

Short description of model database accommodating models with adaptive learning (AL)

Sergey Slobodyan, Volha Audzei, Martin Kuncel

This version of the Macroeconomic Model Data Base is kept as close as possible to the standard version. The current version works under DYNARE 4 (tested under DYNARE 4.2.5).

In this version the models are grouped logically, as indicated in the header of the `MMB.m` file. Compared to the standard version a sixth group of models with AL has been added. The procedure of adding models under AL to the database now differs slightly from the procedure for models in the standard version as described in Appendix A of Wieland, Cwik, Mueller, Schmidt and Wolters (2012): the AL model's identifier needs to be added to the vector `modelbase.names_full` among the other AL models. If not grouped to the AL models, the functionality of the database remains exactly the same as in the standard version.

Before simulation of an AL model, the user is presented with two additional menus. The first menu allows selecting the value of constant *gain*, a number between 0.0 and 0.05. The *gain* parameter measures how fast agents' beliefs change in response to forecasting errors, with *gain*=0 meaning that the beliefs stay fixed. If the user selects *gain*=0 and *All (MSV set)* in the second menu, the model under RE and AL should deliver identical IRFs, conditional on the parameters having exactly the same value in the two versions of the model. Any user adding an AL model to the database is advised to make sure that the corresponding RE counterpart is also present and has parameters calibrated at the same values. Setting *gain*=0 and selecting *All (MSV set)* provides the most straightforward consistency check for an AL model.

In the second menu, the user can choose an arbitrary subset of right-hand side variables that is used by the agents to forecast forward-looking variables. Selecting a set which is a strict subset of *MSV set* leads to the model's transmission mechanism being different from the RE one. The presence of these two menus allows the user to get an idea regarding relative importance of information used by the agents to forecast the forward-looking variables vs. the speed of belief adjustment. It is likely that selecting a set which differs significantly from the *MSV set* will result in dramatically different IRFs.

It is possible to compute ACFs and print unconditional variances of the variables for models under AL. However, the user should take into account that under AL it is, in general, impossible to perform these derivations analytically. Therefore, the version of the model database is using simulations (10 sets of length 500) to generate the data that is then used to produce second order moment statistics. Extensive simulation of US_SW07 (Smets and Wouters 07) vs. US_SW12 (Slobodyan and Wouters 2012) models has shown that even with *gain*=0 and *MSV set* theoretical second moments tend to differ from the simulated ones: typically, under RE unconditional variances and ACFs are higher. It is possible to achieve near equality, especially for ACFs, if one uses very long simulation (10,000-50,000), but selecting this value would be impractical for most users of the database.

Currently, the model database includes 3 models under AL:

1. US_SW12 (Slobodyan and Wouters 2012), with parameters calibrated at the same values as in US_SW07 (Smets and Wouters 07)
2. US_M07 (Milani 2007). No RE counterpart as yet.

3. US_YR13 (Rychalovska 2013) and its RE counterpart. This is a model, as yet published as CERGE-EI Working Paper 482, which incorporates financial frictions into a US_SW12 type of model.

For 2013 it is envisaged to make sure that at least 20% of the models in the Macro Model Data Base have an AL counterpart, plus a software tool, standalone or part of the model database code, which will assist users in selecting the *MSV set* which currently needs to be specified in the corresponding `.mod` file. The choice is, regrettably, not trivial in medium-scale models of SW type (but immediate in small models such as Milani 07).