DISSERTATION DEFENSE

Benjamin Holcblat

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388 Posner Hall

A Classical Moment-Based Inference Framework with Bayesian Properties: Econometric Theory and Simulation Evidence from Asset Pricing

Dynamic, empirical, consumption-based asset pricing has been a challenge to existing estimation theories. The main contribution of this research is to define and develop an inference approach to tackle this challenge. We call it the ESP approach, as it is based on the empirical saddlepoint (ESP) technique. The idea is to provide a moment-based framework that generates point estimates, confidence regions and tests that rely more on the information in the sample at hand and less on asymptotic limits. The result is an inference approach with strong finite-sample theoretical foundations, and robust to lack of identification.

Three main steps have been undertaken.

A first step is to put the ESP technique into a general mathematical framework autonomous from standard classical approaches. We prove that there exists an intensity distribution of solutions to the empirical moments over the parameter space. Then, we use the ESP technique to approximate this intensity distribution. We call the result the ESP intensity. We prove that it is consistent and asymptotically normal, that is to say that it converges to a point mass at the population parameter like Gaussian with a standard deviation that goes to zero at rate square root of the sample size. These results are robust to the presence of multiple solutions to the moment conditions, as long as their number is finite.

A second step is the development of a decision-theoretic approach within the ESP inference framework. We propose to choose a loss function according to an estimation purpose, and then make the estimation decision that minimizes the expected loss. Minimization of expected loss is the *optimal* answer to the estimated uncertainty which comes from estimation, as maximization of expected utility by a consumer is optimal in microeconomic theory. However, a decision-theoretic approach is generally impossible or delicate within existing classical estimation theory (e.g., p.4-5 in Lehmann and Casella, 1998), so that only asymptotic optimality results are typically obtained. For a large class of loss functions, we provide ESP point estimate, confidence set, and prove that they are consistent. Simulations of a consumption-based asset pricing model suggest that ESP point estimates and confidence regions perform similarly to, or clearly outperform, the best existing moment-based estimation approaches.

A third step develops tests within the ESP framework. In classical estimation theory, tests are usually based on confidence regions. Such tests also exist in the ESP framework. We derive a test of over-restricted conditions in this spirit. However, we also propose straightforward decision-theoretic point-hypothesis and set-hypothesis tests that are not based on confidence regions. Set-hypothesis tests are typically non-trivial in standard classical estimation theory. We prove that our ESP decision-theoretic tests do not lead to any asymptotic error unlike standard classical tests. We show that they are robust to some extent to the presence of multiple solutions to the moment conditions. Simulations explore the performance of these tests in the context of consumption-based asset pricing.