README

Replication material of the article "Permanent-Transitory decomposition of cointegrated time series via Dynamic Factor Models, with an application to commodity prices", by Chiara Casoli and Riccardo (Jack) Lucchetti.

All scrips are written in gretl and need a recent version of the software (2021a or later).

Overview

This zip file contains 2 directories:

1. Sec3-MonteCarlo: This folder contains the gretl scripts to replicate the Monte Carlo experiment contained in Section 3:
   - functions.inp: provides the functions to be used in main.inp;
   - main.inp: runs **one** of the many Monte Carlo experiments and saves the results as an appropriately-named data file in gretl format;
   - stats.inp: generates tables of results from the data file generated by main.inp.

   Required gretl packages: DFM.gfn, extra.gfn. Time to reproduce each experiment goes depends on the hardware; on a typical PC, execution time should range from two minutes in the simplest setups to about 25 minutes for the larger systems.
2. Sec4-Commodities: This folder contains the gretl scripts and the dataset (in gretl and csv formats) to replicate the empirical application described in Section 4:
   - commod_data.gdt: the commodity prices data file in gretl format;
   - commod_data.csv: the commodity prices data file in csv format;
   - part1.inp: performs the cointegration analysis;
   - part2.inp: performs the Kasa decomposition and estimates the DFM;
   - part3.inp: performs the comparison between two factor extraction techniques (EM and PC) for the empirical analysis.

   Required gretl packages: DFM.gfn, staticfactor.gfn. The codes should run in less than 5 minutes.

Data Availability and Provenance Statements

The commodity prices used in the empirical analysis performed in Section 4 are provided by the IMF Primary commodity prices database[1]; the Consumer Price Index, used to deflate the nominal prices, is provided by Fred.[2] All data are publicly available. We selected the commodity prices listed in Table A1 of the article and calculated the real prices by deflating them using the CPI Fred series. We then converted all the series with a basis of January 2000 = 100. The dataset we end up with is provided in the directory Sec4-Commodities, both in csv and in gretl formats, containing the series calculated as described above.

Computational requirements

Software Requirements

All the codes have been run using gretl (code was last run with 2021c version).

Memory and Runtime Requirements

The code for the empirical analysis (Section 4) should run in a few minutes; instead, the simulation exercise contained in subfolder Sec3-MonteCarlo considers many different DGPs. Computational time depends on the hardware, but on a typical PC it can range from 2 minutes in the case of a small system (for instance, $n = 32$, $B = 4$, $r = 2$ and $T = 200$) to about 25 minutes in the case of the $n = 128$, $B = 8$, $r = 4$ and $T = 400$ setup.

Details The code was last run on a **2-core Intel-based laptop with Windows 10 Pro, version 20H2**.

Instructions to Replicators

1. Sec3-MonteCarlo
    - Open main.inp and adjust the working directory.
    - Tables 1 and 2 of the paper (and all the tables of the Online Supplement in Section S1.2) can be reproduced **one row at a time**. This is due to the fact that each row refers to a separate simulation experiment (i.e., different DGP).
    - Go to the section "simulation set up" to select which row of Table 1 and 2 (or equivalently Tables in Online Supplement) one would like to replicate. Example: to replicate first row of Table 1, select `nulldata 200`, `ESTIMATE_R = 0`, `matrix blocks = dimblock(1)`; to obtain the second row, replace with `nulldata 400`, and so forth.

[1] International Monetary Fund, retrieved from https://www.imf.org/en/Research/commodity-prices in May 20, 2021.

[2] U.S. Bureau of Labor Statistics, Consumer Price Index for All Urban Consumers: All items in U.S. City Average [CPIAUCSL], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/CPIAUCSL, in May 20, 2021.

- After the output is produced, a .gdt file will be created in the selected working directory. The file name contains a description of the DGP that is being simulated.
- Open stats.inp and select, in the first row, the appropriate file name. Example: if the output of main.inp produces a file named `n032_r2_b4_T200.gdt`, make sure to write the same name after the command `open`.
- Via the option `PRINT_FULL` the user can choose between 0 and 1. With `PRINT_FULL = 0`, the code will produce exactly the chosen row of Table 1 or 2, containing only the positive shares of the difference ∇, as defined in the article. If `PRINT_FULL = 1`, all the output of the Online Supplement's Tables will be produced (including also mean, standard deviation, median and so forth). Again, the output of the Tables must be reproduced one row per time. Note that in this case, each run should reproduce the selected row of more Tables. For instance, the case of `n032_r2_b4_T200.gdt`, with `ESTIMATE_R = 0` and `PRINT_FULL = 1` will reproduce the first row of Tables from S2 to S13.

1. Sec4-Commodities

   - Open part1.inp and run the code. It reproduces Table 3 of the paper.
   - Open part2.inp. Warning: this script produces MANY graphs. To display them on screen, set the `TO_DISPLAY` scalar on line 5 to a non-zero value. Otherwise, the plots of article will be saved as EPS files.
   - Run the code.
   - part3.inp performs the robustness check of considering the comparison between EM- and PC-based factor extraction. Code running will generate all plots.

References

International Monetary Fund, https://www.imf.org/en/Research/commodity-prices (accessed in May 20, 2021).

U.S. Bureau of Labor Statistics, Consumer Price Index for All Urban Consumers: All items in U.S. City Average [CPIAUCSL], Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/CPIAUCSL (accessed in May 20, 2021).