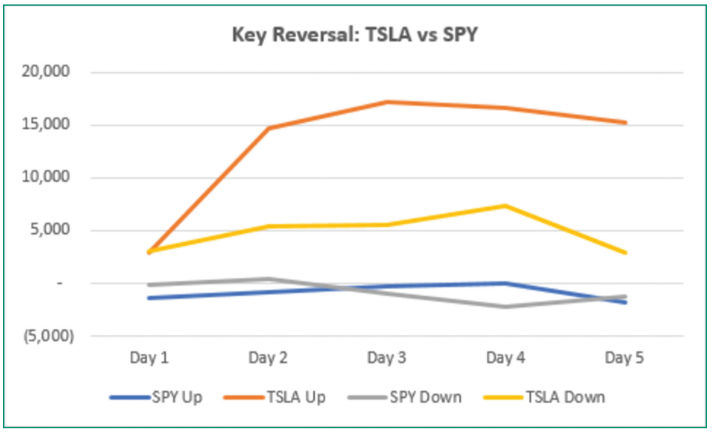

FIGURE 2: KEY REVERSAL PATTERN. The same data from Figure 1 is shown graphically here, cumulative returns following a key reversal day.

	KEY REVERSAL BULL MOVES WITH TREND FILTER					
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
SPY	59	(1,429)	(133)	(520)	(232)	(1,414)
TSLA	32	3,683	14,348	16,441	16,881	16,016
	KEY REVERSAL BEAR MOVES WITH TREND FILTER					
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
SPY	46	959	1,328	1,158	37	1,492
TSLA	13	325	874	(30)	1,168	(252)

FIGURE 3: TREND FILTER. Cumulative returns using a key reversal plus a trend filter.

shocks, and market confusion.

The position size is always $10,000 divided by the closing price. That will come close to making each trade equal risk so that a trade taken in 2020 at a high price will not overwhelm a trade taken in 2000 at a lower price.

In addition to the results of these patterns, I will also apply an 80-day moving average trend filter, typical of a macrotrend system. We will buy only when the moving average is up and sell when it is down.

EXAMPLE

Let's look at the first pattern, a key reversal, applied to SPY and TSLA, two extremes. Because the SPY is the cap-weighted average of 500 stocks, it will always be less volatile than an individual active stock such as TSLA. The table in Figure 1 separates the upward reversals ("bull moves") from the downward ones ("bear moves"). The numbers are the cumulative profits and losses from the entry on the close of the day of the reversal. Figure 2 shows the same returns on a chart.

		KEY REVERSAL BULL MOVES				
Market	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
SPY	96	(1,324)	(864)	(218)	(47)	(1,753)
QQQ	102	730	(257)	2,372	1,064	(187)
IWM	77	(1,372)	(1,294)	474	350	353
AAPL	88	6,521	4,141	4,516	3,655	465
AMZN	117	1,924	1,804	7,205	5,989	11,119
GE	102	3,051	2,524	3,570	5,759	4,717
WMT	95	(597)	1,075	62	3,158	3,579
TSLA	54	2,972	14,717	17,221	16,650	15,192
Avg Index	92	(655)	(805)	876	456	(529)
Avg Stock	91	2,774	4,852	6,515	7,042	7,014

FIGURE 4: KEY REVERSAL BULL. Key reversal bull moves (top) and summary (bottom).

		KEY REVERSAL BEAR MOVES				
Market	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
SPY	131	(173)	362	(927)	(2,279)	(1,301)
QQQ	133	(3,835)	(2,739)	(1,658)	(2,691)	(4,072)
IWM	139	(3,071)	(968)	(2,776)	(2,851)	(4,375)
AAPL	92	(7,542)	(8,464)	(12,934)	(13,198)	(14,854)
AMZN	85	(1,533)	(3,654)	(6,436)	(14,630)	(9,706)
GE	96	2,666	1,335	805	1,389	(1,156)
WMT	113	(2,864)	(4,837)	(5,306)	(4,049)	(5,114)
TSLA	38	3,012	5,422	5,511	7,342	2,923
Avg Index	134	(2,360)	(1,115)	(1,787)	(2,607)	(3,249)
Avg Stock	85	(1,252)	(2,040)	(3,672)	(4,629)	(5,581)

FIGURE 5: KEY REVERSAL BEAR. Key reversal bear moves (top) and summary (bottom).

Peak returns for TSLA occur on the second close after entering a key reversal upward. But then, TSLA has been in a strong uptrend, so we would expect the upside to be more profitable than the downside. SPY shows no gains at all, for either the upward (bull) or downward (bear) reversal.

What if we filter these reversals with a trend, taking the reversal only in the direction of the trend? To avoid massive testing, we will only look at the 80-day moving average, which I consider representative of a macrotrend strategy. Figure 3 shows the results.

While the trend does not seem to change the returns of TSLA except to make days 3, 4, and 5 similar, it drops the number of bull trades from 54 to 32, a reduction of 40%. That makes the profits per trade 40% larger, a significant benefit. The trend improved the downward reversals but not by enough to make them an interesting trade.

A BROADER VIEW OF THE KEY REVERSAL

When we look at our set of 3 ETFs and 5 stocks, we see a pattern that is different for ETFs and stocks. Because the ETFs are an index, the results are muted compared to stocks. QQQ and IWM are more volatile than SPY and show gains on days 3 and 4 for upward moves. Our selected stocks perform much better on those days. This can be seen in Figure 4 and in the averages in the lower section.

The lower table clearly shows that the stock returns increase and peak on day 4. The equity index ETFs have small, positive returns on days 3 and 4.

The bear market scenario is different, as seen in Figure 5.

KEY REVERSAL BULL MOVES WITH TREND FILTER						
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	58	(67)	674	1,414	1,256	178
Avg Stock	58	3,128	4,755	6,026	6,881	6,413

KEY REVERSAL BEAR MOVES WITH TREND FILTER						
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	46	(1,099)	(853)	(1,228)	(2,001)	(1,315)
Avg Stock	36	(736)	(140)	(924)	(1,288)	(1,589)

FIGURE 6: KEY REVERSAL. Key reversal results using an 80-day moving average trend filter.

ISLAND REV BULL MOVES						
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	25	-103	724	1025	-185	1561
Avg Stock	29	-1233	-674	-676	-290	-378

ISLAND REV BULL MOVES WITH TREND FILTER						
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	14	-434	53	-123	-1022	-223
Avg Stock	16	-697	-768	-1410	-1806	-2413

ISLAND REV BEAR MOVES						
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	38	160	-329	1186	1859	1820
Avg Stock	32	-1497	-3046	-2988	-3387	-3716

ISLAND REV BEAR MOVES WITH TREND FILTER						
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	10	295	268	1095	1653	1489
Avg Stock	11	-606	-1017	-923	-915	-1611

FIGURE 7: ISLAND REVERSALS. (Top to bottom): Bull moves without and with a trend filter; bear moves without and with a trend filter.

Again, stocks outperform the index markets, but this time all but GE and TSLA are negative, with the least negative being day 1 and day 2. We can guess that the upward bias of the stock market makes it difficult to profit from moves to the downside.

ADDING A TREND FILTER

Normally, trading only in the direction of a macrotrend will improve returns. It will also reduce the number of trades. Continuing with the key reversal example, but only showing the summary, the results of the bull moves (up) are similar to the results without a trend filter, but using the trend filter (Figure 6) reduces the number of trades by about 37%, which makes the profits per trade that much bigger and reduces the time in the market. Less time in the market means less risk.

All of these require no more than three days to identify and generate a trading signal. That fits my idea of instant gratification.

COMPRESSION BULL MOVES						
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	232	768	1416	3882	2567	1710
Avg Stock	179	1843	1628	4306	4737	4338

BULL MOVES WITH TREND FILTER						
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	172	685	805	2766	3516	2649
Avg Stock	125	830	193	2220	3384	3051

COMPRESSION BULL MOVES WITH TREND FILTER						
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	172	685	805	2766	3516	2649
Avg Stock	125	830	193	2220	3384	3051

COMPRESSION BEAR MOVES WITH TREND FILTER						
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	64	-3031	-582	-7	-930	-858
Avg Stock	67	-311	1197	-1395	-1086	-1008

FIGURE 8: 3-DAY COMPRESSION. (Top to bottom): Bull moves with and without a trend filter; bear moves with and without a trend filter.

Island reversal

The island reversal is more specific than the key reversal; therefore, it has only a few trades per year. That would be fine if it produces more consistent or more profitable returns. Figure 7 shows the summary of bull and bear island reversals, with and without the trend filter.

Unlike the key reversal, this pattern shows profits for the index markets. For stocks, WMT and TSLA were profitable for upward moves without the trend, but the averages reflect large losses from AAPL. An island reversal in the index markets would indicate a broad economic event.

Compression

The 3-day compression represents a market that is consolidating, and the trading signal is a breakout of the high or low of those 3 days. The highs and lows of the 3 days do not have to be inside the larger range of the 4th day back, only the true ranges must be smaller. It is interesting because it seems to identify more frequent and more reliable moves to the upside when compared to the previous patterns. Toby Crabel referenced this as one of the best patterns for intraday trading. Results are shown in Figure 8. This formation does not work well with a trend filter. AAPL and TSLA had strong returns when taking upward breakouts.

Outside day

An outside day indicates volatility, a much more active day. In our test, we go long if the close is in the upper 25% of the range. We sell short if the close is in the lower 25% of the range.

Figure 9 shows the four summary results. Bull moves, that is, upward breakouts, are profitable for both index ETFs and stocks, with all markets net positive after 4 days. Breakouts to the downside posted losses everywhere.

Adding a trend filter gave results similar to the key reversal. The net returns were slightly lower but the reduction in the number of trades made the profits per trade higher.

	OUTSIDE DAY BULL MOVES					
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	114	1551	-486	1717	1709	2485
Avg Stock	97	1573	3314	5157	5841	4791
	OUTSIDE DAY BULL MOVES WITH TREND FILTER					
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	75	-78	1016	1488	1954	1347
Avg Stock	65	2730	2584	3536	4499	3635
	OUTSIDE DAY BEAR MOVES					
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	134	-2089	-890	-1510	-2103	-2870
Avg Stock	99	-758	-2898	-4597	-4893	-6143
	OUTSIDE DAY BEAR MOVES WITH TREND FILTER					
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	48	-1179	-1350	-1746	-2267	-1704
Avg Stock	42	-484	-794	-1318	-1319	-2693

FIGURE 9: OUTSIDE DAY BREAKOUT. Outside day (top to bottom) upward breakout with and without a trend filter; downward breakouts with and without a trend filter.

	WIDE-RANGING DAY BULL MOVES					
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	114	-844	-3038	-1831	-1355	-705
Avg Stock	97	-20	577	923	702	1006
	WIDE-RANGING DAY BULL MOVES WITH TREND					
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	75	-523	-224	12	991	692
Avg Stock	65	470	148	577	334	-15
	WIDE-RANGING DAY BEAR MOVES					
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	134	-811	-108	-190	-499	-1272
Avg Stock	99	509	-400	-1254	-861	-2251
	WIDE-RANGING DAY BEAR MOVES WITH TREND					
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	48	-606	-344	-456	-948	-615
Avg Stock	42	-247	-119	-193	516	-83

FIGURE 10: WIDE-RANGING DAY. Wide-ranging day (top to bottom) upward breakout with and without a trend filter; downward breakouts with and without a trend filter.

Wide-ranging day

A wide-ranging day does not need to be an outside day, only a very volatile one, 50% bigger than the average range. We go long if the close is in the upper 25% of the range and sell short if the close is in the lower 25% of the range.

Although individual stocks show a profitable average, all results are very small. Adding a trend improved results in some places and lowered results in others, as shown in Figure 10. Overall, this pattern is not working, or our breakout rule is wrong.

Gap openings

And now for our old friend, the gap opening. We want to believe that a gap opening, at least a large one, is important. We defined our minimum gap as 50% of the 20-day average true range, so that a stock trading at $100 with an ATR of $2.00 will need to open up or down $1.00 to qualify. That turns out to be about 125 cases over the past 20 years. Hopefully, these larger gaps will have a predictable pattern.

	GAP OPENING BULL MOVES					
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	114	220	2784	629	6783	11310
Avg Stock	97	-645	1865	2447	2805	5627
	GAP OPENING BULL MOVES WITH TREND					
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	75	591	1090	302	1038	-32
Avg Stock	65	824	1508	1114	4445	7914
	GAP OPENING BEAR MOVES					
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	134	766	4923	4504	2402	-2565
Avg Stock	99	2867	2830	1016	3343	-435
	GAP OPENING BEAR MOVES WITH TREND					
	Cases	Day 1	Day 2	Day 3	Day 4	Day 5
Avg Index	48	-545	2668	413	-214	-2251
Avg Stock	42	575	1075	-197	967	-929

FIGURE 11: GAP OPENING. Gap opening (top to bottom) upward with and without a trend filter; downward with and without a trend filter.

Our rule is to go long or short on the close of the day with the gap, *not* on the opening gap, and take a position in the direction of the gap opening. We are looking for some continuation over the next 5 days, and this makes it easier to compare the gap opening with the other patterns.

Figure 11 shows that an upward breakout is followed by upward moves, for both index ETFs and stocks, with the higher returns on day 5. The best performers were AAPL, TSLA, and AMZN, in that order. The only loss was in the SPY, a market dominated by noise.

Gaps to the downside were also profitable, but only during the first two days, then those gains drifted away. The trend filter improved the stock returns everywhere but hurt the index returns. The upward bias of the stock market seems to be a better trend indicator. Applying the trend filter to the downward gaps did not improve returns.

CONCLUSIONS

Trading would be easy if all of these patterns were profitable. But the stock market is biased to the upside, so it is not surprising that upward breakouts (bull moves) are more successful.

In addition to the results of these patterns, I will also apply an 80-day moving average trend filter, typical of a macrotrend system.

Because the index ETFs include a large set of stocks, we would expect them to be less volatile, but when they gap open, have an island reversal, or break out of a compression formation, they tend to reflect a broader economic event.

Island reversals, gaps, outside days, and key reversals are best with stocks because of their higher volatility.

While the gains from any one of these patterns may be small, they are not likely to occur on the same day, so you can trade more than one pattern and add the returns together. Be sure to test these yourself. The more volatile stocks offer the best opportunities.

Perry J. Kaufman is a trader and financial engineer. He is the author of many books on trading and market analysis, including the new sixth edition (2020) of Trading Systems and Methods *(with the first edition published in 1978 as a seminal book in the field of technical analysis), and the newly released* Kaufman Constructs Trading Systems *(2020). For questions or comments, please go to* www.kaufmansignals.com.

The code given in this article is available in the ***Article Code*** *section of our website, Traders.com.*

See our ***Traders' Tips*** *section beginning on page 46 for commentary and implementation of Perry Kaufman's technique in various technical analysis programs. Accompanying program code can be found in the Traders' Tips area at Traders.com.*

FURTHER READING

Bulkowski, Thomas N. [2005]. *Encyclopedia Of Chart Patterns*, 2nd. Edition, Wiley Trading.

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Kaufman, Perry J. [2020]. *Kaufman Constructs Trading Systems* (print and ebook editions), Amazon.

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[1995]. *Smarter Trading*, McGraw-Hill.

‡TradeStation

‡See Editorial Resource Index

EASYLANGUAGE CODE FOR PRICE PATTERNS WITH AND WITHOUT TREND FILTER

```
// PJK Short-Term patterns
// Look at reliability of short-term patterns with and without a
// trend filter.
// Look at using noise as a qualifier
// Copyright 2020, P.J.Kaufman. All rights reserverd
inputs: trendper(0), usekeyreversal(false), useislandreveral(false),
usecompression(0),
        usegaps(0), useoutsideday(false), usewiderangingday(0),
forecast(5),
        investment(10000);
vars:   trend(0), pattern(" "), bullcases(0), bearcases(0),
        keyreversal(false), islandreversal(false),
compression(false),
        gap(false), outsideday(false), widerangingday(false),
bullpattern(false),
        bearpattern(false), bulltrend(false), beartrend(false), bull-
trendcases(0),
        beartrendcases(0), cday(0), comphigh(0),
        complow(0), outsidebull(false), outsidebear(false), ratio(0),
        ndays(0), ix(0), lookahead(0), adate(" "), size(0), back1(0),
back2(0),
        back3(0), back4(0);
arrays: bullreturns[6](0), bearreturns[6](0), bulltrendreturns[6](0),
beartrendreturns[6](0);
// trend
   if trendper > 0 then begin
      trend = average(close,trendper);
      end;
// 3-day compression
   if usecompression = 3 then begin
      cday = truerange[3];
      compression = truerange < cday and truerange[1] < cday
and truerange[2] < cday;
      end;
// key reversals ================================
   if usekeyreversal and ndays = 0 then begin
      keyreversal = true;
      pattern = "Key Reversal";
// without trend
// key bearcases reversal
      if high > high[1] and low < low[1] and close < low[1] then
begin
            ndays = 1;
            bearcases = bearcases + 1;
            bearpattern = true;
            size = investment/close;
            if trend < trend[1] then begin
               beartrend = true;
               beartrendcases = beartrendcases + 1;
               end;
            end
// key bullcases reversal
         else if high > high[1] and low < low[1] and close > high[1]
then begin
            ndays = 1;
            bullcases = bullcases + 1;
            bullpattern = true;
            if trend > trend[1] then begin
               bulltrend = true;
               bulltrendcases = bulltrendcases + 1;
               end;
         end;
      end;
// island reversals ================================
   if useislandreveral and ndays = 0 then begin
      keyreversal = true;
      pattern = "Island Reversal";
// without trend
// bearcases island reversal
      if low > high[1] and close < open then begin
            ndays = 1;
            bearcases = bearcases + 1;
            bearpattern = true;
            size = investment/close;
            if trend < trend[1] then begin
               beartrend = true;
               beartrendcases = beartrendcases + 1;
               end;
            end
// bullcases island reversal
```

```
        else if high < low[1] and close > open then begin
            ndays = 1;
            bullcases = bullcases + 1;
            bullpattern = true;
            size = investment/close;
            if trend > trend[1] then begin
                bulltrend = true;
                bulltrendcases = bulltrendcases + 1;
                end;
        end;
    end;
// compression ===================================
    if usecompression > 0 and ndays = 0 then begin
        pattern = "3-Day compression";
        back4 = truerange[4];
        back3 = truerange[3];
        back2 = truerange[2];
        back1 = truerange[1];
        compression = back4 > back3 and back4 > back2 and back4
> back1;
        if compression then begin
            comphigh = highest(high[1],usecompression);
            complow = lowest(low[1],usecompression);
// bearcases compression
        if close < complow then begin
            ndays = 1;
            bearcases = bearcases + 1;
            bearpattern = true;
            size = investment/close;
            if trend < trend[1] then begin
                beartrend = true;
                beartrendcases = beartrendcases + 1;
                end;
            end
// bullcases island reversal
        else if close > comphigh then begin
            ndays = 1;
            bullcases = bullcases + 1;
            bullpattern = true;
            size = investment/close;
            if trend > trend[1] then begin
                bulltrend = true;
                bulltrendcases = bulltrendcases + 1;
                end;
            end;
        end;
    end;
// Outside day (or wide ranging day) with close in upper/lower
// 25% ============================================
    if (useoutsideday or usewiderangingday <> 0) and ndays = 0
then begin
        if useoutsideday then pattern = "Outside Day"
            else pattern = "Wide Ranging Day";
        outsidebull = high > high[1] and low < low[1] and close >
0.75*(high - low) + low;
        outsidebear = high > high[1] and low < low[1] and close <
0.25*(high - low) + low;
        ratio = 0;
        if usewiderangingday <> 0 then begin
            ratio = truerange/avgtruerange(20);
            end;
// bearcases outside day
        if outsidebear and (ratio = 0 or ratio > usewiderangingday)
then begin
            ndays = 1;
            bearcases = bearcases + 1;
            bearpattern = true;
            size = investment/close;
            if trend < trend[1] then begin
                beartrend = true;
                beartrendcases = beartrendcases + 1;
                end;
            end
// bullcases island reversal
        else if outsidebull and (ratio = 0 or ratio > usewideranging-
day) then begin
            ndays = 1;
            bullcases = bullcases + 1;
            bullpattern = true;
            size = investment/close;
            if trend > trend[1] then begin
                bulltrend = true;
                bulltrendcases = bulltrendcases + 1;
                end;
        end;
    end;
// Gap opening with profits in the direction of the gap ======
    if usegaps > 0 and ndays = 0 then begin
        pattern = "Gap Opening";
        ratio = (open - close[1])/avgtruerange(20)[1];
// downward gap
        if ratio < 0 and -ratio >= usegaps then begin
            ndays = 1;
            bearcases = bearcases + 1;
            bearpattern = true;
            size = investment/close;
            if trend < trend[1] then begin
                beartrend = true;
                beartrendcases = beartrendcases + 1;
                end;
            end
// bullcases island reversal
        else if ratio >= usegaps then begin
            ndays = 1;
            bullcases = bullcases + 1;
            bullpattern = true;
            size = investment/close;
            if trend > trend[1] then begin
                bulltrend = true;
                bulltrendcases = bulltrendcases + 1;
                end;
        end;
    end;
// accumulated profits over next 5 days ==================
    if ndays > 1 then begin
        if bullpattern then bullreturns[ndays] = bullreturns[ndays] +
size*(close - close[ndays-1]);
        if bearpattern then bearreturns[ndays] = bearreturns[ndays]
+ size*(close[ndays-1] - close);
        if bulltrend then bulltrendreturns[ndays] =
bulltrendreturns[ndays] + size*(close - close[ndays-1]);
        if beartrend then beartrendreturns[ndays] =
beartrendreturns[ndays] + size*(close[ndays-1] - close);
        end;
    if ndays > 0 then begin
        ndays = ndays + 1;
        end;
// summary
    if lastbaronchart then begin
        adate = ELdatetostring(date);
        print(file("c:\tradestation\Short-Term Patterns.csv"),
            "Date,Pattern,Cases,Bull Cases,BullPL1,BullPL2,BullPL
3,BullPL4,BullPL5,Bear Cases,",
            "BearPL1,BearPL2,BearPL3,BearPL4,BearPL5,,Trend
Cases,",
            "Bull Trend Cases,BullTrPL1,BullTrPL2,BullTrPL3,BullTr
PL4,BullTrPL5,",
            "Bear Trend Cases,BearTrPL1,BearTrPL2,BearTrPL3,B
earTrPL4,BearTrPL5");
        print(file("c:\tradestation\Short-Term Patterns.csv"),adate, ",",
pattern, ",",
            bullcases+bearcases:8:0, ",", bullcases:8:0, ",",  Bullre-
turns[2]:8:0, ",", Bullreturns[3]:8:0, ",",
                Bullreturns[4]:8:0, ",", Bullreturns[5]:8:0, ",", Bullre-
turns[6]:8:0, ",",
            bearcases:5:0, ",", Bearreturns[2]:8:0, ",", Bearre-
turns[3]:8:0, ",",
                Bearreturns[4]:8:0, ",", Bearreturns[5]:8:0, ",", Bear-
```

```
returns[6]:8:0, ",,",
            bulltrendcases+beartrendcases:5:0, ",", bulltrendcas-
es:5:0, ",",  Bulltrendreturns[2]:8:0, ",",
              Bulltrendreturns[3]:8:0, ",",
              Bulltrendreturns[4]:8:0, ",", Bulltrendreturns[5]:8:0, ",",
Bulltrendreturns[6]:8:0, ",",
            beartrendcases:5:0, ",", Beartrendreturns[2]:8:0, ",",
Beartrendreturns[3]:8:0, ",",
              Beartrendreturns[4]:8:0, ",", Beartrendreturns[5]:8:0,
",", Beartrendreturns[6]:8:0);
      end;

// end of trade
   if ndays > 6 then begin
      bullpattern = false;
      bearpattern = false;
      bulltrend = false;
      beartrend = false;
      ndays = 0;
      end;
```