

PhD course: **Quantile Regression and Causality**  
Economics Division, Linköping University, Sweden  
ECTS points: 2

Course Coordinator: Gazi Salah Uddin, Associate Professor, Linköping University, Sweden  
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Date: September 20, 2019 (One day course)

**Course Instructor:** Victor Troster, Assistant Professor of Economics at the Department of Applied Economics at the Universitat de les Illes Balears (UIB).  
<https://sites.google.com/site/victortroster/home>

Location: Economics Division (A-Building), Department of Management and Engineering, Linköping University, Sweden.

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-This course offers a comprehensive introduction to quantile regression, quantile causality methods, and some recent extensions. Quantile regression models provide very useful statistical analysis, such as in finance and in wage inequalities studies. For example, the conditional quantile regression helps examine how a treatment or a social program affects the distribution of an outcome of interest, or it directly measures the market risk of financial institutions by estimating a particular quantile of future portfolio values - the Value at Risk (VaR) - held by those institutions.

Course lectures will be complemented by computer laboratory sessions. The lab sessions will be conducted in the open-source R language and Matlab. Session 1: 9-12

**Class hours:** 6

**Objectives of the course:**

At the end of this course, students will be capable of:

1. Running and interpreting a quantile regression in R;
2. Performing Granger-causality-in-quantile methods in R and Matlab;
3. Applying quantile unit root and quantile cointegration tests;
4. Running panel quantile regression models and other extensions in R.

**Bibliography:**

- Jeong, K., Härdle, W. K., & Song, S. (2012). A consistent nonparametric test for causality in quantile. *Econometric Theory*, 28, 861-887.
- Koenker, R. (2012). Quantile regression in R: A vignette. Retrieved from: <https://cran.r-project.org/web/packages/quantreg/vignettes/rq.pdf>
- Koenker, R. (2017). Quantile regression for Panel/Longitudinal Data. Retrieved from: <http://www.econ.uiuc.edu/~roger/courses/NIPE/lectures/L6.pdf>
- Koenker, R., & Hallock, K. F. (2001). Quantile regression. *Journal of Economic Perspectives*, 15, 143-156.

- Koenker, R., & Xiao, Z. (2004). Unit root quantile autoregression inference. *Journal of the American Statistical Association*, 99, 775-787.
- Koenker, R., & Xiao, Z. (2006). Quantile autoregression. *Journal of the American Statistical Association*, 101, 980-990.
- Troster, V. (2018). Testing for Granger-causality in quantiles. *Econometric Reviews*, 37, 850-866.
- Xiao, Z. (2009). Quantile cointegrating regression. *Journal of Econometrics*, 150, 248-260.

### **Course Outline:**

Session 1: 09:00-10:15

- Quantile regression analysis
- Linear Granger-causality-in-quantiles tests
- Nonlinear Granger-causality-in-quantiles tests

Session 2: 10:30-12:00

- Quantile unit root test
- Quantile cointegration test
- Panel quantile regression analysis

Session 3: 14:00-15:15

- Quantile regression in R
- Linear Granger-causality in quantiles in R
- Nonlinear Granger-causality in quantiles in Matlab

Session 4: 15:30-17:00

- Quantile unit root test in Matlab
- Quantile cointegration test in Matlab
- Panel quantile regression in R

Mandatory: Personal Laptop with R and Matlab installation (Econometrics Toolbox)

Exam: Take-home exam

Grade: Pass/Fail

### **Resource Person**

**Victor Troster**, Ph.D., is an Assistant Professor of Econometrics at the Department of Applied Economics, Universitat de les Illes Balears (UIB), Spain. His research interests emphasizes on financial econometrics, theoretical econometrics, and time series, in particular Granger-causality-in-quantile tests, specification tests of quantile regression models, and forecasting models of financial assets. He received his Ph.D. in Economics (*Cum laude*) at the Universidad Carlos III de Madrid, Spain, in 2015.

He has teaching experience at the undergraduate and graduate studies at the Universidad Carlos III de Madrid and at the Universitat de les Illes Balears. His latest courses taught are 'Econometrics for Big Data' in the Master of Analysis of Big Data at the Universitat de les Illes Balears and 'Econometrics' in the Degree of Business Administration at the Universitat de les Illes Balears.

He has participated in competitive research projects, for example those funded by the Spain's Ministry of Science and Innovation. He has attended many international conferences on Econometrics. He has published articles in well-renowned journals such as *Econometric Reviews*, *Energy Economics*, *Economic Modelling*, *Finance Research Letters*, and *Resources Policy*.

**Gazi Salah Uddin**, Ph.D, is an Associate Professor of Financial Economics at the Department of Management and Engineering, Linköping University, Sweden and also a visiting Professor Trinity Business School, Ireland. His research interests emphasizes strongly on multidisciplinary aspects, where econometric techniques and methodologies from economics, physics, engineering, and psychology are implemented in studying the complexity of economic and financial systems on a macro level, focused on areas such as international economics and financial markets, energy and corporate finance. He received the “*Jan Wallanders and the Tom Hedelius Scholarship*” for best doctoral thesis in economics during 2016. Recently, he received the “*TRiSS*” award as a visiting scholar at the Trinity Business School. He has a wide variety of teaching experience having taught at different universities at all levels ranging from undergraduate to doctoral supervision and achieved excellent teaching evaluation scores.

He has attended various international seminars and conferences and have publications in well-renowned journals such as *European Journal of Operation Research*, *Tourism Management*, *Annals of Tourism Research*, *Journal of Economic Dynamics and Control*, *Energy Economics*, *International Review of Financial Analysis*, *Journal of Financial Markets Institution and Money*, *Journal of International Money and Finance*, *Journal of Financial Stability*, *Economics Letters*, *International Journal of Finance and Economics*, and *Review of Quantative Finance and Accounting*.

Before joining Linköping University for his doctoral studies, he worked with Financial Consumer Agency, Government of Canada; Carleton University and on a projects of IFC (World Bank), UNESCAP and East West University, Bangladesh. He holds a successful track record having completed projects funded by IFC (World Bank), UNESCAP, UPAR-United Arab Emirates University, UAE and have an ongoing project NASDAQ-OMX foundation and Swedish Energy Agency.