Research Statement

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My primary research agenda lies in the field of nonstationary time series econometrics. I have worked on various theoretical and empirical issues pertaining to estimation, inference and forecasting in nonstationary time series models. In particular, I have contributed to the literatures on detection and estimation of structural change in cointegrated regression models, procedures for robust trend break detection and its application in unit root testing, methods for uncovering the nature of persistence change in econometric models, inference in models with bubbles, and forecast combination methods with stochastic and deterministic trends. I have been involved in developing new econometric methods on the aforementioned topics with each method accompanied by detailed empirical applications which illustrate the relevance of the proposed approach in practice. More recently, I have also developed a strong interest in the application of large dimensional panel data models for answering important empirical questions, particularly the returns to schooling. The following provides a selective overview of my contributions to each of these two strands of the broader econometrics literature.

My early research developed methods for estimating and testing structural changes in cointegrated regression models ([5],[6]). A wide variety of models were considered, including those where all coefficients were allowed to change (pure structural change) as well as those where a subset of coefficients were held fixed (partial structural change). An empirically relevant issue not considered in these studies is that the behavior of test statistics in partial models is sensitive to changes in coefficients not being tested thereby making it difficult to identify the source of the detected instability in practice. In a recent contribution [8], we address this problem by proposing a simple two-step procedure to test for partial parameter stability. The first entails the application of a joint test of stability for all coefficients. Upon a rejection, the second conducts a stability test on the subset of coefficients of interest while allowing the other coefficients to change at the estimated breakpoints. In an application to US money demand, we show how the proposed approach can be fruitfully employed to estimate the welfare cost of inflation.

In another set of papers ([1],[7],[9]), I have extensively studied the problem of detecting persistence change in a univariate time series. Paper [7] develops procedures for testing multiple persistence shifts allowing the process to be either stationary or nonstationary under the null hypothesis of no shifts and alternate between stationary and unit root regimes or between stationarity-preserving regimes under the alternative hypothesis. Paper [1] proposes a novel approach to estimate the number of persistence shifts. A general treatment of the problem in the presence of heteroskedastic errors is provided in [9] where a new wild bootstrap procedure is developed for inference. An application to inflation persistence in OECD countries highlights how the proposed approach can be used to disentangle shifts in persistence from nonstationarity in volatility as well as shifts in the deterministic component.
A set of companion papers ([4],[10]) studies the problem of constructing combination forecasts in the presence of uncertainty about the stochastic trend as well as the short-run dynamics driving a time series. In [10], we develop a new approach to forecasting a highly persistent time series that employs feasible generalized least squares (FGLS) estimation of the deterministic components in conjunction with Mallows model averaging. We also provide theoretical justification for a generalized Mallows averaging estimator that incorporates lag order uncertainty in the construction of the forecast. Our analysis demonstrates that the proposed procedure yields considerably lower finite sample forecast risk relative to ordinary least squares (OLS) averaging. An application to US macroeconomic time series illustrates the efficacy of the advocated method in practice and finds that both persistence and lag order uncertainty have important implications for the accuracy of forecasts. In [4], we present a new approach to constructing multistep combination forecasts based on minimizing an Accumulated Prediction Errors (APE) criterion. The motivation for adopting this criterion emanates from the fact that it directly targets the asymptotic forecast risk (AFR) in contrast to existing approaches such as Mallows and cross-validation weighting which target the in-sample asymptotic mean squared error (AMSE). While AFR and AMSE are approximately equivalent in the strictly stationary setup, such equivalence breaks down in a nonstationary setup. The large sample properties of the APE-weighted forecasts are established and their favorable performance is demonstrated through simulations and empirical applications.

A recent piece of research [11] concerns the problem of conducting inference in mildly explosive autoregressive models which have been extensively employed in recent theoretical and applied econometric work to model the phenomenon of asset market bubbles. An important issue in this context concerns the construction of confidence intervals for the autoregressive parameter that represents the degree of explosiveness. Existing studies rely on intervals that are justified only under conditional homoskedasticity/heteroskedasticity. We study the problem of constructing asymptotically valid confidence intervals where the innovations are allowed to be unconditionally heteroskedastic. The assumed variance process is general and can accommodate both deterministic and stochastic volatility specifications commonly adopted in the literature. Within this framework, we show that the standard heteroskedasticity-autocorrelation consistent (HAC) estimate of the long-run variance converges in distribution to a nonstandard random variable that depends on nuisance parameters. Notwithstanding this result, the corresponding t-statistic is shown to still possess a standard normal limit distribution. To improve the quality of inference in small samples, we propose a dependent wild bootstrap-t procedure and establish its asymptotic validity under relatively weak conditions. Applications to international stock price indices and US house prices illustrate the empirical relevance of the advocated procedure.

A final set of papers ([2],[3]) grew out of my interest in employing recently developed methods for high dimensional panel data models to estimate the returns to schooling. In contrast to my time series research which is primarily methodological, this research is considerably more empirical and involves the use of large, confidential data sets. The motivation for this work arose from the observation that a sizeable portion of the literature estimating the returns to schooling relies
heavily on instrumental variable (IV) methods or the use of ability proxies to control for latent skills. However, such estimates are likely to be biased given that the IV methods have been shown to be susceptible to the weak instruments problem and/or the lack of instrument exogeneity while the proxies typically used are subject to substantial measurement error. In [2], we present new evidence on returns to schooling based on a factor model framework that allows for multiple unobserved skills with potentially time-varying prices as well as individual-level heterogeneity in returns. Our empirical analysis employs a unique linked survey-administrative panel data set on education and earnings. Our estimates of the average marginal returns to schooling are much smaller than the typically reported OLS/IV estimates. Omitted ability is shown to account for a larger fraction of the aggregate OLS bias compared to heterogeneity. In a companion paper [3], we employ the factor model framework to conduct a formal evaluation of the proxy approach. We use the fact that the factor model approach allows consistent estimation of the returns to schooling without the need to rely on proxies thereby providing a flexible test bed for quantifying the contribution of the proxies to the aggregate OLS bias. A bias decomposition analysis as well as direct tests for the viability of proxies clearly indicate their inadequacy in capturing the underlying latent skills. The use of these tests in this context is particularly novel given that they have only been used in macroeconomic applications thus far.

Almost all of my post-tenure research has been conducted in collaboration with my current and former graduate students. This collaboration includes five published articles, two working papers that are currently under revise and resubmit status (one each at Econometric Theory and Journal of Applied Econometrics) and a further two working papers that are currently under review. The article [10] was awarded the 2021 Denis Sargan Econometrics Prize for “the best (unsolicited) article published in The Econometrics Journal in a given year, by anyone who is within five years of receiving their doctorate.” (prize awarded to my Ph.D. student/coauthor).

References


