This document introduces the code usage for the paper, "Quantifying the Fiscal Backing for Monetary Policy". The basic sequence is to first estimate the DSGE model and then extract the estimated monetary shock from it. Next, exploit the monetary policy estimates as a proxy for instrumental variable of monetary policy shock in VAR model.

<1> Estimating DSGE model

- DSGE/benchmark/main_SMC.m runs the Sequential Monte Carlo estimation. All the estimation and hyperparameter setups are in that m file.
Estimation result will be saved as DSGE/benchmark/result/SMC_posterior.mat.

- The folder DSGE/benchmark/model contains the state space representation of the model, the transition and measurement equation. Prior distribution is specified in the DSGE/benchmark/model/prior_info_setup.m with their names, distribution and regarding parameters.

- After the estimation, DSGE/MP_shock_extracting.m picks up the posterior MP shock of the DEGE model and then save the median of the MP shock with its actual dates in DSGE/benchmark/result/estimated_MP_shock.mat.

- There are some posterior analysis exercises. (a) DSGE/SMC_estimation_report.m collects and reports posterior sampler and particle's innovations. On top of that, it shows the SMC algorithm adaptations too. (b) DSGE/posterior_predictive.m computes the IRF and debt valuation decomposition and plots the figures of them. The main function is DSGE/functions/IRF_and_DVD.m where it computes the debt valuation decomposition between line 69 to 77. (c) DSGE.counterfactual.m repeats IRF and debt valuation computation through DSGE/functions/IRF_and_DVD.m.

<2> Estimating Bayesian VAR model through proxy IV method

- First, I need to estimate the coefficient and covariance parameters of the reduced form VAR. I use the code from Giannone et al (2015), the hierarchical Bayesian modeling that incorporates with the Minnesota type prior, sum-of-coefficient and cointegration priors. Estimation can be done with VAR/HBVAR/mainfile_HBVAR.m. It stores the reduced form estimates in VAR/HBVAR/result/BVAR_posterior.mat.

- Given the reduced form estimates, I identify the MP shock through proxy IV method. The proxy I use is the MP shock extracted from the DSGE model, saved in DSGE/benchmark/result/estimated_MP_shock.mat. The code VAR/proxy_iv_irf.m runs the proxy-IV method analogous to Mertens and Ravn (2013). In this code, the main function is the proxy_iv_25bps.m in the line #88. The function can be found in VAR/functions/proxy_iv_25bps.m where it computes the IRF and debt valuation decomposition mainly. The for loop starts at line 51 identifies MP shock through the proxy IV method and get impact vector for IRF. Then the rest of IRF horizons can be computed with the estimates of reduced form. The debt valuation decomposition part lies in between line 113 to 120. There is the c_x vector which is the selection vector of x. (I do not use the forecast error decomposition FEVD part here)

- VAR/proxy_iv_VD.m computes the variance decomposition for monetary policy shock on each observable.

- VAR/proxy_iv_HD.m computes the historical decomposition for monetary policy shock on primary surplus observables and draws the proxy relevance posterior distribution.

<3> Estimating Bayesian Proxy SVAR model from Caldara and Herbst (2019)

- This method shares the same proxy IV method to the above estimation, but the code is from Caldara and Herbst (2019) and the method is fully Bayesian by augmenting the proxy-IV part into the VAR model. VAR/BPSVAR/main_BPSVAR.m run the estimation and save the result in VAR/BPSVAR/results/ BVAR_posterior.mat.

- VAR/BPSVAR/IRF_DVD_BPSVAR.m reports the IRF and debt value decomposition analogous to the DSGE and the benchmark VAR estimation.

<4> Estimating Bayesian SVAR model from Arais et al (2018)

- The method does not require the proxy variable, so it can be executed independent to the DSGE model. The code VAR/SVAR/mainfile.m runs the estimation and save the result in VAR/SVAR/results/results.mat.

- VAR/SVAR/report_result.m reports the IRF and debt value decomposition analogous to the DSGE and the benchmark VAR estimation.

Description for DSGE/benchmark/model

variable_listing.m: Write down all the variables of the DSGE model.

equilibrium_conditions_listing.m: Write down all the equilibrium equations of the DSGE model.

model_setup.m: Based on the above two functions, it assigns calibrated values and computes steady state values.

equilibrium_condition.m: Write down the model based on the above three functions into the GENSYS format.

prior_info_setup.m: Specify each prior's distribution, mean, std dev and names.

Description for DSGE/functions

IRF_and_DVD.m: Compute the IRF and debt valuation decomposition with given parameters

Other functions are relatively straightforward with their names.

To get the figures and tables

data_study.m: report data stats. It shares the exact code with data_importing function in data folder. It plots Figure 1, 12, 13

The followings need <1> come first.

DSGE/counterfactuals.m: Figure 4, 5

DSGE/MP_shock_extracting.m: Figure 30

DSGE/posterior_predictive.m: Figure 2, 15, 22 and Table 3, 5

DSGE/posterior_predictive_fiscal.m: Figure 3

DSGE/prior_predictive.m: Table 3

DSGE/benchmark/SMC_estimation_report.m: Table 2, Figure 14, 23 ~ 29

The followings need <1> and <2>

VAR/proxy_iv_HD.m: Figure 6, 11, 17

VAR/proxy_iv_irf.m: Figure 7, 8, 9, 15, 16, 19, 20 Table 4, 6

VAR/proxy_iv_VD.m: Figure 10

The followings need <1> and <3>

VAR/BPSVAR/IRF_DVD_BPSVAR.m: Figure 18, Table 7

The followings need <4>

VAR/SVAR/report_result.m: Figure 21, Table 8