

Data sets and programs used to run the models

This readme file contains an overview of the folders with the data sets and programs used to run the models. Table 1 describes the folders and main files. The programs are written in MATLAB, and data is stored as binary MATLAB files (MAT-files). In the spirit of Dynare, the model is implemented in a style close to the formal description. In particular, the function *abm.m* implements the model in vector notation with variable names and equations that match the symbols and equations from the formal description in the Online Appendix A. Thus, the Online Appendix with the full description of the model also documents the implementation.

To run a basic simulation with the model in MATLAB:

- go to the folder *./model_scaled/* in MATLAB
- run the command *[nominal_gdp,real_gdp]=simulate_abm(year,quarter,seed,perdictors)*, for example, *[nominal_gdp,real_gdp]=simulate_abm(2010,4,1,0)* simulates the ABM from 2010:Q4 with seed 1 for the random number generator and returns twelve quarters ahead out-of-sample forecasts for nominal and real GDP.

Table 1: Folders and files

Folder	Description
<i>./ar/</i>	Contains scripts and functions for Monte Carlo simulation of autoregressive models (AR) used as a benchmark. The scripts <i>run_ar.m</i> and <i>run_arx.m</i> run the simulations and save the AR forecasts in <i>./data/ar/</i> and <i>./data/arx/</i> respectively.
<i>./calibration/</i>	Contains scripts and functions to calibrate model parameters. <i>set_parameters_and_initial_conditions.m</i> calibrates parameters and initial conditions to 40 different reference quarters from the first quarter of 2010 to the third quarter of 2019 and saves the respective files in <i>./model/parameters</i> and <i>./model/initial_conditions</i> .
<i>./data/</i>	Contains simulation results from all models as well as time series from Eurostat stored as binary MATLAB files (MAT-files) for calibration, estimation, and validation of the models.
<i>./dsge/</i>	Contains the Dynare <i>.mod</i> files as well as scripts and functions of the DSGE model used as a benchmark. The script <i>create_data_file.m</i> creates the data file for Dynare. The scripts <i>import_dsge.m</i> and <i>import_dsgex.m</i> save DSGE forecasts to <i>./data/dsge/</i> and <i>./data/dsgex/</i> respectively. The script <i>create_error_tables.m</i> creates the error tables for the Appendix on the DSGE model.
<i>./dsge_shadow_rate/</i>	Contains the Dynare <i>.mod</i> files as well as scripts and functions of the DSGE model estimated on the Wu-Xia shadow rate. The folder has the same structure as the folder above.
<i>./eurostat/</i>	Contains Eurostat data tables downloaded from the bulk download facility used in the calibration, estimation, and validation of the models.
<i>./figs/</i>	Contains scripts and functions to create the figures of the manuscript.
<i>./model/</i>	Contains scripts and functions of the ABM. The function <i>abm.m</i> implements the model close to the formal description. The functions <i>simulate_abm.m</i> and <i>simulate_abm_mc.m</i> run individual and Monte Carlo simulations of the ABM respectively. The script <i>run_abm.m</i> runs Monte Carlo simulations for the 40 reference quarters from 2010:Q1 to 2019:Q4. The scripts <i>import_abm.m</i> and <i>import_abmx.m</i> saves ABM forecasts to <i>./data/abm/</i> and <i>./data/abmx/</i> respectively. Due to the long runtime of this version of the ABM, high-performance computing resources are required to run Monte Carlo simulations.
<i>./model_scaled/</i>	Contains scripts and functions of a scaled version of the ABM (1:1000). This version has a much-reduced runtime and can be used to run basic simulations. The folder has the same structure as the folder above.
<i>./tabs/</i>	Contains scripts and functions to create the tables of the manuscript. The script <i>create_error_tables.m</i> creates the error tables and <i>create_parameter_tables.m</i> the tables with parameters and initial conditions of the manuscript.
<i>./vsc/</i>	Contains the C source code (generated with the MATLAB Coder), compiled program, and simulation results from the Vienna Scientific Cluster (VSC). The compiled program to run the ABM is <i>simulate_abm [year quarter seed perdictors]</i> (requires the shared libraries libmat and libmx from the MATLAB Runtime). For example, <i>simulate_abm 2010 4 1 0</i> simulates the ABM out-of-sample from 2010:Q4 with seed 1 for the random number generator and returns the file <i>0_2010Q4_1.mat</i> . The script <i>combine.m</i> combines the Monte Carlo simulations from each reference quarter and saves the forecasts in the folder <i>./model/</i> .