

# High-Frequency Financial Econometrics using Matlab

Instructor: Rodrigo Hizmeri

May 13 and 14, 2019

Location: Work Foundation, 21 Palmer St, Westminster,  
London SW1H 0AD

## Day 1

- 9:30 – 11:00
  - The Interface, editor, comments, dot-dot-dot (...)
  - help
  - Matlab Syntax
  - Decision rules and loops

11:00 – 11:20 : Coffee break

- 11:20 – 12:50
  - Matlab Functions
  - Matlab Plots
  - Importing/exporting files
  - Data Aggregation

12:50 – 14:00 : Lunch break

- 14:00 – 15:30
  - Tick vs. TAQ Database
  - Estimation of Intraday returns
  - Stylized Facts
  - Data Generating Process

15:30 – 15:50 : Coffee break

- 15:50 – 17:20
  - Estimation of Realized Measures
  - Jump-Robust Measures
  - Market Microstructure Noise
  - Noise-Robust Measures

## Day 2

- 9:30 – 11:00

- Realized Jumps
- Jump Test Statistics
- Disentangling Significant Jumps
- Conditional Variance Models

11:00 – 11:20 : Coffee break

- 11:20 – 12:50

- Forecasting Conditional Variance Models
- Introduction/Estimation to the HAR Model
- Forecasting Techniques
- Comparison of Conditional Variance from Daily and High-frequency Measures

12:50 – 14:00 : Lunch break

- 14:00 – 16:00

- Value-at-Risk using high-frequency measures and Conditional Variances
- Realized Betas: Estimation and Forecasting
- Monte Carlo Simulation
- Heston Model
- Simulating a Heston Model
- Simulating Microstructure Noise
- Monte Carlo Study – BNS Test

## References

- [1] Torben G Andersen and Tim Bollerslev. Intraday periodicity and volatility persistence in financial markets. *Journal of empirical finance*, 4(2-3):115–158, 1997.
- [2] Torben G Andersen, Tim Bollerslev, and Francis X Diebold. Roughing it up: Including jump components in the measurement, modeling, and forecasting of return volatility. *The review of economics and statistics*, 89(4):701–720, 2007.
- [3] Torben G Andersen, Tim Bollerslev, Francis X Diebold, and Paul Labys. The distribution of realized exchange rate volatility. *Journal of the American statistical association*, 96(453):42–55, 2001.
- [4] Torben G Andersen, Tim Bollerslev, Francis X Diebold, and Paul Labys. Modeling and forecasting realized volatility. *Econometrica*, 71(2):579–625, 2003.
- [5] Federico M Bandi and Jeffrey R Russell. Microstructure noise, realized variance, and optimal sampling. *The Review of Economic Studies*, 75(2):339–369, 2008.
- [6] Ole E Barndorff-Nielsen and Neil Shephard. Power and bipower variation with stochastic volatility and jumps. *Journal of financial econometrics*, 2(1):1–37, 2004.
- [7] Ole E Barndorff-Nielsen and Neil Shephard. Econometrics of testing for jumps in financial economics using bipower variation. *Journal of financial Econometrics*, 4(1):1–30, 2006.
- [8] Kris Boudt, Christophe Croux, and Sébastien Laurent. Robust estimation of intraweek periodicity in volatility and jump detection. *Journal of Empirical Finance*, 18(2):353–367, 2011.
- [9] Christian T Brownlees and Giampiero M Gallo. Financial econometric analysis at ultra-high frequency: Data handling concerns. *Computational Statistics & Data Analysis*, 51(4):2232–2245, 2006.
- [10] Rama Cont. Empirical properties of asset returns: stylized facts and statistical issues. *Quantitative Finance*, 1(2):223–236.
- [11] Fulvio Corsi. A simple approximate long-memory model of realized volatility. *Journal of Financial Econometrics*, 7(2):174–196, 2009.
- [12] Fulvio Corsi, Davide Pirino, and Roberto Reno. Threshold bipower variation and the impact of jumps on volatility forecasting. *Journal of Econometrics*, 159(2):276–288, 2010.
- [13] Xin Huang and George Tauchen. The relative contribution of jumps to total price variance. *Journal of financial econometrics*, 3(4):456–499, 2005.
- [14] Cecilia Mancini. Non-parametric threshold estimation for models with stochastic diffusion coefficient and jumps. *Scandinavian Journal of Statistics*, 36(2):270–296, 2009.
- [15] Michael McAleer and Marcelo C Medeiros. Realized volatility: A review. *Econometric Reviews*, 27(1-3):10–45, 2008.