**Readme File for “Piecewise-Linear Approximations and Filtering for DSGE Models with Occasionally Binding Constraints” by Aruoba, Cuba-Borda, Higa-Flores, Schorfheide and Villalvazo**

These files were written and run using Julia 1.5.3 and MATLAB R2019b. Random seeds are fixed so that each script will produce the same results when run using the same configuration. To save space results are not included in this folder.

While these files replicate the results in the paper, readers interested in using these codes for different models should check our websites for any updates to the codes that may be updated since we froze these codes in January 2021. Note that most of these functions need to be edited to be used for a different model.

**Folders**

* **Data:** Contains the actual and the simulated data used in the paper.
* **FunctionsEstimation:** Contains Julia functions used for estimation and filtering. The “run” functions are called from the corresponding script.
* **FunctionsExpost:** Contains MATLAB functions for the fiscal experiments in Section 8.
* **FunctionsSolution:** Contains Julia function used for solution given a set of parameters.
* **LikelihoodEvaluations:** Parameter draws from the simulation exercise.
* **PosteriorDraws:** Currently only contains the initial parameters used in various MCMC scripts. When these scripts are run it will also contain the relevant data files.
* **PriorSpec**: Contains the specification file for the prior used in the paper.

**List of Scripts**

These scripts, run in this order, generate the results presented in the paper. Numbers in [ ] indicate approximate running times. Those without running times run in a few minutes. We suggest running codes that will take some time with fewer draws initially to get an idea of the running time. (For example, our main estimation codes can be run with 200 draws, 20 of which are dropped, to get a good idea of total running time.) Our codes print out running time elapsed and this will provide a good forecast.

script\_install\_packages.jl**:** To install packages used when running for the first time.

**1. Generate artificial data**

script\_SimulateModel.jl

**2. Figure 1**

script\_LikelihoodEval.jl: nSimEval=100, nParamDraw=1, run for each ME scale separately

Graph\_LoglhApprox\_Densities.m: run for each ME scale separately

**3. Figure 2**

script\_LikelihoodEval.jl [1.5 hours each run] : nSimEval=100, nParamDraw=100, run for each ME scale separately

Graph\_LoglhApprox\_Stddev.m: run for each ME separately

**Figure 3**

script\_PriorDrawsDirect.jl to generate draws from the prior for proposal covariance matrix

script\_MCMC\_KF.jl [10 minutes]: to generate draws from the posterior of the linearized DSGE using the Kalman Filter (KF) to evaluate the likelihood function; mhrun=0 with proposal = prior covariance matrix, initial parameters from the true DGP and c=0.002. 110,000 draws, 10,000 dropped.

script\_SummarizeDraws to compute a posterior covariance matrix based on the KF run; need to specify input file with nFilter, nPrior, nMHrun, nDataSet

script\_MCMC\_KF.jl [10 minutes]: to generate draws from the posterior of the linearized DSGE using the Kalman Filter (KF) to evaluate the likelihood function; mhrun=1 with proposal = posterior covariance matrix from previous run , initial parameters from the posterior mean of the previous run and c=0.3. 110,000 draws, 10,000 dropped.

script\_SummarizeDraws to compute a posterior covariance matrix based on the KF run; need to specify input file with nFilter, nPrior, nMHrun, nDataSet

script\_MCMC\_BSPF.jl [6 hours] : to generate draws from the posterior of the nonlinear DSGE using the BSPF to evaluate the likelihood function; mhrun = 2 with proposal = posterior VCV and initial parameters from posterior mean from KF mhrun=1.

script\_MCMC\_COPF.jl [6 hours] : to generate draws from the posterior of the nonlinear DSGE using the BSPF to evaluate the likelihood function; mhrun = 2 with proposal = posterior VCV and initial parameters from posterior mean from KF mhrun=1.

*Top row:* Graph\_PostDraws\_Densities\_Compare.m

*Middle row***:** Graph\_PostDraws\_ACFs\_Compare.m

*Bottom row:* Graph\_PostDraws\_ACF\_Scatters.m

**Table 2**

script\_PriorDrawsDirect.jl to generate draws from the prior for proposal covariance matrix [Already done for Figure 3]

script\_MCMC\_KF.jl [10 minutes]: to generate draws from the posterior of the linearized DSGE using the Kalman Filter (KF) to evaluate the likelihood function; mhrun=0 with proposal = prior covariance matrix and c=0.002. (110,000 draws, 10,000 dropped)

script\_SummarizeDraws to compute a posterior covariance matrix based on the KF run; need to specify input file with nFilter, nPrior, nMHrun, nDataSet

script\_MCMC\_KF.jl [10 minutes]: to generate draws from the posterior of the linearized DSGE using the Kalman Filter (KF) to evaluate the likelihood function; mhrun=1 with proposal = posterior covariance matrix from previous run, initial parameters are the posterior mean from previous run and c=0.3 (110,000 draws, 10,000 dropped)

script\_SummarizeDraws to compute a posterior covariance matrix based on the KF run; need to specify input file with nFilter, nPrior, nMHrun, nDataSet

script\_MCMC\_COPFexactZLB [12.5 hours] : to generate draws from the posterior of the nonlinear DSGE model using the COPF to evaluate the likelihood function; M=180, c=0.2, ME=0.001, 55,000 draws, discard 5000.

script\_SummarizeDraws to compute a posterior covariance matrix based on the COPF run; need to specify input file with nFilter, nPrior, nMHrun, nDataSet

script\_PosteriorDistributionTable.m produces the summary statistics from the posterior draws used in Table 2.

**Figure 4**

script\_Filter\_COPFexactZLB.jl to generate filtered states conditional on the MAP or posterior mean estimates.

script\_FiscalExercise.m to produce intervention vs no-intervention paths; need to specify directory containing filtered states conditional on posterior mean or MAP, point to output directory from script\_Filter\_COPFexactZLB.jl

**Table 3**

script\_FiscalExercise.m run above also produces this table.