



## Part 4: Light Crude Oil

# Channel Breakouts

*Have you ever thought of skipping the next trade when you just had a big loss? Or of increasing the position size after some consecutive winning trades? In this article we will apply our DAX- and Bond-proven channel breakout strategy to the currently hottest market: Light Crude Oil. After finding suitable exits and verifying the result of all trades, we will focus on the question how it can affect your trading results when you leave out some trades- with predefined rules, of course.*

### Light Crude Oil

As a car driver, you are worried that Crude Oil is now trading at around \$100 a barrel, while it was below \$20 only some years ago. As a trader, however, you can be very happy since this situation offers you big opportunities. The whole world is now focused on oil prices and therefore Light Crude Oil futures are heavily traded. This ensures high volume and high volatility, the two most important factors for a market to qualify for profitable trading. To a systematic trader who builds portfolios Light Crude Oil has another big advantage. It is not as highly correlated with financial futures (Stocks, Bonds, Currencies) as the

financial markets are with each other. Therefore Light Crude Oil, like other Commodities, offers the possibility of diversifying your portfolio and increasing the overall return/risk ratio. These are good reasons to find out how the channel breakout system works on this market. Before we do this let's briefly recapitulate the entry logic for those readers who missed our earlier articles [1].

The entry signals of the system are generated by breakouts out of four exponential moving average bands (Figure 1, example taken from DAX future). As an important filter for the entries we restrict them to special time periods, so-called equilibrium phases. Such phases are

characterised by lower market volatility, measured with daily average true ranges. We trade only breakouts out of such equilibrium regions since we found them to have a higher average profitability. The entry logic is built symmetrically in long and short. The entries have been kept the same for all the markets tested so far. They will be kept for Light Crude Oil as well in order to ensure high robustness of the strategy. As we did on the DAX future and the US-Bond markets, we'll work again with 60-minute data since we have had good experience with that time scale and wish to keep things comparable. For our quantitative analysis we take back-adjusted NYMEX futures data from Tradestation 8 ([www.tradestation.com](http://www.tradestation.com)). All computer tests in this article are calculated with \$30 slippage and commissions per round turn. The used futures data used was back adjusted to avoid artificial gaps between different contract months.

### Finding Good Exits

As you know, exits can never be considered independently of the entry logic and of the selected time scale. Since in the channel breakout system trading positions are not closed with an end-of-day exit but kept overnight, we must insert suitable exits. So let's check how different profit targets and stop losses affect trading results. It is clear that good exits must be adaptive to current market conditions: Imagine a fixed \$1 stop loss: It means 5% risk when the Light Crude Oil market trades at \$20, whereas it means just 1% risk when the market trades at \$100. More importantly, while your \$1 stop might be ideal for a market trading at \$20, it might be far too close when the market trades at higher values. Since the market value changes every day, your exits must do the same in order to stay competitive. In earlier articles we have presented different types of variable exits. Here we use their simplest type: percentage-based exits. Their result is usually only slightly worse than that of volatility based-stops (e.g. average true range based stops), but they are much easier to apply and to handle: a 1% profit target means \$1 when the market trades at \$100 and it means 20 cents with the market trading at \$20, all of which is easy. So let's vary our exit points in percentage terms of the current market value. We change our profit target and stop loss from 0.1% up to 10% in increments of 0.1%, one after another. You can similarly calculate key figures of the trading system like total net profit, maximum intraday drawdown, percentage of profitable trades etc. for each target and stop loss percentage. With the results of this calculation you can plot system figures as a function of the varied exits. We do this here for the ratio net profit/maximum drawdown ratio (Fig. 2). This ratio contains more information than net profit or drawdown alone. From this plot you can see that small profit targets below 3-4% lower the net profit/maximum drawdown ratio. You close many trades with small gains and miss the big wins which cut your overall profits. Within our channel breakout system only profit targets between 5 and 7% increase the Net Profit/Maximum Drawdown ratio, but not really significantly. The message is that you can leave out profit targets completely. It makes things easier and you need not worry about missing anything. For the stop loss points the situation is similar at first glance. Too tight stop losses (below 0.8 %) worsen your trading results. So be careful not to set the stop loss too close. But in contrast to profit targets, stop losses can never be left out since they are your „risk insurance“ against big

### F1) Logic of the Channel Breakout System

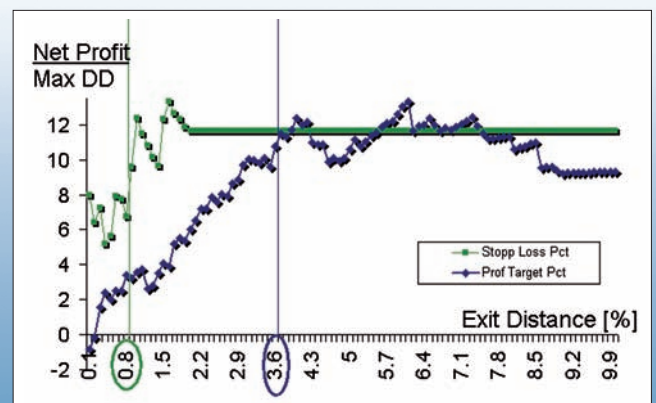


Entry Signals are generated by breakouts out of four exponential moving average bands by moving average crossovers of Pivot points.  $Pivot = -(High + Low + Close) / 3$ . Trades are exited when reaching a profit target or a stop loss point. Chart: Adjusted Dax-Future, 60 Minutes, 06 Mar 2007-16 Mar 2007. The same logic is applied in this article, without profit target, to the Light Crude Oil Future.

losing trades. In Crude Oil we achieved good results with all stop losses bigger than 1.5%. Be aware that 1.5% already means quite a lot of money per traded contract. With the market trading near \$100, a 1.5% stop loss means a \$1.5 or \$1,500 possible loss per trade on your account (since for light crude oil \$1 per barrel means \$1,000 per contract).

Let's see how the channel breakout system works on the Light Crude Oil future with a 1.6% stop loss and no other exits in place (Fig. 3). After a longer sideways phase from 2002 until 2004 the equity curve has been growing nicely in the last three years. It seems that the big volume and volatility recently have really helped to create longer trends and bigger breakouts which are necessary for the channel breakout strategy to be profitable. The key figures of the trading system underline this observation (Table 1, left-hand

### F2) Ratio of Net Profit/ Maximum Drawdown



To arrive at this figure, the Stop loss percentage and Profit target percentage are varied, one after another, and for each exit distance the Net Profit and Maximum Drawdown of the trading logic are calculated.

column). The system shows a high profit factor of 1.63, a high total net profit of \$83,650 compared with a small maximum worst case drawdown of \$7,420. This results in a high return/drawdown ratio of bigger than 11. Another positive figure of the trading system is a high average net profit per trade of \$187, with subtracted \$30 for slippage and trading costs. The trend-following character of our

channel breakout is revealed by the fact that only 41% of all trades are profitable but that you have a high ratio (2.3) of average winning trade/ average losing trade and that the average length of winning trades (2 days 16 hours) is much longer than the average length of losing trades (23 hours 49 min). This means that the system cuts losses relatively early but on the other hand lets profits run for a longer time.

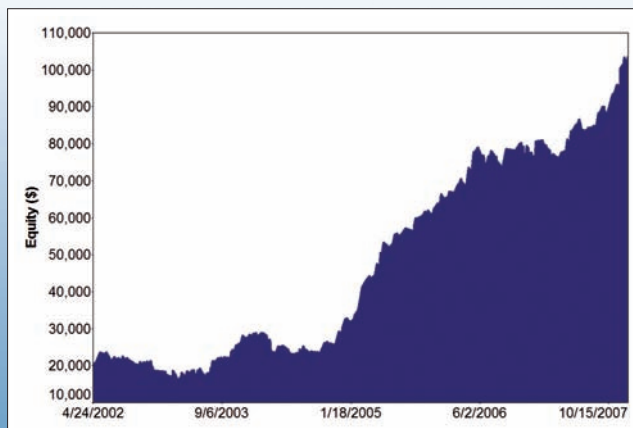
### T1) TradeStation Performance Summary – US-T-Note (10/14/1985-10/11/2007)

Dependency Rule	No Dependency	Positive Dependency	Negative Dependency
		Wins follow wins; losses follow losses. Skip trades after a loss until a skipped trade would have been a winner	Wins follow losses; losses follow wins. Skip next trade after a win, take next trade after a loss
Trades Taken	All Trades	Only trades after a winner	Only trades after a loser
Total Number of Trades	447	184	263
Trades Not Taken	0	262	183
Total Net Profit	<b>\$83,650</b>	<b>\$19,520</b>	<b>\$64,130</b>
Gross Profit	\$215,910	\$81,530	\$134,380
Gross Loss	(\$132,260)	(\$62,010)	(\$70,250)
Profit Factor	<b>1.63</b>	<b>1.31</b>	<b>1.91</b>
Return on Starting Equity	416.95%	97.60%	320.65%
Total Number of Trades	447	184	263
Number of Winning Trades	185	70	115
Number of Losing Trades	262	114	148
Percent Profitable	41.39%	38.04%	43.73%
Largest Winning Trade	\$5,750	\$4,340	\$5,750
/Percent of Equity	5.89%	9.93%	7.34%
Largest Winning Trade (%)	14.90%	23.80%	12.84%
/Trade Value	\$3,380	\$3,380	\$2,290
Average Winning Trade	\$1,172	\$1,165	\$1,169
Average Winning Trade (%)	2.98%	4.30%	3.21%
Average Length of Wins	2 days 16 hours	2 days 11 hours	2 days 19 hours
Max Number Consecutive Wins	8	7	6
Largest Losing Trade	(\$1,870)	(\$1,870)	(\$1,410)
/Percent of Equity	-2.36%	-3.90%	-1.77%
Largest Losing Trade (%)	-6.82%	-6.98%	-3.10%
/Trade Value	(\$1,300)	(\$1,300)	(\$570)
Average Losing Trade	(\$505)	(\$544)	(\$475)
Average Losing Trade (%)	-1.39%	-1.91%	-1.44%
Average Length of Losses	23 hours 49 min	22 hours 44 min	1 days 38 min
Max Number Consecutive Losses	13	8	12
Average Win/Average Loss	<b>2.32</b>	<b>2.14</b>	<b>2.46</b>
Average Trade	<b>\$186.97</b>	<b>\$106.09</b>	<b>\$243.84</b>
Return/Drawdown Ratio	<b>11.27</b>	<b>2.39</b>	<b>14.44</b>
Sharpe Ratio	0.38	0.17	0.46
Longest Drawdown	1 year 126 days	2 years 254 days	313 days 0 min
Start of Drawdown	05.06.2002	05.06.2002	25.02.2004
End of Drawdown	10.10.2003	14.02.2005	03.01.2005
Worst Case Drawdown (%)	31.67%	36.55%	19.93%
/Equity Value	(\$7,420)	(\$8,180)	(\$4,440)
Date at Trough	27.03.2003	16.09.2004	26.02.2003
Trade Number at Trough	78	211	69
Length of Drawdown	1 year 126 days	2 years 254 days	231 days 0 min

What happens if you skip predefined trades, e.g. trades following one or two losses, one, two wins etc? With the channel breakout system such rules make a difference. Left-hand column: Trading figures of all trades; Middle column: Trading figures for only those trades which follow wins; Right-hand column: Trading figures for only those trades which follow losses. Used Data for calculation: Light Crude Oil, 60 minutes, 01 Jan 2002-04 Jan 2008. Market: Light Crude Oil (NYMEX); Tradestation Symbol: CLC; Time scale: 60 minutes; Trading Period: 24.04.2002 to 04.01.2008 (5 years 254 days); Number of Contracts per Trade: 1; Slippage and Commissions per Roundturn: \$30.

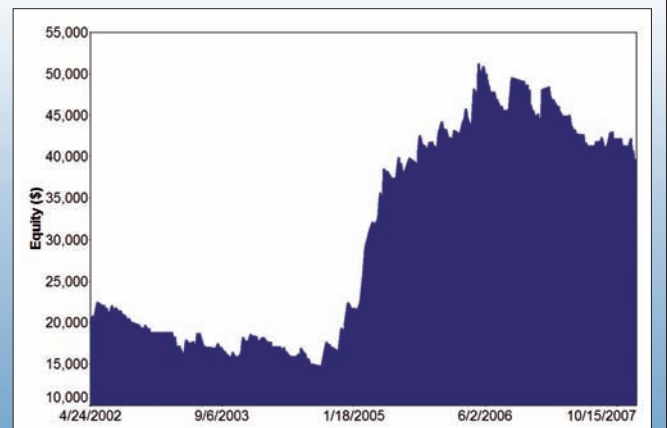


F3) Detailed Equity Curve (Light Crude Oil Future)



01 Jan 2002-04 Jan 2008. This equity curve includes all trades of the channel breakout system with applied stop loss of 1.6% and no profit target in place.

F4) Detailed Equity Curve (Light Crude Oil Future)



Negative Dependency Rule: Win follows loss, loss follows win; 01 Jan 2002-04 Jan 2008; The equity curve is calculated with same entry and exit rules, but includes only the trades which followed after a winning trade. So all trades after a losing trade are skipped until a skipped trade would have been a loser.

### Dependency Analysis or „How to leave out special trades“

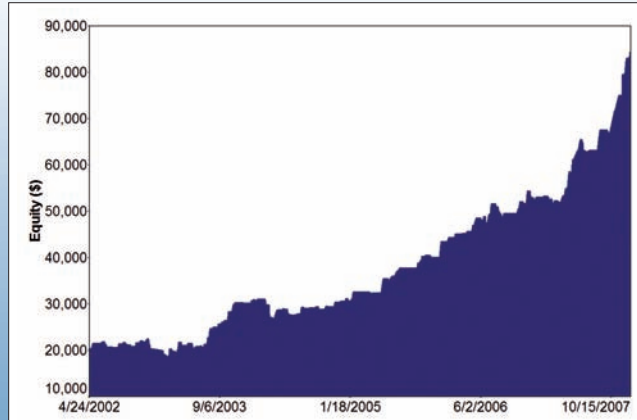
Wouldn't it be good to just trade the winning trades and to skip the losses? Of course, this dream cannot come true since none of us can predict the future. Yet what you can do is to leave out the next trade depending on the result of your current trade. So, for example, you can skip all trades following one or two losses or the trades which follow one win, two wins etc. (Table 1). There are many other possibilities like just increasing or decreasing the contract size after a special series of trades has occurred etc..

We want to stay here with simple situations and see how it affects the equity line if you only trade after a winning signal (Fig. 4) or if you only trade after a losing signal (Fig. 5). Usually you think that after a loss you should take a short break and skip the next trade and that after a winning trade you should always continue. So you expect the equity line, if you only trade after a winning signal, to be significantly better than the equity line if you only trade after a loss. Interestingly, the results

are in contrast to the usual expectations. Just the opposite is the case!

If you look at the trading figures of such so-called „positive“ and „negative dependency rules“ you see the much better result of the trades which follow a losing trade (Table 1, right-hand column) compared with trades that follow a winner (middle column). The trades with negative dependency have a three times bigger net profit (\$64,130 vs. \$19,520) and half the worst case drawdown (\$4,440 vs. \$8,180) compared with the trades with positive dependency. This results in a Return/Drawdown ratio of 14.4 (Negative Dependency trades) vs. 2.4 (Positive Dependency trades)! Other important trading figures like Average Trade (\$243 vs. \$106), Percentage of profitable trades (43% vs. 38%) or Profit Factor (1.9 vs. 1.3) underline the superiority of the trades which follow a loss. The trades which follow a winner only have two minor advantages: The number of consecutive losses is lower (8 vs. 12) and

## F5) Detailed Equity (Curve Light Crude Oil Future)



Positive Dependency Rule: Win follows win, loss follows loss; 01 Jan 2002-04 Jan 2008; The equity curve is calculated with same entry and exit rules, but includes only the trades which followed after a losing trade. So all trades after a winning trade are skipped until a skipped trade would have been a winner.

the average length of losses is slightly lower (22 hours vs. 24 hours). But these figures are not very important if you see the output in the equity curves and the other numbers.

What is the explanation for this behaviour? Why is it better within the channel breakout logic to trade a signal after a loss than after a winner? To understand this, let's have a look at the trading logic again (Fig. 1). In the middle of the chart you see two smaller losses which happen in the so-called equilibrium phase. Two times in a row our trading system wants to go long but the market reverses and stops us out with two small losses. This is typical within a phase when market participants are unsure what to do and volatility decreases. After the system survives these two losses, a bigger downward breakout happens and rewards you for your patience with a profitable short signal (Note: In this example the trade is exited with a profit target. As you know, the profit target was only put in place for the DAX future but is not set for the Light Crude Oil Future). Obviously the more false breakouts happen and the longer the consolidation phase exists the higher the probability of a subsequent bigger breakout. This fits well into the model of our dependency analysis: If you had a losing trade with a false breakout, there will be a slightly higher chance that your next signal is a real breakout and therefore a winner. On the other hand, if you just had a winning trade in a big breakout, the market is more likely to move again into a consolidation phase, which increases the probability of your next trade being a loser.

### Conclusion

As usual, the market works against common expectations. It is not good to take a break after a losing trade but instead you should do

### References

- [1] Urban Jäkle, Emilio Tomasini: „Channel Breakout“, Parts 1,2 and 3: TRADERS' August, September, and December 2007

this after a winner. We want to point out here, however, that we are only talking about probabilities and that this resultant rule does not hold true for every system logic. If you are a discretionary trader who works with other entry and exit rules, it can well be advisable to stop trading if you are on the way to losing your last shirt instead of increasing the position size.

In our example, however, we had a real improvement with the negative dependency rule. Skipping all the trades after winners helps to increase profit per trade (from \$187 to \$243 and the return/drawdown ratio (from 11 to 14), compared with the situation of taking every trade. Therefore the dependency analysis offers a simple way to improve this trading system. It is worth mentioning that we also performed this dependency analysis on our markets tested so far: DAX, US-T-Bond and US-T-Note (10 years). And as with the Crude Oil Future within the channel breakout system the trades after losses were on average better than the trades after a win. From the above explanations with false breakouts in equilibrium phases this outcome is not a surprise any more.

In the next article of this series „Channel breakout“ it is time to combine the markets tested so far, DAX, T-Bond and Light Crude Oil, into a portfolio. Of course, we will not stay with simple portfolios but go to the limits of modern money management techniques.

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