

Research Training on Time Series Modelling  
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R-Lab: Dr. Muhammad Yahya, Stavanger University, Norway

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This course offers a comprehensive introduction to volatility modelling, spillover approach, cross quantilogram dependence methods, wavelet-based dependence methods and some recent extensions. These models provide very useful statistical econometrics analysis, such as in finance and economics studies. Course lectures will be complemented by computer laboratory sessions. The lab sessions will be conducted in the open-source R language.

### **Objectives of the course:**

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

1. Running and interpreting modelling in R;
2. Performing spillover methods in R;
3. Applying wavelet coherence and decomposition tests;
4. Running quantile-based dependence models and other extensions in R.

### **Course Outline:**

#### **L 1:**

**Session 1: Diebold-Spillover Approach** (Diebold and Yilmaz, 2012, 2009)

- Economic and Financial Application
- Possible data set
- R-exercise

#### **L 2:**

**Session 2: Wavelet decomposition and Coherence** (Daubechies, 1992; Grinsted et al., 2004; Torrence and Compo, 1998; Torrence and Webster, 1999)

- Economic and Financial Application
- Possible data set
- R-exercise

#### **L 3:**

**Session 3: Volatility-DCC (GARCH-Types) Modelling** (Bollerslev, 1986; Engle, 2002; Engle and Bollerslev, 1986; Glosten et al., 1993; Nelson, 1991)

- Economic and Financial Application
- Possible data set
- R-exercise

#### **L 4:**

**Session 4: Cross quantilogram approach** (Han et al., 2016)

- Economic and Financial Application
- Possible data set
- R-exercise

#### **L 5:**

**Session 5: Wavelet-based Spillover approach** (Baruník and Křehlík, 2018)

- Economic and Financial Application
- Possible data set

- R-exercise

## L 6:

### Session 6: Research Idea and possible application

- Economic and Financial Application
- Possible data set

### Bibliography:

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### Resource Person

**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.

R-Lab : Muhammad Yahya, Ph.D, is an external consultant at the Department of Industrial Economics, risk management, and urban planning at the University of Stavanger. My research interests revolves around the the time-frequency connectedness dynamics, and in particular temporal and spectral dependence between various asset classes. He has strong command in Time Series Modelling Application in R. He has attended various international seminars and conferences and have publications in well-renowned journals such as *Energy Economics*, *Energy*, *Journal of Commodity Market*, *IAEE Energy Forum* and *Aquaculture economics and management*.