

# Comment on ‘Of quantiles and expectiles: consistent scoring functions, Choquet representations and forecast rankings’ by W. Ehm et al.

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As a meteorologist, I found this to be a very interesting and stimulating paper, with important ramifications for the verification of weather forecasts. Apart from the obvious usefulness of the newly proposed Murphy diagrams, the paper clarifies the importance of specifying the user’s *functional* of interest, and not simply the forecast scenario.

Consider two forecasters competing for business with a wind energy company. The company requires warning if wind speeds will exceed 60 mph, as in this case they must act if they want to prevent damage to the turbines. Their cost loss ratio is 0.05.

Forecaster A presents the company with the probability that the winds will exceed 60 mph. Forecaster B presents the company with the 95th quantile of his forecast PDF, which can be compared to the cut-off wind speed. Both forecasts are tailored to the same scenario, but they fall into the two different classes of point forecasts outlined in the paper.

The energy company can rank the two forecasters by comparing their expected profits when decisions are made using each forecast in turn, given the stated cost-loss ratio and cut-off wind speed. In addition, for Forecaster A, they can use a Murphy diagram to consider how the probability forecast would perform at a variety of cost-loss ratios,  $\theta$ , for the given cut-off threshold. This could be of interest if the turbines became cheaper to replace, or the cost of electricity changed. For Forecaster B, they can use a Murphy diagram to consider how the quantile forecast would perform at a variety of wind cut-offs,  $\theta$  — important if developments allowed safe use of turbines at higher wind speeds.

However it is not possible to compare the performance of Forecaster A and B except at the original threshold and cost-loss ratio, unless the full predictive PDF was available, in which case equation (16) could be invoked. The user must specify which type of point forecast is of more use to them, to allow for fair comparison and to test whether one point forecast dominates the other. It is likely that the dominance of one forecaster over the other is dependent on the point forecast requested. In explicitly stating which point forecast is required (probability or quantile), the competing forecasters are provided with an additional goal to use in improving their forecast model and calibrating the resultant forecasts.

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