Research Statement

Summary of Current Research

My research focuses on econometrics, time series statistics, forecasting and their applications in finance, macroeconomics and international economics. Specifically, my theoretical interests include developing new methods regarding predictive model averaging when there is uncertainty on parameter instability in the conditional mean. As an applied econometrician, I have utilized the cross-validation model averaging method proposed in my job market paper to forecast the U.S. and Taiwan quarterly GDP growth, and to compare predictive performance across several popular combination methods. In an empirical working paper, I apply the newly developed optimal and robust weighting theory to forecasting the U.S. market equities premium out-of-sample for several competing CAPM predictive models with detected structural breaks. I also reexamine the efficient financial market hypothesis based on my results. In another working paper, I combine the cross-validation model averaging and other related methods to forecast the U.S. equities premium pooling all candidate models, and to compare predictive performance with results presented in the Strauss et al. paper (*2012, Review of Financial Studies*).

Research: Cross-Validation Model Averaging with Structural Breaks

Forecasting economic variables of interest when structural breaks are possible is highly relevant to many macroeconomic and financial applications. This task becomes even more challenging when the underlying time series data exhibits features such as conditional volatility, as it is difficult to separate the impact caused by parameter instability and volatility in model selection. As an alternative to model selection by hypothesis testing, model averaging or forecast combination provides possible predictive gains by better managing the model selection risk. Built upon the Mallows' model averaging theory, I propose replacing the Mallows' Cp criterion with the cross-validation criterion in the derivation of optimal weights, as the cross-validation criterion is known to be robust to heteroscedasticity and can be applied in quite general settings. The cross-validation optimal weights combining the break and stable predictive models outperform several competing methods, such as Mallows' weights and Bayesian information criterion weights, in our controlled simulations for various combinations of break size and volatility. To examine the empirical performance of cross-validation model averaging, I apply several weighting methods to forecasting the U.S. and Taiwan quarterly GDP growth rate out-of-sample. For both countries, the cross-validation weights outperform Cp weights, equal weights and Bayesian criterion weights across several candidate models, and the results are robust to the sample split choice for forecast evaluation.

Research: Structural Breaks and Forecast Equity Premium Out-of-Sample

Goyal and Welch (*2008, Review of Financial Studies*) examined the predictive ability of popular financial variables in forecasting equity premium out-of-sample based on a comprehensive dataset. This paper contributed to the debate on the efficient capital market hypothesis, suggesting that structural breaks may be the cause of the poor out-of-sample performance of a variety of predictors. Applying the newly proposed optimal and robust weighting theory (*Pesaran et al., 2013, J Econometrics*) which explicitly deals with structural breaks for forecast, I reexamine the out-of-sample predictive ability using Goyal and Welch's data, and conclude that parameter instability cannot fully explain the poor performance of the majority of variables considered in their paper. An interesting empirical finding is that the stock market variance seems to have non-trivial predictive power if we take the structural breaks into account.

In another working paper, I apply a variety of forecast combination methods, including cross-validation model averaging, equal weighting and discounted test error rate weighting, to forecasting equity premium out-of-sample. Compared with the empirical findings presented in the paper by Strauss et al., my preliminary results suggest that forecast combination can significantly improve the out-of-sample performance measured by Campbell and Thompson's R square statistic (*2008, Review of Financial Studies*).

Future Research Plans

I plan to continue my theoretical research by extending the cross-validation model averaging to combining multiple models, especially non-linear models. Additionally, I would like to investigate the optimality properties of various weighting methods when the break date occurs close to the end of the sample, and to propose adjustments if the impact of break location is significant. Furthermore, I plan to explore various bootstrapping methods on the selection of predictive model when structural breaks are possible, and to work on the associated hypothesis testing problem.

In my applied work, I am particularly interested in applying my own research results and closely related new econometric theory to forecasting financial and macroeconomic variables, such as GDP growth, inflation and stock returns, and to comparing and evaluating predictive performance for all methods considered. In addition to forecasting, based on my work experience in the finance industry, I am interested in finding and creating new financial predictors, evaluating them in both controlled simulations and in historical data back-testing. In these applications, I would welcome opportunities for collaboration with experts from other fields such as accounting, statistics and computer science.