Non-stationary time series analysis and the bootstrap

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Topic 1. Non-stationary time series and unit root testing

Introduction to linear non-stationary time series models and unit root testing. Basic asymptotic theory. Power issues, specification issues and the role of deterministic trends. Co-integration: representation and testing.

Topic 2. Introduction to the bootstrap for time series

Introduction. Bootstrap hypothesis testing. Bootstrapping stationary time series: the finite order AR case. Bootstrap AR(\infty) processes: sieve bootstrap and block bootstrap. Dealing with heteroskedasticity.

Topic 3. Bootstrap methods for non-stationary time series models

Inconsistency of the bootstrap under a unit root. Bootstrap unit root tests: the iid case. Bootstrap unit root tests in the AR(\infty) case: sieve and block bootstrap unit root tests. Dealing with deterministic components. The bootstrap in co-integrated models: rank determination and hypotheses on the co-integration vectors.

Topic 4. Further issues in the analysis of non-stationary time series

Volatility breaks in nonstationary time series models. Unit root tests under volatility breaks. Disentangling volatility breaks and unit roots: wild bootstrap unit root tests. Extension to co-integration. Dealing with infinite variance innovations: inconsistency of the i.i.d. bootstrap, wild bootstrap and permutation bootstrap.