

Improving Asset Price Prediction when All Models are False

Garland Durham* and John Geweke†

September, 2010

Abstract

This study considers three alternative sources of information about volatility potentially useful in predicting daily asset returns: past daily returns, past intra-daily returns, and a volatility index based on observed options prices. For each source of information the study begins with one or more state-of-the-art models, and then works from the premise that all of these models are false to construct a single improved predictive distribution for daily S&P 500 index returns. The criterion for improvement is the log predictive score, equivalent to the average probability ascribed ex ante to observed returns. The first implication of the premise is that models within each class can be improved. The paper accomplishes this by introducing flexibility in the conditional distribution of returns, in volatility dynamics, and in the relationship between observed and latent volatility. The second implication of the premise is that model pooling will provide prediction superior to the best of the improved models. The paper accomplishes this by constructing ex ante optimal pools. All procedures are strictly out-of-sample, recapitulating one-step-ahead predictive distributions that could have been constructed for daily returns beginning January 2, 1992, and ending March 31, 2010. The prediction probabilities of the optimal pool exceed those of the best of the state-of-the-art models by 1.47% and the worst of these models by 7.75%. Optimal pools place a premium on diversification in much the same way as do optimal portfolios. The paper finds that optimal pools incorporate models place substantial weight on models using each of the three sources of information about volatility, and measures the value of each group of models in the context of the optimal pool.

KEYWORDS: EGARCH, intradaily returns, model combination, optimal pool, S&P 500, stochastic volatility, VIX. JEL classification: G17 primary, C52 secondary

*Division of Finance, Leeds School of Business, University of Colorado USA; Garland.Durham@colorado.edu

†Centre for the Study of Choice, University of Technology Sydney, Ultimo NSW 2007, Australia; and Division of Finance, Leeds School of Buainess, University of Colorado; John.Geweke@uts.edu.au.