

Vacancy for a PhD position in statistics/econometrics

Ref: ISBA/2013/11/01

Deadline for application : December 15, 2013

Context

Under the framework of the 5-year research project "Stochastic Modelling of Dependence: Systems under Stress", sponsored by the Académie Louvain, the Université catholique de Louvain opens a PhD position in statistics or econometrics.

The overall goal of the research project is to construct new ways of measuring and modelling risks in systems with intricate dependence structures, moving towards model assumptions that better reflect real life complexity. Particular attention is to be paid to the behaviour of such systems in periods of distress, that is, upon the arrival of shocks, after structural breaks, or when comovements between risk factors are higher than usual.

The PhD candidate is supposed to work on one of the following specific topics:

1. **Nonparametric modelling and estimation of the dependence structure of high-dimensional time series panels.**

Economic and financial data are increasingly of high dimensionality, hence estimation of its serial and cross-sectional dependence, e.g. for subsequent prediction purposes, is a difficult task. In this PhD project we will address these problems by combining recently developed methodology on: regularisation (shrinkage) of covariance matrices, locally stationary modelling (abrupt regime switching or smoothly varying over time), dimension reduction for time series panels. Good quantitative knowledge of parametric (and ideally nonparametric) estimation and inference for multivariate data and some experience with data simulation/analysis (in R or Matlab) are required.

2. **Prediction and nonparametric estimation in the presence of dependent functional regressors**

Driven by the idea that economic or financial variables observed with a high frequency in time can often be seen as discretizations of a data generating process in continuous time, the prediction and nonparametric estimation based on continuous measurements of economic indicators is a demanding task. Take for instance the prediction of the German DAX industry index based on (ideally)

continuous measurements of energy market prices. Typically, a collection of weekly measurements of energy prices is obtained by splitting up a record over the last decade. The assumption of independence does not reflect the data structure and the assumption of stationarity is at least questionable over the whole decade. In this PhD project we will study the influence of dependencies within the functional regressors on the attainable accuracy of a nonparametric prediction or estimation procedure. This PhD thesis will provide an opportunity to extend the student's knowledge of statistical tools including nonparametric smoothing, out of sample evaluation, unbiased risk estimation or regularised estimation, as well as mathematical tools mainly from approximation theory, functional and numerical analysis.

Profile

- You have completed (or you are near completion) of a five-year Master in Statistics, Actuarial Sciences, Econometrics or related fields (e.g. applied mathematics, probability, physics, engineering, ...) with honours.
- Strong interest in quantitative and mathematical modelling.
- Decent knowledge of written and spoken English. Knowledge of French is *not* required.
- Final-year master undergraduate students are especially encouraged to apply.

Terms of employment

You will receive a tax-free monthly grant for two times two years. The position is a pure research position, that is, with (almost) no teaching or administrative obligations.

Research environment

The project is a joint venture between CORE and ISBA (formerly known as the Institut de statistique), two renowned research centres of high international reputation. Equipped with modern computing facilities, a statistics library, a vivid visitors program and ample funding for scientific travel, they provide a stimulating place for scientific research. Regularly organized short courses, workshops, and seminar series (all in English) are given by international short and long-term visitors. A high percentage of the PhD students graduate and succeed in starting a promising career, be it in academia or industry. CORE and ISBA have numerous academic contacts, including those to neighboring fields (medicine, agronomy, social science, economy, finance and engineering) as well as collaborations with industry. CORE and ISBA are located in the heart of the modern, vivid and international UCL university campus at Louvain-la-Neuve, in close proximity of Brussels and its international airport, and in short travel distance to other European capitals.

How to apply

Your job market package should include the following elements:

1. A motivation letter, including your preferred topic in the above list
2. At least one reference letter to be sent by e-mail directly by the referee
3. A detailed curriculum vitae
4. A list of past courses and grades
5. A copy of your relevant diploma(s)
6. A written work, for instance your master thesis or a paper you have written

Please send your application by email or by regular mail to

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www.uclouvain.be/isba - <http://www.uclouvain.be/core>

The deadline for application is: **December 15, 2013**

Contact

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Prof. Jan Johannes (jan.johannes@uclouvain.be) - specifically for research topic 2

Prof. Rainer von Sachs (rvs@uclouvain.be) - specifically for research topic 1