README file for the article entitled "Backtesting Marginal Expected Shortfall and Related Systemic Risk Measures"

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The goal of this README file is to facilitate the re-use of the codes and data, and the replication of the results reported in our article. The structure and contents of this README file are similar to those recommended by the AEA Data Editor (Vilhuber, 2019) and the Social Science Data Editors.

Identification

Banulescu-Radu, D., Hurlin, C., Leymarie J., and Scaillet, O. (2020). Backtesting Marginal Expected Shortfall and Related Systemic Risk Measures, published in *Management Science*.

The archive file (.zip) includes two folders (with subfolders) and one file:

- Monte_Carlo_Simulations
- Empirical_Application
- README file (pdf format)

The folder "Monte_Carlo_Simulations" allows to re-run the codes for the empirical sizes and size-corrected powers presented in the Monte Carlo simulations (Section 3.3 of the article). The folder consists of three subfolders, namely "Marginal_MES", "Conditional_MES", and "Marginal_DeltaCoVaR". In "Marginal_MES", we provide the codes that are used in the marginal MES setting to reproduce Table 1 of the paper. In "Conditional_MES", we provide the codes that are used in the conditional MES setting to reproduce Table 2 of the paper. In "Marginal_DeltaCoVaR", we provide the codes that are used in the marginal DeltaCoVaR setting to reproduce Table 3 of the paper.

The folder "Empirical_Application" allows to reproduce all the outputs of the empirical application (Section 5 of the article). The folder consists of three subfolders, namely "ShortTerm_Forecasts", "MediumTerm_Forecasts", and "Figures". In "ShortTerm_Forecasts", we provide the codes that are used to apply the backtesting tests for daily systemic risk forecasts. We provide separate codes for the backtesting tests dedicated (i) to the Delta CoVaR (see subfolder "DeltaCoVaR") and for (ii) the MES-based indicators, including SRISK and SES (see subfolder "MES_SES_SRISK"). In "MediumTerm_Forecasts", we provide the codes used for the backtesting tests with longer forecasting horizons, in line with the LRMES and SRISK defined in Brownlees and Engle (2017, RFS). The subfolder "Figures" reproduces the figures of the empirical application using the numerical matrices that are calculated from the codes available in the subfolders "ShortTerm_Forecasts" and "MediumTerm_Forecasts". Finally, we can find data in two Excel files "bdd_for_matlab.xlsx" and "ref_ticker.xlsx". We present their structure in the next section. All data and Matlab codes necessary to reproduce our results are also uploaded on Zenodo and are available at https://doi.org/10.5281/zenodo.3732345.

Data availability statement

The datafile "bdd_for_matlab.xlsx" contains the 95 U.S. financial firms with a market capitalization greater than 5 billion dollars as of the end of June 2007. The datafile covers the period from January 3, 2000, to December 30, 2016. Column 1 is used as firm identifier (from 1 to 95). The file "ref_ticker.xlsx" matches firm identifiers with the list of tickers. We report in Appendix I (online appendix) the list of tickers and company names.

Columns 2 and 3 indicate the year and month in consideration, respectively. Columns 4, 5, 6, 7 contain the firm daily logarithmic returns, the market daily logarithmic returns, the quarterly book value of total liabilities, and the daily market capitalization, respectively, for the 95 firms considered in the empirical application. For the market daily logarithmic return, we consider the daily CRSP market value-weighted index return. Market data (columns 4, 5, 7) are collected from CRSP and quarterly book value of total liabilities (column 6) are collected from Computstat.

Computational requirements

All the codes are written with Matlab R2016a, with the Toolboxes Optimization and Econometrics. For the parameter estimation of the GARCH-DCC model, we rely on the MFE Toolbox of Kevin Sheppard (https://www.kevinsheppard.com/code/matlab/mfe-toolbox/). All the necessary codes are provided. Our codes were run on a 4-core Intel-based laptop with Windows 10.

Instructions

1. Download the archive and extract the files referenced above.
2. Open and execute with Matlab the main script in a given folder. In the “Empirical_Application” folder, keep in mind to change the path in a given script to load the dataset “bdd_for_matlab.xlsx” before executing the code.