ECB Workshop on Forecasting Techniques

“Understanding the Sources of Macroeconomic Uncertainty”
by Rossi, Sekhposyan and Soupre

Discussion by Michel van der Wel and Didier Nibbering

Erasmus U Rotterdam, CREATEES Aarhus, Tinbergen Institute, ERIM

June 4, 2016
Paper Summary

- A lot of interest in measuring uncertainty

- Paper proposes uncertainty measure based on forecast densities

- Furthermore, provides two decompositions:
  - Knightian uncertainty and risk
  - Ex-ante and ex-post uncertainty

- Applies measure to SPF densities, for GDP (main) and Inflation

- Provides relation with macroeconomic effects and studies measure through the lens of a model
1. Relation with CRPS

■ In forecast evaluation literature, Continuous Rank Probability Score (CRPS) often used

■ Measures difference between forecasted distribution and realization

■ CRPS definition (Hersbach, 2000):

\[
CRPS = \int_{-\infty}^{\infty} [P(x) - P_a(x)]^2 \, dx,
\]

with

\[P(x)\] cdf of forecast distribution
\[P_a(x)\] cdf of realization (with actual value \(x_a\)); 1 if \(x \geq x_a\), 0 else
Example CRPS
CRPS and New Uncertainty Index

- Index proposed in paper:

\[ U_{t+h|t} = \int_{-\infty}^{\infty} E \left[ (x_{t+h}(r) - p_{t+h|t}(r))^2 \right] dr \]

based on (2), plugging in (1) with \( N = 1 \), with \( x_{t+h}(r) \) cdf of actual [like \( P_a(x) (?) \)] and \( p_{t+h|t}(r) \) probability forecast of \( x_{t+h}(r) = 1 \) [like \( P(x) (?) \)]

- Compared again to CRPS:

\[ CRPS = \int_{-\infty}^{\infty} [P(x) - P_a(x)]^2 \, dx \]

- What is precise relationship between measures?
2. Decompositions

■ For first decomposition need/use
  ■ \( \text{Cov}(x_{t+h}(r)p_{t+h|t}(r)) \approx 0 \), to decompose Aggregate Uncertainty in Mean-Bias, Dispersion and (Realized) Risk
  ■ \( V_{t+h|t} \approx 0 \), this is Dispersion / variability in predictive density

Both cases point out “empirically small”
→ How small empirically?
→ Small here or always?
→ Under what conditions?
→ What are implications?

■ Second decomposition on ex-ante / ex-post under Gaussianity
  → Study consequences of deviations in density?
3. Deeper takeaways

- Possible to get further implications of using different indices?

- Now studied through VAR with macros and find ‘differences’

- How do we know whether one index is truly ‘better’?

- Are there other/deeper takeaways of the measure and decompositions?
4. Model of ambiguity

- Follows Ilut and Schneider (2014)
  → Study ambiguity about TFP

- In this application same setting used for ambiguity about GDP growth, with for GDP

\[ Z_{t+1} = \rho_z Z_t + \mu_t^* + u_{t+1}, \]

while agent \( i \) beliefs about GDP are based on

\[ Z_{i,t+1} = \rho_z Z_{i,t} + \mu_{i,t} + u_{t+1} \]

- Plausible to take GDP as hard to measure as TFP?

- What if at time \( t \) (or \( t + 1 \)) actual \( Z_t \) is observed?
Smaller points and conclusion

Smaller points:

1. Timing of surveys varies over time
   → Causes difference in measure and decompositions?

2. Fixed event interpolation
   → Assumes flat growth over year?
   → For robustness try annual data?

In conclusion:

- Very insightful decomposition
- Great work!
ECB Workshop on Forecasting Techniques

“Understanding the Sources of Macroeconomic Uncertainty”
by Rossi, Sekhposyan and Soupre

Discussion by Michel van der Wel and Didier Nibbering

Erasmus U Rotterdam, CREATEES Aarhus, Tinbergen Institute, ERIM

June 4, 2016