

# MARINA KHISMATULLINA

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## RESEARCH INTERESTS

Econometrics, Nonparametric Statistics, Applied Time Series Analysis

## EDUCATION AND AFFILIATIONS

- 2019 - present** *Institute of Finance and Statistics, University of Bonn*  
Research Fellow
- 2015 - present** *Bonn Graduate School of Economics, University of Bonn*  
Ph.D. candidate in Economics  
Expected completion: fall 2021  
Supervisors: Prof. Dr. Michael Vogt, Prof. Dr. Alois Kneip
- 2012 - 2014** *National Research University «Higher School of Economics»*  
M.Sc. in Economics  
GPA – 8.52 out of 10 (8, 9, 10 - excellent)  
Rating: 18 out of 266
- 2007 - 2012** *Moscow State University n.a. M.V. Lomonosov*  
Diploma with honours in Mathematics  
GPA – 4.98 out of 5 (5 - excellent)

## PUBLICATIONS

### **Multiscale Inference and Long-Run Variance Estimation in Nonparametric Regression with Time Series Errors** (with Michael Vogt)

*Journal of the Royal Statistical Society: Series B, Volume 82, Number 1 (2020), p. 5-37*

We develop new multiscale methods to test qualitative hypotheses about the trend function  $m$  in the nonparametric regression model  $Y_{t,T} = m(t/T) + \varepsilon_t$  with time series errors  $\varepsilon_t$ . In time series applications,  $m$  represents a nonparametric time trend. Practitioners are often interested in whether the trend  $m$  has certain shape properties. For example, they would like to know whether  $m$  is constant or whether it is increasing or decreasing in certain time intervals. Our multiscale methods enable us to test for such shape properties of the trend  $m$ . To perform the methods, we require an estimator of the long-run error variance  $\sigma^2$ . We propose a new difference-based estimator of  $\sigma^2$  for the case that  $\{\varepsilon_t\}$  belongs to the class of auto-regressive  $AR(\infty)$  processes. In the technical part of the paper, we derive asymptotic theory for the proposed multiscale test and the estimator of the long-run error variance. The theory is complemented by a simulation study and an empirical application to climate data.

## WORKING PAPERS

### **Nonparametric comparison of epidemic time trends: the case of COVID-19** (with Michael Vogt)

*Submitted to Journal of Econometrics*

The COVID-19 pandemic is one of the most pressing issues at present. A question which is particularly important for governments and policy makers is the following: Does the virus spread in the same way in different countries? Or are there significant differences in the development of the epidemic? In this paper, we devise new inference methods that allow to detect differences in the development of the

COVID-19 epidemic across countries in a statistically rigorous way. In our empirical study, we use the methods to compare the outbreak patterns of the epidemic in a number of European countries.

### **Multiscale Testing for Equality of Nonparametric Trend Curves** (with Michael Vogt)

The comparison of nonparametric curves is a classic topic in econometrics and statistics. Depending on the specific application, the curves of interest are densities, distribution functions, time trends or regression curves. In this paper, we focus on the comparison of nonparametric trend curves. We develop new multiscale method for testing whether the trend curves are the same across observed time series. Moreover, this method allows us to detect the regions where the differences between the trend curves occur. We illustrate our method with an application to daily price returns for a number of US companies.

## **GRANTS AND AWARDS**

### **Doctoral Scholarship of the Bonn Graduate School of Economics**

2015 - 2019

### **Research Fellowship, German Research Foundation (DFG)**

since 2019

## **WORKSHOPS AND PRESENTATIONS**

<b>2020</b>	Econometrics and Statistics Seminar, Bonn
<b>2019</b>	12th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2019)
<b>2018</b>	11th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2018) The 23rd International Conference on Computational Statistics Econometrics and Statistics Seminar, Bonn Bonn Mannheim Workshop for PhD students (discussant)
<b>2017</b>	BGSE Brown Bag Seminar, Bonn Bonn Mannheim Workshop for PhD students (discussant)
<b>2013</b>	Social Network Analysis Summer School, Saint-Petersburg

## **WORKSHOPS I (CO-)ORGANISED**

Bonn Mannheim Workshop for PhD student, May 2018

## **TEACHING EXPERIENCE**

### **University of Bonn**

Lecturer, Wissenschaftliches Arbeiten (B.Sc.), Winter 2020/2021

TA, Econometrics II for PhD, Summer 2020

TA, Econometrics I for PhD, Winter 2019/2020

TA, Econometrics II for PhD, Summer 2019

TA, Econometrics I for PhD, Winter 2018/2019

TA, Econometrics II for PhD, Summer 2018

TA, Mathematics for Economists (M.Sc.), Winter 2017/2018

### **National Research University «Higher School of Economics»**

TA, Institutional Economics (B.Sc.), Fall 2013

### **Branch of Moscow State University in Dushanbe, Tajikistan**

Lecturer, Calculus (B.Sc.), Fall 2012

### **Moscow State University**

Assistance during the exam, 2011 – 2013

### **Education Company «Unium», Moscow, Russia**

Senior teacher of mathematics, 2009 – 2012

## **NON-ACADEMIC EXPERIENCE**

### **Nonprofit partnership «Market Council»**

Analyst, 2014 – 2015

## **PACKAGES**

### **R package «Multiscale»**

This package implements the multiscale analysis proposed in the papers "Multiscale Inference and Long-Run Variance Estimation in Nonparametric Regression with Time Series Errors" and "Nonparametric comparison of epidemic time trends: the case of COVID-19". Specifically, it allows to test qualitative hypotheses (such as shape properties) about the time trend in a nonparametric regression with time series errors and to compare nonparametric time trends in the context of epidemic modelling. The package as well as the detailed description of its functionality can be found in the following github repository: <https://github.com/marina-khi/multiscale>.

## **SKILLS**

Language efficiency: Russian (native), English (fluent), German (intermediate)  
Programming: Advanced skills in R, Git, LaTeX, Python, SAS Base  
Intermediate skills in Wolfram Mathematica, Matlab, Jekyll  
Basic skills in Stata, EViews

## **MISCELLANEA**

Citizenship: Russian  
Hobbies: Books, making TikTok videos, biking and jogging  
Marital status: Married

## **REFERENCES**

Prof. Dr. Michael Vogt  
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