博士学位請求論文要旨

Essays on Stationary and Nonstationary Common Factor Models in Econometrics

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Stationary and nonstationary common factor models are a driving force of recent empirical studies in various fields of economics. For example, in macroeconomics, the model represents the traditional idea of summarizing a large set of macroeconomic time-series by a small number of factors related to fundamental concepts such as real and nominal factors. In asset pricing, there is a long history of modeling common factors in investigating cross-sections of asset returns. In this dissertation, I make further contributions to theoretical developments in stationary and nonstationary common factor models under the perspective of developing useful applications in the fields of empirical macroeconomics and asset pricing.

Chapter 1: Testing Skewed Dynamics in the Common Factor Model

Chapter 1 proposes tests to investigate whether the skewed property of time-series data is attributed to the economy-wide common components and/or the idiosyncratic components. To this end, I apply the formal econometric test based on the coefficient of

skewness proposed by Bai and Ng (2005) to the large dimensional common factor model. I propose the Wald-type and max-type test statistics for the space spanned by the common components and a test for idiosyncratic components. The results show that these tests have the standard asymptotic distributions. Monte Carlo simulations confirm that all tests have good size and power in finite samples. Furthermore, I apply the tests to a common factor model using 127 U.S. macroeconomic time-series data from 1960 to 2019. Strong evidence of skewness is found in the common components as well as some idiosyncratic components related to housing, labor market, and uncertainty. Finally, results suggest empirical relevance of incorporating the skewed dynamics in business cycle modeling in a general equilibrium context or in specific factor markets.

Chapter 2: A Cross-Sectional Method for Right-Tailed PANIC Tests under a Moderately Local to Unity Framework

Chapter 2 assesses the size and power properties of the right-tailed version of the Panel Analysis of Nonstationarity in Idiosyncratic and Common Components (PANIC) of Bai and Ng (2004) tests when the common and/or the idiosyncratic components are moderately explosive. I find that, when the idiosyncratic component is moderately explosive, the tests for the common components may have considerable size-distortions, and those for the idiosyncratic component may suffer from the nonmonotonic power problem. I provide an analytic explanation under the moderately local to unity framework developed by Phillips and Magdalinos (2007). I then propose a new cross-sectional (CS) approach to disentangle the common and idiosyncratic components in a relatively short explosive window. Monte Carlo simulations show that the CS approach is robust to the nonmonotonic power problem.

Chapter 3: Date-Stamping the Origination of Explosive Behaviors in the Large Dimensional Factor Model

Chapter 3 applies the date-stamping methodology for the origination of explosive behaviors proposed in the seminal work of Phillips et al. (2011) to the large dimensional factor model. To this end, I compare two methods of identifying the common and idiosyncratic components: PANIC and CS investigated in the previous chapter. Monte Carlo simulations show that, when the explosive behavior lies only in the common component, the origination date is precisely estimated by either method. However, when the explosive behaviors exist in the idiosyncratic components, the PANIC method loses its power of detection and provides inaccurate origination dates. These problems are resolved through the CS method.