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Frequentist Evaluation of small DSGE Models

Abstract

This paper proposes a new evaluation approach for the class of small-scale `hybrid' New Keynesian Dynamic Stochastic General Equilibrium (NK-DSGE) models typically used in monetary policy and business cycle analysis. The empirical assessment of the NK-DSGE model is based on a conditional sequence of likelihood-based tests conducted in a Vector Autoregressive (VAR) system, in which both the low and high frequency implications of the model are addressed in a coherent framework. If some of the low frequency behavior of the original time series of the model can be approximated by non-stationary processes, stationarity must be imposed by removing the stochastic trends. This gives rise to a set of recoverable unit roots/cointegration restrictions, in addition to the short-run cross-equation restrictions. The procedure is based on the sequence `LR1 LR2 R3', where LR1 is the cointegration rank test, LR2 the cointegration matrix test and LR3 the cross-equation restrictions test: LR2 is computed conditional on LR1 and LR3 is computed conditional on LR2. The type-I errors of the three tests are set consistently with a pre-fixed overall nominal significance level. A bootstrap analogue of the testing strategy is proposed in small samples. We show that the information stemming from the individual tests can be used constructively to uncover which features of the data are not captured by the theoretical modeland thus to rectify, when possible, the specification. We investigate the empirical size properties of the proposed testing strategy by a Monte Carlo experiment and show the empirical usefulness of our approach by estimating andtesting a monetary business cycle NK-DSGE model using U.S. quarterly data.