

# Volatility Forecast Comparison with Biased Proxy and Related Test Statistic

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## Abstract

Various loss functions are employed in literature to evaluate competing volatility forecasting models. The loss function for an evaluation requires true volatility, which is unobservable. Patton (2011) provides a new class of loss functions that guarantees the consistency of the ranking (asymptotically) when the unbiased volatility proxy is used instead of true volatility. However, while realized variance (RV) is commonly used as the proxy in practice, it is natural to consider that RV does not satisfy the unbiasedness condition due to market microstructure noise.

In this presentation, we show that such bias in the volatility proxy can cause misspecified rankings of competing models. We also introduce a new notion for the robustness of loss functions to incorporate the effect of the biased volatility proxy and propose a proper method to evaluate the competing forecasting models if the volatility proxy is biased. We conduct a series of Monte Carlo simulation to assess the performance of our method and confirm that the proposed method behaves well.

We also report the finite sample properties of DMW test with imperfect (noisy and biased) proxy in various settings.

**keywords:** forecasting evaluation, loss function, realized variance, volatility.