Prediction Using Several Macroeconomic Models:

Readme file for data and replication codes

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Abstract

This document illustrates the data and codes used in the paper. Data,replication codes and readme file are available at the URL:

https://sites.google.com/site/gianniamisanowebsite/home/research/current-papers/

1 Introduction

The paper is based on the recursive Bayesian estimation of different models. All the code is in Matlab. The estimation codes can be run on different platforms (Windows, Linux, Mac).

After running each of the models and saving the results, it is necessary to run the code to gather the relevant output from the single models and to collect a single file containing

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the necessary inputs for performing model combination and all the analyses contained in the paper. The root folder where all codes are saved is called

`AG_2016_REStat_final_submission_code_and_data_to_be_submitted`.

2 Data

The data are described in Section A of the online appendix. In the folder you can find the following files

- `usmodel_data_new_2012.xls`: xls file with data used for the DSGE and the VAR models ;
- `usmodel_data_new_2012.mat`: same as above but in Matlab format;
- `usmodel_data_new_2012_ext.xls`: file used for DFM model (larger data set);
- `us_dfm_basic_dataset_2012.mat:` same as above but in Matlab format.

3 Code

3.1 Needed routines

The folder `needed_routines` collects the routines needed to run the codes. Please add this folder (with subfolders) to Matlab before executing the replication codes. Add only the `modified_Dynare` to run the DSGE model recursive estimation. For all the other code, do not include `modified_dynare` in the path, but only the remaining subfolders.

3.2 Single models

3.2.1 DFM

In the folder `/code/single_models/dfm/kf3_pf2_pv2` (3 common factors with VAR(2) dynamics and idiosyncratic terms with AR(2) dynamics). The file `main_dfm_060_069.m`, invoking `script.m`, carries out MCMC recursive posterior simulation of the model for the first 10 subsamples of the evaluation period and produces the files `logscore_061.mat` to `logscore_070.mat`. It is necessary to modify `dfm_060_069.m` to process other groups of subsamples and in this way generating recursive results throughout all the evaluation period. In this way it is possible to distribute the computations across several nodes on a computer cluster.

The recursive estimation results must be then assembled across subsamples using the script `main_dfm_loop_results_RB_2012.m`.

In the same directory one can also find the code to run recursively the SAME algorithm (Doucet et al. 2002, see section B.1 of the online appendix) to obtain posterior mode estimates of the DFM. The algorithm is implemented using the script `script_SAME_dfm_1.m`. Then the file `main_assemble_SAME_results.m` should be used to assemble the results.

In order to obtain the multistep results reported in Section 5.6, it is necessary to run the code `main_dfm_loop_results_multistep_2015.m`. This script obtains multistep ahead conditional moments and predictive densities of functions of the observables: see details in Section F of the online appendix, for all the models.

3.2.2 DSGE

The folder `/code/single_models/DSGE/fully_bayesian_new` contains code for recursive estimation of the DSGE model. Recursive MCMC based estimation can be parcelled into blocks using subfolders `batch_01` to `batch_19` to distribute computations. We include only `batch_01` as an example that produce recursive MCMC estimation of the DSGE model using the first 10 subsamples (the first one ending in 1965:Q1 and the last one ending in 1966:Q3) to do posterior maximization and then MCMC simulation. The script that preforms this recursive estimation job is called `usmodel_loop_02.m`. To process subsamples 11 to 20, the user should create a folder batch_02 and run a modified loop script file that processes these subsamples.

The DSGE folder contains also the following files:

- `main_dsge_recursive_predictive_fb_RB_2012.m:` to assemble results;
- `main_dsge_recursive_predictive_fb_multistep.m:` to produce multistep conditional distributions results.

3.2.3 VAR

The code for VARs is in the folder `/code/single_models/bvar`. There one can find two folders, one for the model in which some variables appear in differences and the one for model where all variables appear in levels.

Here in the documentation we focus on the material for running the model in differences. There are two further subfolders, `FB` and `PM`, to perform Full Bayes and posterior mode estimation. In particular, sequential posterior mode estimation is obtain by running the

code `main_BVAR_find_pmode.m`. For full Bayesian analysis, we have:

- `main_bvar_differences_FB_2012.m` to run MCMC recursively;
- `main_bvar_differences_loop_results_RB_2012.m`: to assemble results.
- `main_bvar_differences_loop_results_multistep_2015.m`: to compute recursive multistep ahead predictive densities.

3.3 Assembling results for all models

Synopsis folder The `synopsis` folder contains the code to assemble the output of single models and to produce the `mat` files that are used in following elaborations and moved and stored in the directory `/code_tables_figures_paper/results_120411`. These codes are:

- `main_assemble_all_models_synthetic_1.m`: to assemble results;
- `main_compute_std_logscores.m`: to measure standard deviations of MCMC based log score computations.

In addition the folder contains also the following routines

- `main_rtop.DOP.m`: to compute real time dynamic pooling (see Section 5.5.2 of the paper and Section E.3 of the online appendix)
- `main_rtop.ff.m`: to compute real time dynamic pooling using the forgetting factor approach see Section 5.5.2 of the paper and Section E.3 of the online appendix).
- `main_table_results_1.m`: to produce several tables, in particular RMSFEs tables (e.g. Table 6 in the online appendix).

The `Synopsis_nh` folder contains code pertaining to collect and manipulate multistep ahead predictive densities. In particular:

- `main_assemble_all_models_synthetic_nh_2015.m:` to produce and assemble results regarding recursive multistep predictive
- `main_multistep_model_value_2015.m`: to compute model values looking at multistep ahead densities.
- `main_table_results_nnh_2015.m:` to produce several tables, in particular multistep ahead RMSFEs tables.

3.4 Code for tables and figures

Compact results directory (`from_Gianni results_120411`) The folder code_table_figures_paper contain code used to generate figures contained in the paper and in the online appendix. A subfolder called `from_Gianni/results_120411` has the following `mat` files, which contains, with different levels of the detail, summaries of the results of the recursive estimation of all models:

- `all_models_MCMC_logscores_2012_04_11.mat;`
- `all_models_MCMC_results_2012_04_11.mat;`
- `all_models_synthesis_results_2012_04_11.mat.`

In all these files results are stored in convenient Matlab structures.

Calibration The code `main_calibration.m` computes probability integral transforms for all models being considered and save them into array `pita (T×(n+1)×n. models))`, saved in a `mat` file for further manipulation, as shown in Section C.4 of the online appendix. Job can be segmented and sent to can be used also to compute PITs using multivariate distributions and PITs based on marginal conditional distributions.

Code for pooling This directory `mlwork_pool` contains code to do model pooling. In particular:

- `run0.m:` creates a file with real-time optimal pools beginning with the start of the study period ('realtime').
- `run1.M`: computes real-time pool weights and Bayesian model averaging, appearing in Figure 3 in the paper.
- `run1_REStat_2016_bw.m`: same as above but in black and white (for REStat).
- `run2.m:` looks at how optimal pools differ depending on whether models are full Bayes or posterior mode (Table 1, panel (a) of the paper).
- `run3.m:` generates the basic results for full-period model weights and values. It produces the results in Table 1, Panel (b) of the paper, and produces Figure 1.
- `run3_black_white_REStat_2016_final.m`: same but with figure produced in black and white.
- `run4.m:` compares the log scores of the individual models, all relative to the equally weighted pool.

- `run4A.m`: same as above and produces Figure 2 in the paper.
- `run4A_REStat_2016_final_bw.m`: same as above and produces figure in black and white.
- `run5.m`: to produce upper panel of Figure 3 in the paper.
- `run5_ReStat_2016_final_bw.m`, same as above with figure in black and white.
- `run6.m`: produces Table 4 in the paper.
- `run7.m`: produces Table 3 in the paper.
- `run_merged_figure_bw.m`: produces Figure 3 with 3 panels, as appearing in the paper

Analysis of Variance (ANOVA) code This directory 'mlwork_anova' has work related to the analysis of variance exercises.

- `run1.m`: produces ANOVA graphs for different series.
- `run2A.m`: preliminary analysis and Figure 3 in the online appendix.0.
- `run3.m`: produces PIT tests reported in Table 4 (intermediate step).
- `run4.m`: produces PIT tests reported in Table 4 of the paper.

Posterior mode versus Full Bayes code This directory `mlwork_modefull` has work related to comparing results using posterior mode and full Bayes.

- `run1.m`: comparison between FM and PM, Table 1 panel (a) in the paper.
- `run2.m`: produces Figure 3 in the online appendix.

Data profile and summary table Folder Section_2 the file:

- `main_series_graphs_2015.m`: produces Figure 2 and Table 2 in the online appendix.