Assessing Loss Preferences on the Basis of Noisy Forecast Errors

Matei Demetrescu[a], Christoph Hanck[b] and Hajo Holzmann[c]

[a] TU Dortmund University; [b] University of Duisburg-Essen
[c] University of Marburg

Extended abstract: February 15, 2025

The framework of Elliott et al. (2005) allows for the quantification of the asymmetry of unknown loss functions based on observed forecasts as well as for rationality testing under (specific) asymmetric loss functions. To this end, they formalized a class of loss functions characterized by two parameters, the asymmetry and the tail weight parameter, class which nests the asymmetric linear and asymmetric quadratic loss functions.

Given the shape of this family of loss functions, tractable moment conditions for optimality of forecasts can be derived. In particular, the so-called generalized forecast error should have zero conditional expectation given all predictors available to the forecaster.

Based on these moment conditions, GMM estimation of the asymmetry parameter is possible (for simplicity often assuming known tail weight parameter). Regularity conditions assumed, Elliott et al. showed the GMM estimator to be consistent and asymptotically normal, and provide formulas for standard errors, thus allowing practitioners to conduct inference, most often about the asymmetry parameter. E.g. Christodoulakis and Mamatzakis (2009, 2008) find this way asymmetric preferences in series of GDP growth forecasts of EU institutions and countries.

However, forecast errors are likely to be noisy in practice (e.g. due to estimating the relevant forecast models), such that the assumptions on which Elliott et al. (2005) build are only approximately met. We follow West (1996) in modelling the estimation noise and assess, theoretically and in simulations, the impact of such noise on the estimators of loss function parameters.

We show that consistency of the GMM estimators of loss function parameters is typically not affected, but the standard errors derived by Elliott et al. (2005) underestimate the true variability of the estimators. Like in West's analysis of the Diebold-Mariano test, the correct standard errors depend on the forecast model and on the estimation scheme.

While one often observes forecasts, information on how the forecasts were generated is seldom not available, such that corrections based on suitably adjusted standard errors do not seem feasible. Notwithstanding, our second contribution is to propose a conditional

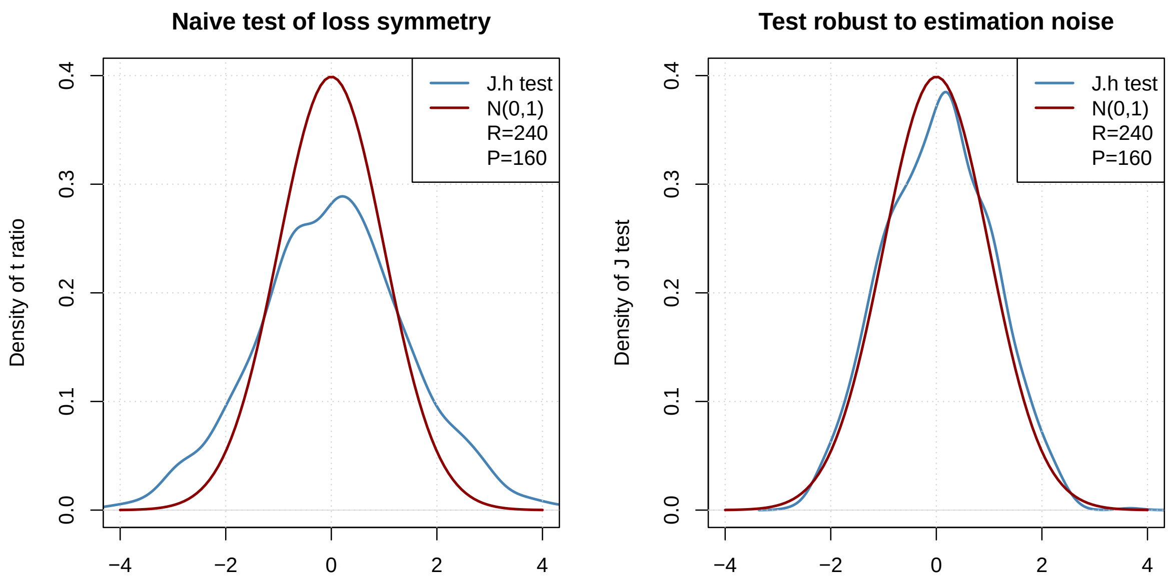

Figure 1: Estimation noise (rolling window estimation, $R = 240$ pre-sample observations, $P = 160$ available forecast errors) leads to over-rejections if not taken into account

moment test for the parameters of the loss function that is robust to estimation noise, and find it to have good size properties in general. Figure 1 depicts the effect of estimation noise on the Elliott et al. (2005) procedures (left plot) and the robustness of the proposed test (right plot). Size control does come at the cost of some reduced power, yet the proposed test has the further advantage of being able to single out subsamples where the null hypothesis violated.

Key words: Asymmetric power loss function; Estimation error; Forecast rationality; Robustness

JEL classification: C12 (Hypothesis Testing), C22 (Time-Series Models)

References

Christodoulakis, G. and E. Mamatzakis (2008). An assessment of the EU growth forecasts under asymmetric preferences. *Journal of Forecasting 27*(6), 483–492.

Christodoulakis, G. and E. Mamatzakis (2009). Assessing the prudence of economic forecasts in the EU. *Journal of Applied Econometrics 24*(4), 583–606.

Elliott, G., I. Komunjer, and A. Timmermann (2005). Estimation and testing of forecast rationality under flexible loss. *Review of Economic Studies 72*(4), 1107–1125.

West, K. D. (1996). Asymptotic inference about predictive ability. *Econometrica 64*(5), 1067–1084.