



# Selling Options on S&P 500 Futures

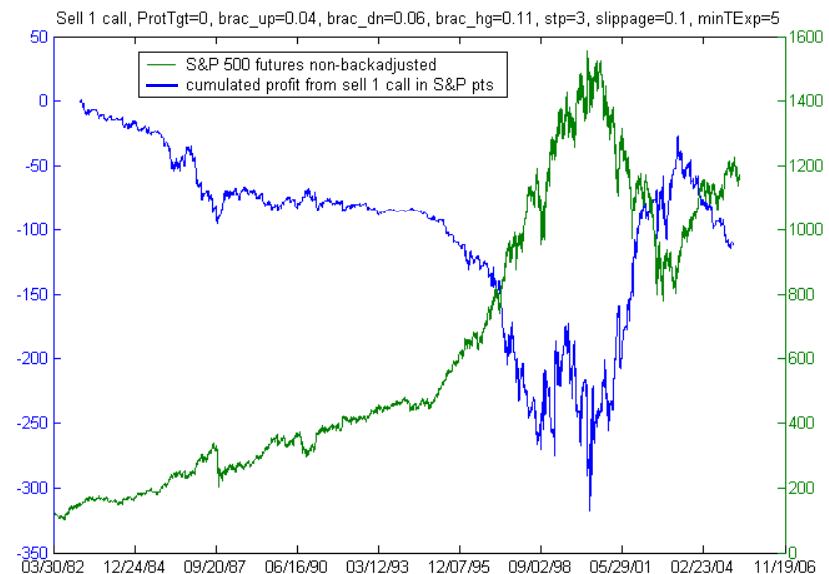
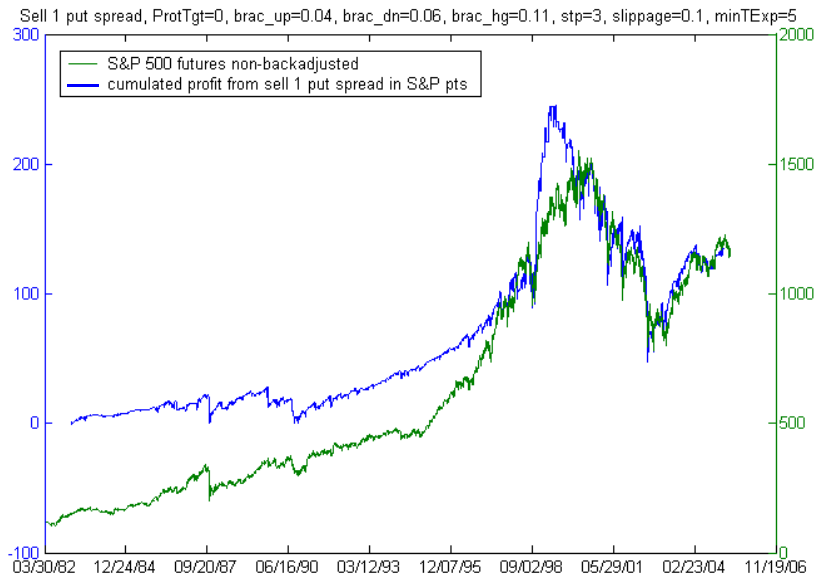
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## The baseline strategy of selling strangles is not too good

- We present the results of simulations of option strategies created using settlement prices of all options on S&P 500 futures traded on the CME between Jan 1983 and May 2005.
- The baseline strategy is to sell put spreads struck at 6% and 11% below the current futures closing price and to sell calls struck at 4% to 6% above. The put spread is short 1 put at the higher strike and long 1 put at the lower strike.
- Only the nearest expiry options with at least 5 trading days to maturity are sold. A transaction cost of 10% of the price of the option is applied at the time it is sold (no transaction cost is applied if the option is bought to cover). Since settlement prices are mid-points of the closing bid and ask prices, an addition transaction cost of one bid-ask spread is already implied for each round-trip.
- Each put spread is restruck at the current 6% and 11% brackets when it expires or when its premium exceeds 3 times the initial premium collected. The same scheme applies to calls.
- Basically selling calls in the baseline strategy does not work and selling puts only works when the S&P 500 futures is rising.

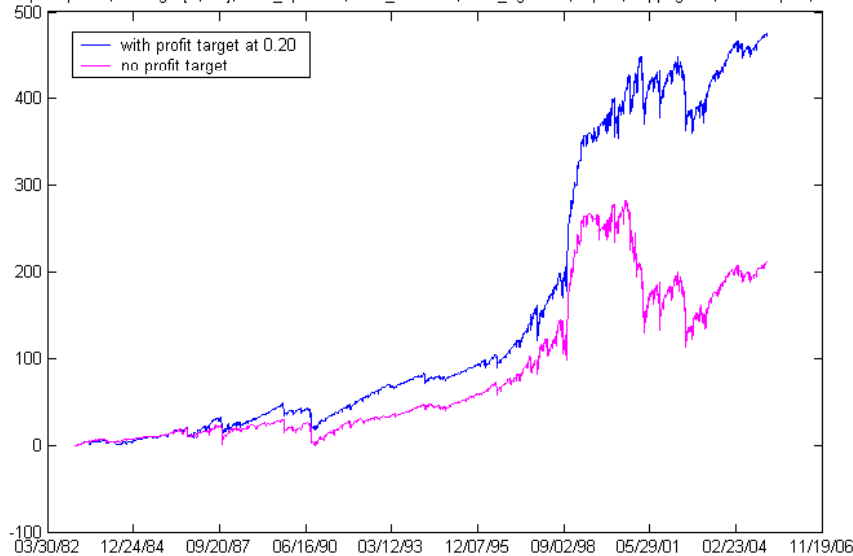




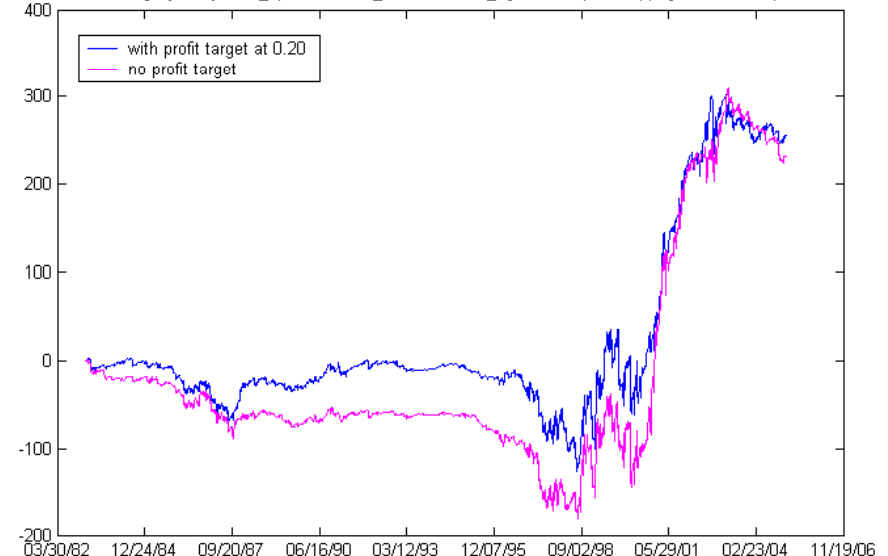
## Profit targets improve profitability of baseline strategy

- Profit targets are implemented by covering the options on a limit when they have decayed to 0.20 S&P points. The idea is that hanging on until expiry for the extra 0.20 while bearing substantial short gamma risk is not a good idea.
- The baseline put spread strategy improves substantially if we use profit targets. The call strategy does not change very much if we use profit targets.

Sell 1 put spread, ProtTgt=[0,0.2], brac\_up=0.04, brac\_dn=0.06, brac\_hg=0.11, stp=3, slippage=0, minTEp=5, base line



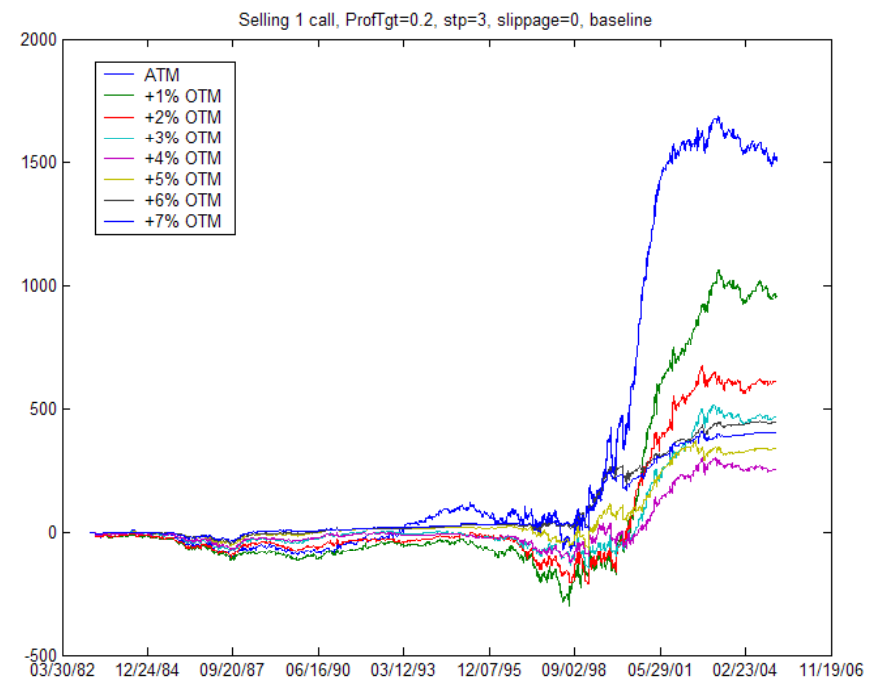
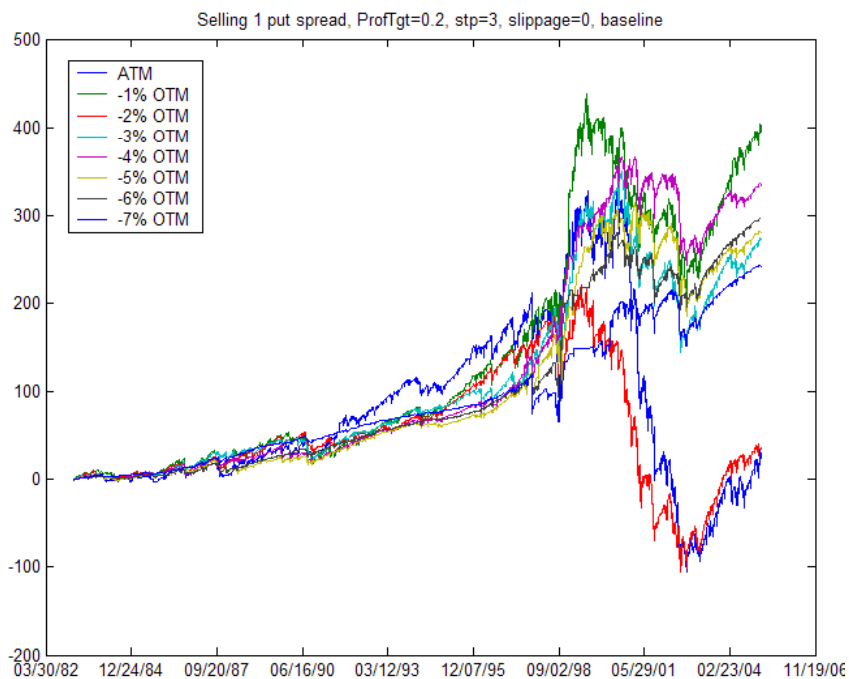
Sell 1 call, ProtTgt=[0,0.2], brac\_up=0.04, brac\_dn=0.06, brac\_hg=0.11, stp=3, slippage=0, minTEp=5, base line





## Overall profit is greater if options are struck closer to the money

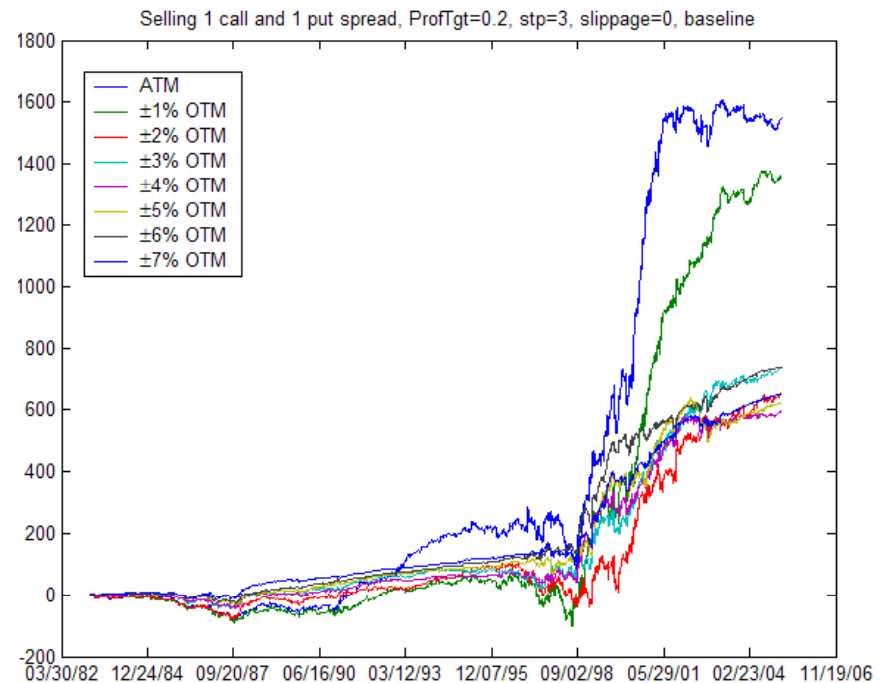
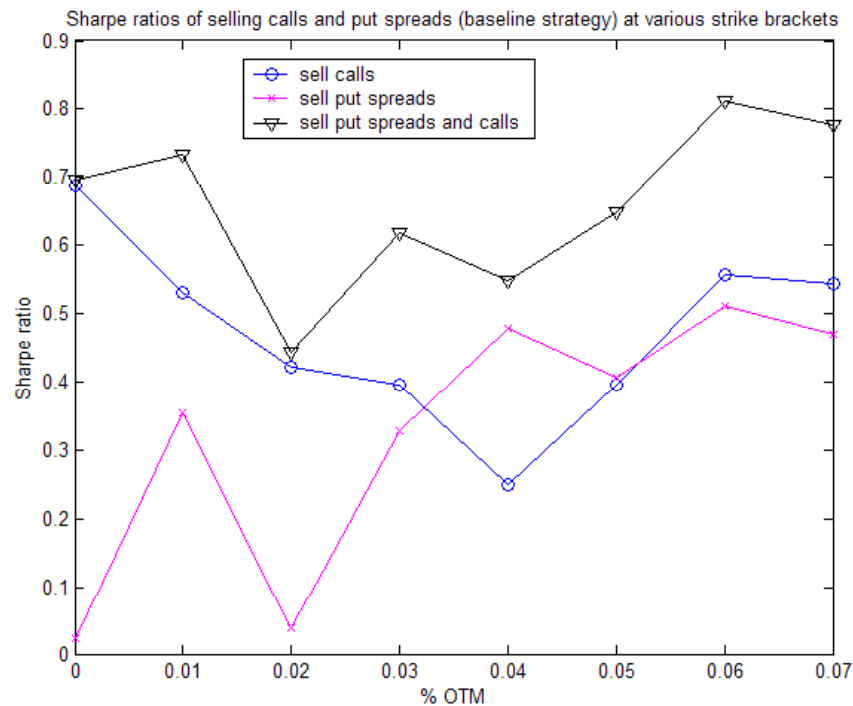
- The effect of moneyness on the return profile is shown below. Looking at just the equity curve from the put or call strategy on its own can be misleading, since the two strategies are almost perfectly anti-correlated.
- The combined put and call strategy equity curves are far smoother (see next page).





## For baseline strategy $\pm 6\%$ strike bracket gives best Sharpe ratio

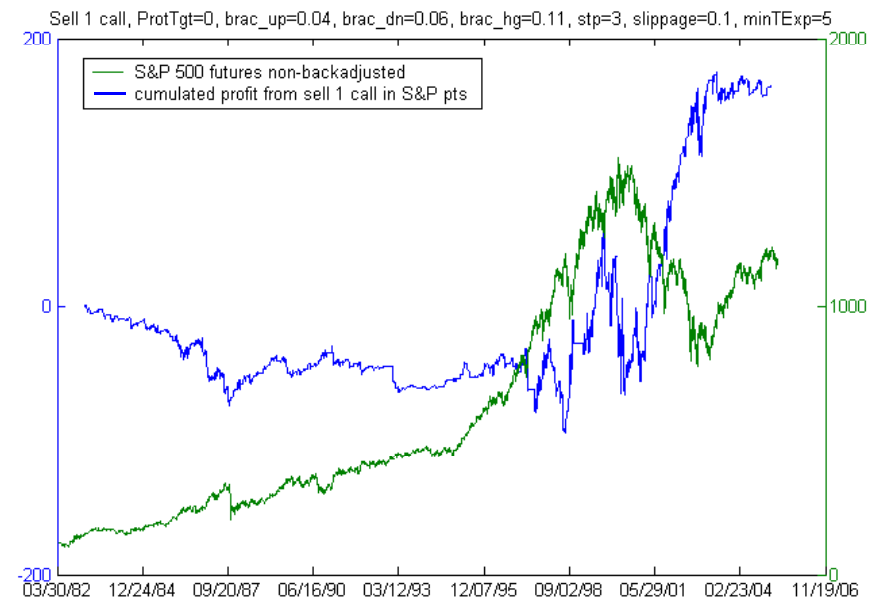
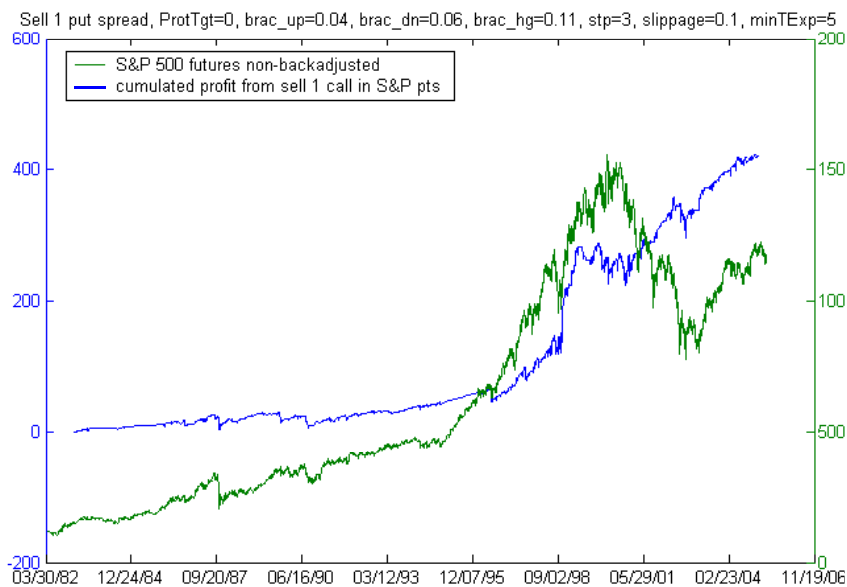
- The effect of strike bracket on the Sharpe ratio (i.e. annualized ratio of average profit per day to standard deviation of profit per day) is shown below.
- The outer strike brackets tend to have better Sharpe ratios.





## Improving the baseline strategy using a trend indicator

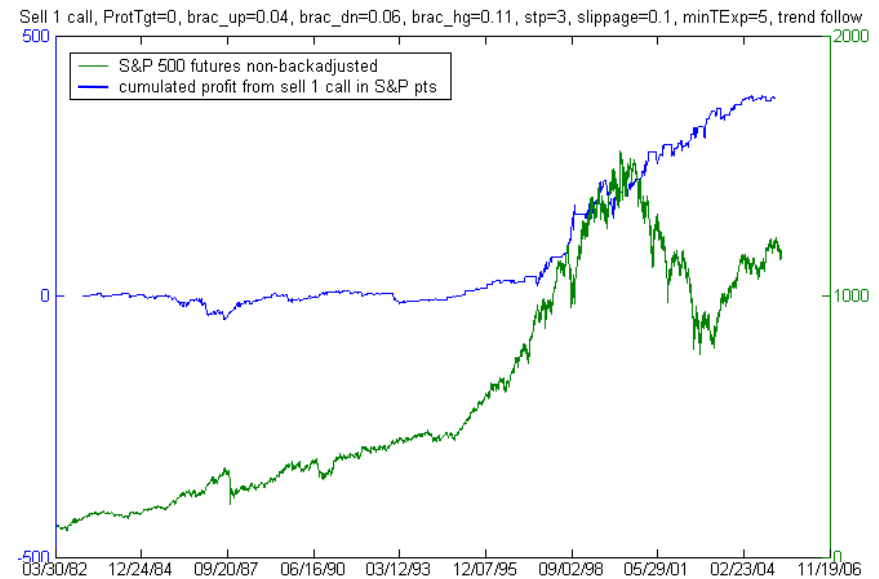
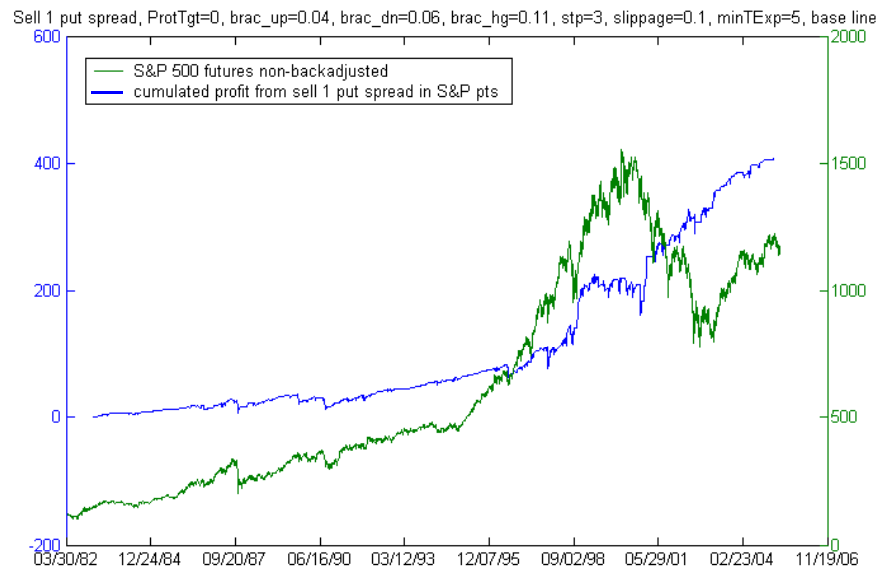
- Define a trend indicator which is equal to 1 if the S&P has closed above the past 10 closes and not yet closed below the past 10 closes, and which is equal to  $-1$  if the S&P has closed below the past 10 closes and not yet closed above the past 10 closes.
- If we have no option position, then we sell a put spread (at the minus 6% and 11% bracket) only if the trend indicator is 1, and we sell a call (at the plus 4% bracket) only if the trend indicator is  $-1$ .
- This produces a dramatic improvement in profitability of both the put spread and call strategies.





## Trend following through selling options

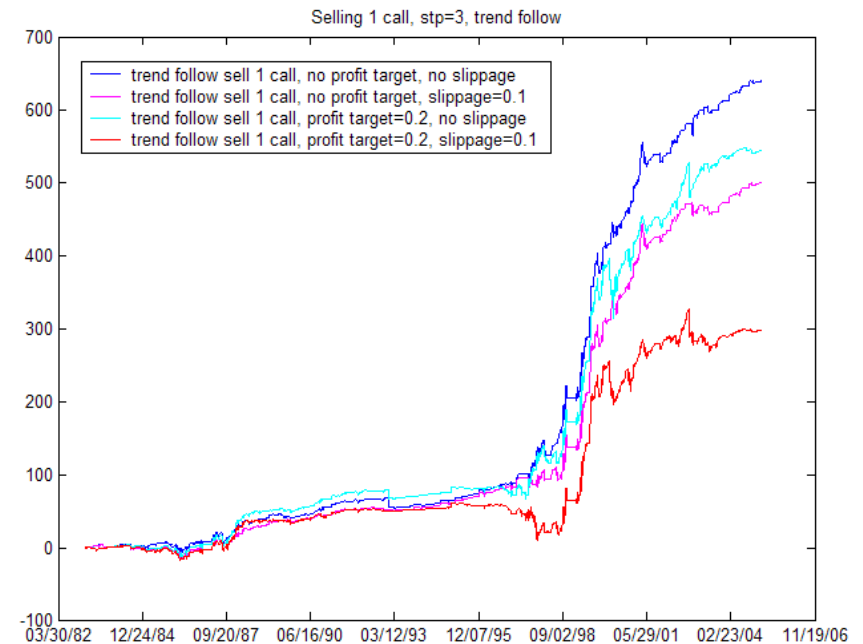
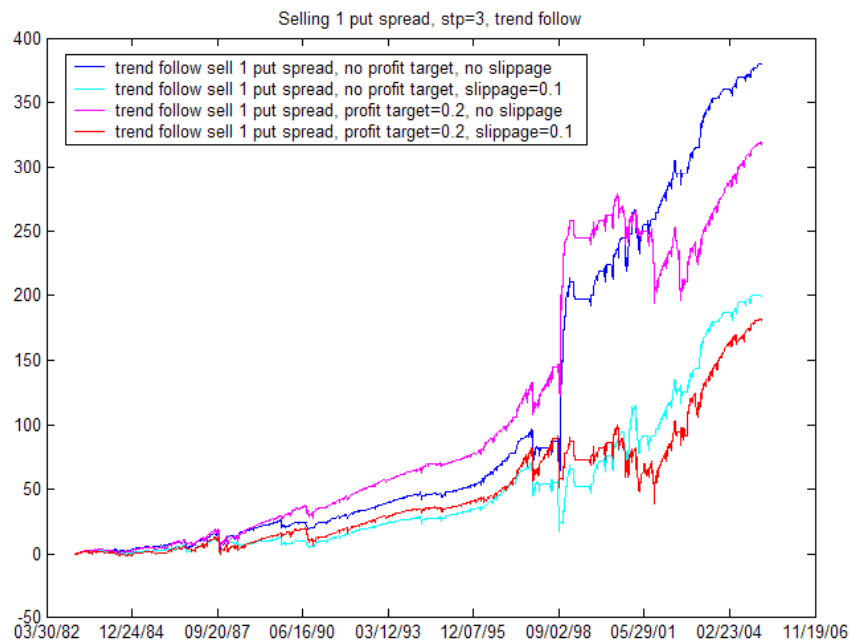
- We can improve profitability even further by selling a put spread just on the day the trend indicator switches from  $-1$  to  $+1$ , i.e. when the trend reverses from short to long, and keep the position until it is stopped out or expires.
- Similarly we sell a call just on the day the trend indicator switches from  $+1$  to  $-1$  and keep the position until it is stopped out or expires.
- After each put spread or call expires or is stopped out, we wait until the next trend reversal before we sell again. The strike brackets are the same as before and only options with at least 5 days to expiry are traded.





## Trend following trades are more profitable without profit targets

- If we use trend following signals to time the selling of options, we should not use profit targets when selling calls.
- When used in conjunction with trend following signals, profit targets appear to increase volatility.

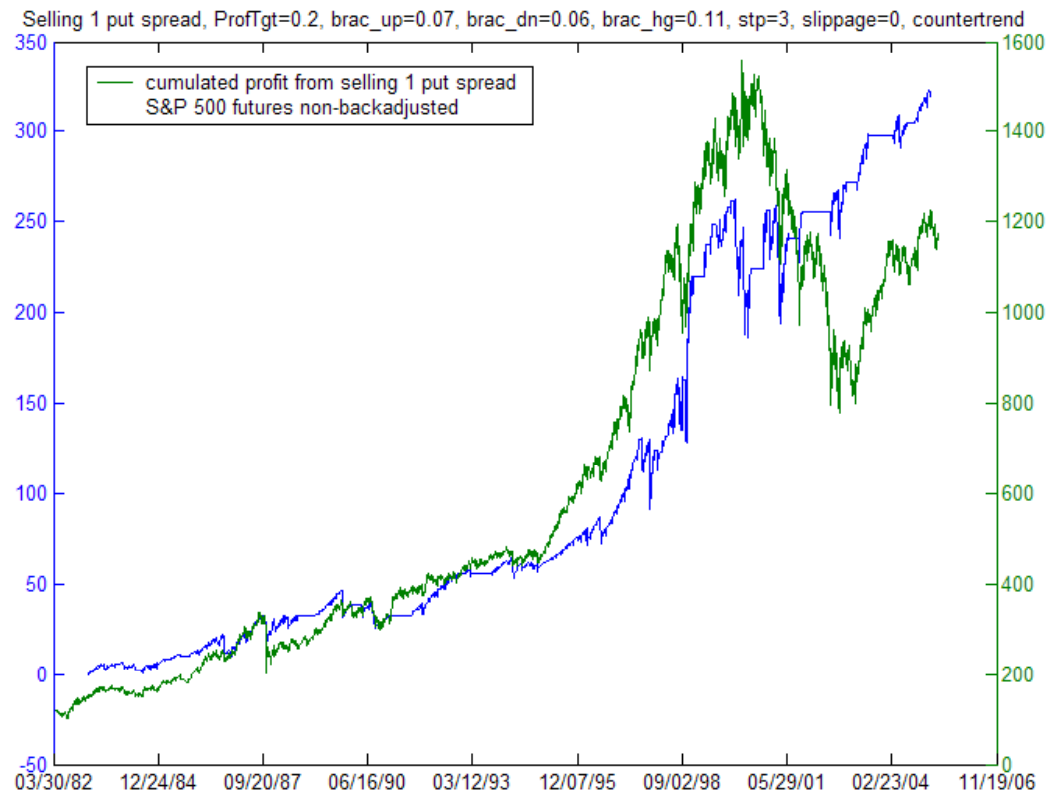






## Countertrending through selling options

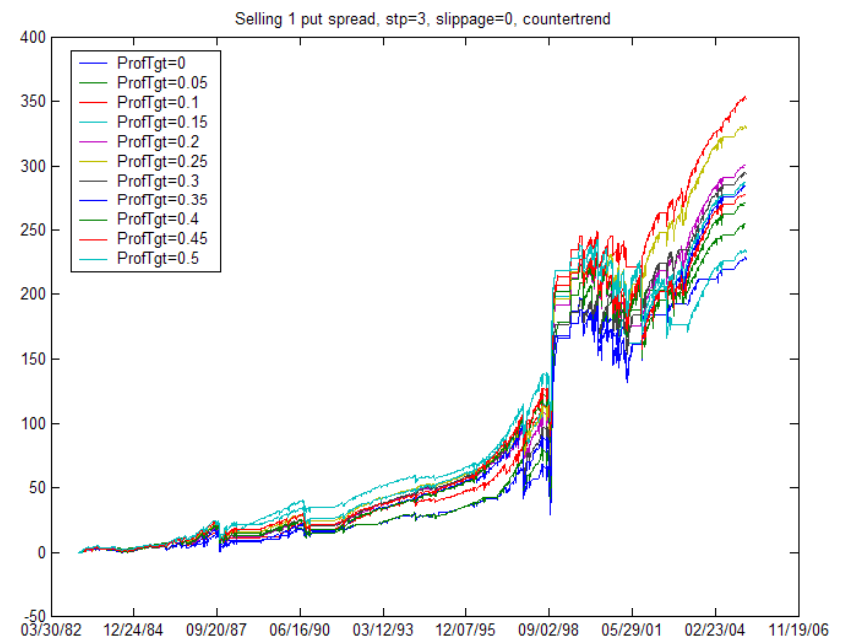
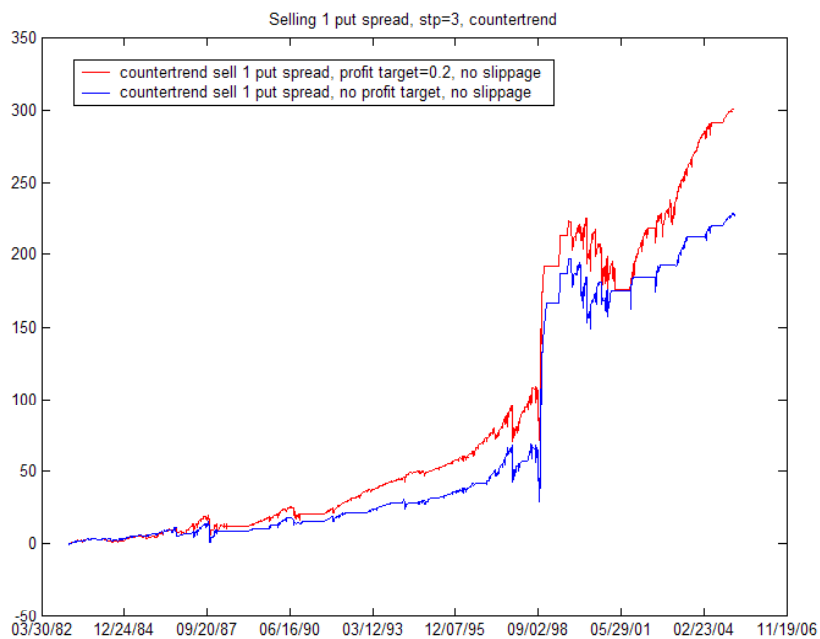
- Define a countertrend indicator which is a time series of the number of standard deviations each closing S&P 500 futures price differs from the 20-day moving average of the closing price.
- We sell a put spread only when the closing S&P price is at least 2.5 standard deviations below the moving average. This spread is then held until it is stopped out or expires.
- This countertrend indicator only works for put spreads and does not work for calls.





## Profit targets generally work for put spreads

- The effect of profit targets on profitability of put spreads is shown below. Note that when slippage is indicated as 0 in the graphs, this means no additional slippage is applied above the one-half bid-ask spread already implied by the settlement prices.





## Combining the best strategies

- The best strategies are: (1) sell put spread and call at  $\pm 6\%$  strike brackets with profit targets at 0.20; (2) sell put spread and call at  $\pm 6\%$  strike brackets only when a trend following (reversal) signal occurs; (3) sell put spread at -6% strike bracket only when a countertrend signal occurs.
- The combined equity curve (shown on next page) is now super-smooth.

