Unit Root and Cointegration Analysis

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About this course

This course is about the econometric analysis of non-stationary data. Aim: prepare the students for empirical research in macroeconomics and finance by laying sound theoretical foundations. Topics to be covered include:

- Asymptotic methods for non-stationary processes including functional limit theory and stochastic integration
- Unit root tests and tests of stationarity
- Spurious regression
- Cointegrated systems
- Cointegration tests
- Reduced rank regression and estimation of error-correction models
Cointegrated time series

**Figure:** Number of kilometers travelled by trucks and German investment. Year-on-year percentage change. Source: Statistisches Bundesamt, own calculations.
Topics (tentative outline)

Part I: Unit roots
- (Review of) Stationary stochastic processes
- Integrated processes and the functional central limit theorem
- Unit root and stationarity tests

Part II: Cointegration
- Spurious regression
- Multivariate integrated processes and cointegration
- Estimation of cointegrated regression models
- Cointegration tests
- Cointegrated VAR models

Additional topics (optional, based on student’s interests):
Structural breaks, panel unit root and cointegration tests, time-varying cointegration, ...
Organization

Format: block course after the lecture period
Thursday, Feb 9 – Tuesday, Feb 28,
9am - 4:30pm, CDI 120
We’ll switch between lectures, pen-and-paper exercises and practical computer sessions.

Exam
TBA during the first lecture

Prerequisites
Successful completion of the courses in Asymptotic theory and Time Series Analysis is highly recommended.
The slides, in conjunction with the lectures, are aimed to be self-contained. Links to original research papers will be provided. Relevant textbooks include:

