

## **On MAPE-R as a Measure of Estimation and Forecast Accuracy\***

### **Abstract**

We examine “MAPE-R” (Mean Absolute Percent Error-Rescaled), a recently introduced measure of accuracy designed to overcome shortcomings noted in “MAPE” (Mean Absolute Percent Error), a measure commonly used to evaluate the accuracy of population estimates and forecasts. We show that MAPE-R can be calculated using a simple calculation, thus overcoming the cumbersome calculation procedure used in its introduction and noted as a feature that needed correction. We also provide a closed form expression for MAPE-R and find it to be a member of the family of power mean-based accuracy measures. This enables it to be placed in relation to other members of this family, which includes HMAPE (Harmonic Mean, Absolute Percent Error), GMAPE (Geometric Mean, Absolute Percent Error), and MAPE. Given that MAPE-R was designed to be robust in the face of outliers, it is unsurprising to find that it is a valid estimator of the distribution(s) generating the absolute percent errors. Simulation studies suggest that MAPE-R is a far more efficient estimator of this median than MEDAPE (Median Absolute Percent Error). Because the Box-Cox transformation on which MAPE-R depends is known to be unstable, we suggest that this represents a line of further research into GMAPE, which, like MAPE-R, is neither subject to the shortcomings observed for MAPE nor the instability of the Box-Cox transformation. While further lines of research are called for, nothing in our examination of MAPE-R here suggests that it should not be used. It is now less cumbersome to calculate and, as such, more accessible. It also meets the NRC’s major criteria as a summary measure of accuracy. Like other measures, it is subject to some cautions, but these are no more restrictive than those affecting other measures.