Can We Really Discard the Forecasting Ability of Option Implied Risk-Neutral Distributions?

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The Paper

- Interesting study of the Risk Neutral Distributions obtained from option contracts.
- From Breeden and Litzenberger (1978),

$$f_t^*(S_T) = e^{r(T-t)} \frac{\partial^2 C(\cdot)}{\partial K^2},$$

  where $f(S_T)$ is the RN density of the asset at expiration, r is the risk free rate and K is the strike price.
- Problems for empirical work:
  - Need of data for all possible future payoffs (interpolation needed).
  - Option prices can be noisy (smoothing needed).
- Solutions (e.g. Bliss and Panigirtzoglou, 2002):
  - Parametric approach.
  - Implied binomial methods.
  - Approximation methods.
  - Finite differences.
  - Smoothed implied volatility smile methods.

The Paper

- Method proposed:
  - Mixture of lognormals
  - Non-parametric (kernel and splines)
  - Parametric (Generalised Pareto) modeling of the tails of the distribution (due to unavailability of strike prices for that part).
- Testing procedure:
  - PITs (Diebold, Gunther and Tay, 1998) and Berkowitz (2001).
  - Test based on Brier scores for the tails.
- Main results:
  - Reject the null of 'forecast ability' and lack of independence.
  - Similar results pre crisis and full sample.
  - Better results for shorter maturities when bootstrapped critical values are used.
  - RNDs overestimate the frequency of extreme events (left tail).

Ad-hoc suggestions

- Other 'Goodness-of-fit' tests?
  - Hong (2001): robust to non-independence.
  - Rossi and Sekhposyan (2013): Robust to dynamic mis-specification.
- How do nonparametric techniques compare to the parametric one?
  - Amisano and Giacomini (2007) or Corradi and Swanson (2006).
  - Diks et al. (2011) for the tails based on scoring rules.
- Tests check in-sample fit. What about out-of-sample?

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