Discussion of "Optimal Option Portfolio Strategies" by Jose Afonso Faias and Pedro Santa-Clara

Pierre Collin-Dufresne
EPFL & SFI

Swissquote October 2011

- Summary
- Interpretation of Option return ‘anomalies’
- Performance Attribution?
- Conclusion

Methodology

- Propose a novel approach to portfolio allocation to options that deals with:
  - non-normality in option returns
  - transaction costs
  - out of sample testing
- Consider buy and hold (long only) allocation to positions that are combinations of: long at ask / short at bid $\bowtie$ ATM / 5% OTM $\bowtie$ Call / Put
- Every month simulate 1-month stock return based on different models:
  - Expanding window empirical distribution
  - Normal distribution with sample moments
  - GEV distribution with sample moments
- Allow for time-varying second moments by fitting distributions to standardized returns and scaling future return by current estimate of volatility.
- Maximize simulated expected (CRRA) Utility of terminal return by choosing long-only allocation to eight positions.

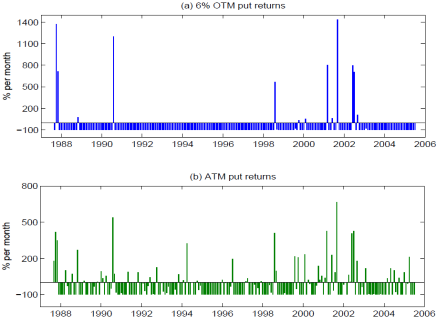
  (only data on current option prices are used and combined with simulation based future stock return)
- Test out of sample performance by using realized stock returns to compute realized return on proposed trading strategy.

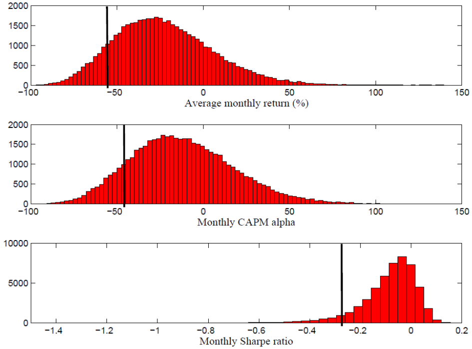
Results

- Use data from IVDB Option metrics from 1996-2008
- Unconditional strategies (based on non-normalized returns - no time variation in volatility) do poorly
- Conditional strategies (which allow for time varying second moments) do well: Sharpe ratio of .59 relative to .2 for long in the underlying.
- Strategies have delta of zero on average (ranging between [-0.06,0.02]) but elasticities (omega) on average -20 (ranging [-45,13]).
- On average strategy are long ATM puts and OTM Calls and short OTM puts.

- Literature on option returns has identified certain 'anomalies'
  - OTM puts are overvalued:
    selling OTM puts generates large Sharpe ratios
  - ATM implied vols are too high:
    selling variance swaps or delta-hedged straddles generates large Sharpe ratios

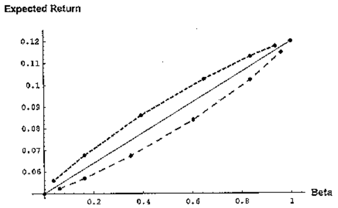
- Broadie, Chernov, Johannes (2008) warn of using simple 'linear' metrics (such as t-statistics $> 2\dots$) to evaluate statistical significance of OTM option returns.
  - Show that under the null of Black-Scholes (i.e., no 'mispricing') the observed OTM put return performance do not actually seem that 'anomalous'
  - However, ATM vol risk-premium still looks anomalous (based on Black-Scholes).





- Leland (1998) shows that one can achieve higher Sharpe ratios than the market by trading options in a Black-Scholes world (without mispricing) by effectively 'selling' higher order moments
  - {Buy market + sell call} plots above security market line (outperforms market)
  - {Buy market + buy put} plots below security market line (underperforms market)

FIGURE 1: CAPM Plot of Option Strategies



source: Leland (1998)

⇒ Beware of using Sharpe ratios to measure option strategy performance

⇒ Beware of using standard statistics (based on 'Gaussian asymptotics') even out of sample to evaluate statistical significance.

Q? When using mean-variance preferences (instead of CRRA) obtain **lower** Sharpe ratio. Conclude: *'This shows importance of using an objective function that penalizes skewness and kurtosis'* . . . . . . **to maximize Sharpe ratio?**

! When adding a constraint on skewness or kurtosis one expects a lower Sharpe ratio (certainly in-sample).

⇒ One would like to have better economic understanding of the source(s) of 'alpha.'

- Suggestions:
  1. Small sample simulation as suggested by Broadie, Chernov, Johannes (2008).
     - Under the null of BS or Heston (1996), how likely is a OOPS Sharpe of 0.6 when the underlying has Sharpe of 0.3?
     - Note that good performance of OOPS hinges on 5 extreme positive returns
     - Further, the delta is approximately zero, but the Omega ($= \Delta/(C/S)$) is large reflecting high leverage.
  2. Take out effect of known anomalies. Study residual in performance attribution.
     - Are these 'high' Sharpe ratios evidence for a new anomaly?
  3. Allow for stock market timing as a benchmark (based on their time varying mean/variance estimates) and measure option performance in excess of timing:
     - Buy-hold underlying is not correct benchmark since Buy-hold option $\sim$ dynamic trading strategy in underlying.
     - With iid stock returns benefits to rebalancing are actually very small.
     - With time-varying opportunity set benefits can be very high (Ang-CDG)

Conclusion

- Simple, practical algorithm to backtest option strategies with little look-ahead bias.
- Interesting out-of-sample performance.
- But performance drivers poorly understood.
- Given non-normality of option returns and of tested strategies (which display high time-varying leverage), seems important to use different performance measures than Sharpe ratio.
- Small sample simulations based on realistic null hypothesis (Broadie, Chernov, Johannes).
- Performance attribution by regressing on known 'anomalies'/factors.
- Test Stock market timing components.