Abstract

In the first chapter of this dissertation I study the properties of a model averaging estimator with ridge regularization. I propose the ridge-regularized modifications of Mallows model averaging (Hansen, 2007, *Econometrica*}, 75) and heteroskedasticity-robust Mallows model averaging (Liu and Okui, 2013, *The Econometrics Journal*, 16) to leverage the capabilities of averaging and ridge regularization simultaneously. Via a simulation study, I examine the finite-sample improvements obtained by replacing least-squares with a ridge regression. Ridge-based model averaging is especially useful when one deals with sets of moderately to highly correlated predictors, because the underlying ridge regression accommodates correlated predictors without blowing up estimation variance. A two-model theoretical example shows that the relative reduction of mean squared error is increasing with the strength of the correlation. I also demonstrate the superiority of the ridge-regularized modifications via empirical examples focused on wages and economic growth.

The second chapter focuses on the use of elastic-net regression for instrumental variable estimation. I investigate the relative performance of the lasso and elastic-net estimators for fitting the first-stage as part of IV estimation. Because elastic-net includes a ridge-type penalty in addition to a lasso-type penalty, it generally improves upon lasso in finite samples when correlations among the instrumental variables are not negligible. I show that IV estimators based on the lasso and elastic-net first-stage estimates can be asymptotically equivalent. Via a Monte Carlo study, I demonstrate the robustness of the sample-split elastic-net IV estimator to deviations from approximate sparsity, and to correlation among instruments that may be high-dimensional. Finally, I provide an empirical example that demonstrates potential improvement in estimation accuracy gained by the use of IV estimators based on elastic-net.

The third chapter, a joint work with S. Anatolyev, contributes to wider use of advanced conventional methods for dealing with instrumental variable regression with many, possibly weak, instruments in Stata. We introduce a STATA command, *mivreg*, that implements consistent estimation and testing in linear IV regressions with many instruments, which may be weak.