“Financial Intermediation, Investment Dynamics, and Business Cycle Fluctuations”, by Andrea Ajello

Read-me File in support of the replication code available on the AER website

The zip file contains four folders:

- **Ajello_AER16_FGS_Compustat** contains the code to compute the Financing Gap Share from Compustat data.
- **Ajello_AER16_Model** contains the mod file that can be used to solve and estimate the model with Dynare (a specialized software package for the solution of dynamic general equilibrium models, available at http://www.dynare.org/).
- **Ajello_AER16_Figures_Tables** contains the code that replicates the figures and tables in the published article, starting from the results of the estimation in Dynare.
- **Ajello_AER16_Data_Code_Online_Appendix** contains data and code that can be used to replicate results in the online appendix, available on the AER website.

1) Ajello_AER16_FGS_Compustat

You will need copies of Stata and Eviews to run the code in this folder.

The folder contains Stata code *FGS_Ajello_AER16.do* to replicate results in section 1. Compustat is a Standard and Poor’s proprietary dataset, available through WRDS. You will have to download the following variables from the North America Compustat Fundamentals Quarterly File:

> *gvkey fqtr fyr datacqtr datafqtr capxy chechy dvy fincfy fopty ivncfy oancfy fic sic*

Please follow the detailed comments in the *do* files to input the data and perform the analysis. The output of the *do* file is saved as *FGS_output.dta* and *FGS_output.csv*.

The Compustat series are seasonally adjusted by means of the additive Census X12 procedure. The folder also contains the Eviews program *fgs_ajello_seasonadjust.prg* that

stores the seasonally-adjusted series in the output file *FGS_AJELLO_SA.CSV*.

2) Ajello_AER16_Model

You will need a copy of Matlab (or Octave) and a free release of Dynare to execute the files in this folder.

- *run_Ajello_AER16.m* can be executed with 3 different options:
  - *run_Ajello_AER16(0)* runs a calibrated version of the model (at the posterior mode)
  - *run_Ajello_AER16(1)* maximizes the posterior and searches for the posterior mode for a given initial condition.
  - *run_Ajello_AER16(2)* performs the MCMC exploration of the posterior (possibly starting from or close to the posterior mode).
- *Ajello_AER16.mod* is the Dynare mod file that contains the model equilibrium conditions, the parameter priors and the options to perform Bayesian estimation. The file includes comments that can guide you to modify the model and include **flexible wages**, **liquidity and risk shocks** and **constant household member shares** (versions of the model discussed either in the manuscript or in the online appendix).
- *MYDATA_baseline.mat* collects the observables used for the estimation of the baseline model. You can substitute this file with alternative datasets included in the **Appendix_Additional_Data_Code** folder to perform robustness checks described in online appendix K.
- the three files *Ajello_AER16_steadystate.m*, *SS_Ajello_AER16.m*, and *obj_dummy.m* are needed to compute the steady state equilibrium of the economy and are called by Dynare.
- additional files are produced and stored by Dynare when computing the model solution and are not necessary to run the *mod* file.
- the subfolder **misc** contains modified Dynare code that performs the variance decomposition at business cycle frequencies (6 to 32 quarters, *th_autocovariances.m*), and appends a prior on the volatility of the financing gap share to the model posterior (see file *endogenous_prior.m*).

Once you have estimated the model and performed the MCMC exploration of the posterior function, Dynare will produce two files, among others:

- *Ajello_AER16_results.mat* that stores the summary results of the MCMC exploration of the model posterior (saved in folder **Model_Solution_Estimation**)
- *Ajello_AER16_posterior_draws1.mat* that contains a subsample of 1000 posterior draws, used to analyze the distribution of model statistics (saved in folder **Model_Solution_Estimation\Ajello_AER16\metropolis**)

I am supplying *results* and *posterior_draws1* files that can replicate results in the paper. These files are named *Ajello_AER16_results_master.mat* and *Ajello_AER16_posterior_draws1_master.mat* and are called to display tables 1 to 4 and figures 1 to 12 in the paper. As expected, your replication results may vary slightly from those published due to the intrinsic randomness of the Metropolis-Hasting algorithm.

3) Ajello_AER16_Figures_Tables

You will need a copy of Matlab (or Octave) and a free release of Dynare to execute the files in this folder.

This folder contains subfolders named after the figure or table they are intended to reproduce and format:

- **Figure 1**, **Figure 2**, **Figure_4_5**, **Figure_6_7_8_9**, and **Figure_10_11_12**
- **Table1**, **Table2**, **Table3**, and **Table4** Each folder contains a Matlab *m* file that loads results and produces figures (saved in pdf format) and tables (saved in txt or tex format, or displayed on the Matlab prompt in the case of table 2). Please refer to the detailed comments within the *m* files for additional information.

Note that the code *figure4_5.m* also produces and saves the impulse responses to all shocks, shown in the online appendix.

Note that the code *figure6_7_8_9.m* relies on impulse response functions computed under model variants (sticky/flex prices and wages, constant investment technologies). You can compute these results by running the *mod* files included in subfolder **Ajello_Dynare_flexpw** (once in the subfolder, type *run_Ajello_AER16_flexpw(0)*) and **Ajello_Dynare_constA** (once in the subfolder, type *run_Ajello_AER16_constA(0)*). The baseline posterior mode is hard-coded in the calibration section of the *mod* files.

Finally, note that the file *pre_sample.mat* in the **Table3** folder contains the historical pre-sample time series of the macro observables (spanning 1954:Q4 - 1988:Q4).

4) Ajello_AER16_Data_Code_Online_Appendix

You will need a copy of Matlab (or Octave) and a free release of Dynare to execute the files in this folder.

This folder contains the following subfolders:

- **Alternative_Datasets_Estimation**, used for online appendix K
    - Estimate the model using *MYDATA_EBP.mat* to substitute Gilchrist and Zakrajsek's EBP to the Moody's Baa spread used in the baseline;
    - Estimate the model using *MYDATA_FGS_EXDIV.mat* to substitute the financing gap share excluding dividends (FGS_EXDIV) to the financing gap share (FGS).
- **Appendix_F_ZLB_experiment** contains code to solve and simulate the model economy under the ZLB, as described in online appendix F. You will need a copy of OccBin, a toolbox to solve models in Dynare with occasionally binding constraints (see Guerrieri and Iacoviello (2015) in references for more details). Execute file *run_Ajello_OccBin.m* in Matlab to produce figure 18 in the online appendix.
- **Figure31** reproduces figure 31 in the online appendix (model-implied TFP growth dynamics in comparison with Fernald estimates).
- **Model_Constant_HHMemberShares** provides the *mod* and steady-state files to solve the economy with constant household members (as in appendix I).
- **Model_Quadratic_Distribution** provides the *mod* and steady-state files to solve the economy under a quadratic approximation of the investment technology distribution F(A_{i,t}).

The folder also contains an Excel spreadsheet *Appendix_Ajello_AER16.xlsx* with data to reproduce online appendix material: table 5 and figures 28 (CAPX in Compustat and Flow of Funds), table 6 (data and model-implied stock market statistics), figures 30 (Spreads of different maturities) and 31 (Fernald's non-utilization-adjusted TFP growth series).