Getting started

Start by solving the AG model:

1. Unzip the program package that contains the AG model codes (AGcodes.zip). Go through the set-up using the package's introductory guide.
2. Run the program in MATLAB, and save the resulting workspace in .mat format.

To simulate effects of exogenous adjustments of the structural balance

1. Start by unzipping the package (Exogenous_adjustment.zip).
2. Check the initial set-up section (and the sub programs therein) in the main program file Rulessimulator_exogenousprogram.m. In particular, you should choose the program in terms of the adjustment of the structural balance.
   a. AG_initvals.m mainly includes parameter and initial values for the applied specification of the AG model and the identification of the structural shocks. In particular, pay attention to the initial (**quarterly**) values of the endogenous vars in the AG model that are assigned in this program.
   b. Rules_initvals.m mainly includes parameter and initial values for the fiscal rule simulator.
   c. DATA.xls. Calibrate here the exogenously assigned, **annual** paths of macroeconomic variables in the benchmark no-policy-change scenario. These paths are used to generate the counterfactual by adjusting them with the differences between the model-based counterfactual and the model-based no-policy-change benchmark. Remember to calibrate sufficient amount of periods for each exogenous variables (>= the forecast horizon in the model).
   d. Before starting the simulations, you may also want to check the specification of the used output gap model (at the beginning of the solveprogramshocks_BP_OGreg.m) and the Phillips curve (row 244 in the Rulessimulator_exogenousprogram.m)
3. You may then initiate the simulation by running the program Rulessimulator_exogenousprogram.m
4. The program automatically shows graphs of the key macroeconomic variables. The data is collected to **datacube_CI**. The corresponding data labels can be found in the rows 258-283 of the program Rulessimulator_exogenousprogram.m.

An important part of the exercise is the calibration of the model-based no-policy-change benchmark. The delivered programs include the package Nopolicychange.zip that may be used to calibrate the benchmark.

1. The package has to be unzipped to the same folder with the contents of the Exogenous_adjustment.zip (while maintaining the links to the AG codes and workspace).
2. Assign different values for the revenue-to-GDP ratio and the GDP shocks (also the initial values of the AG model in the AG_initvals), and test the qualities of the no-policy-change benchmark by running the code nopolicychange.m.
3. When you have found a reasonable benchmark, copy the revenue-to-GDP ratio and the GDP shock paths to the AG_initvals to be used as a part of the main exercise.

The software can be used to analyze compliancy of fiscal shocks with the EU's minimum fiscal targets

1. The Rulessimulator.zip package needs to be unzipped to the same folder with the contents of the Exogenous_adjustment.zip (while maintaining the links to the AG codes and workspace).
2. In this case, use the programs AG_initvals_EFS.m and Rules_initvals_EFS.m to calibrate the initial values. The main difference to the earlier programs is that the Rules_initvals_EFS program includes additional parameterization regarding the fiscal rules. The program includes descriptions of these parameters.
3. The rules are defined at two places within the code:
    a. xbenchmark in Rows 38-39 of the Mainsimulator_EFS.m defines the minimum adjustment that is sufficient to reach 1. at least the MTO at the end of the program 2. the minimum adjustment speed in terms of changes in the structural balance.
    b. Loopf_EFS defines additional rules in the form of tests in rows 260-. They are later used to discard infeasible adjustment programs in Mainsimulator_EFS.m.
4. To operate the simulator, run the Mainsimulator_EFS.m program.
5. The output is saved to the program directory / Results.xlsx. The output variable labels can be found in the result file.
6. In order to generate confidence intervals for the variables of the adjustment program, collect the adjustment of the structural balance from the file Results.xlsx, and insert it as an exogenous variable to the program Rulessimulator_exogenousprogram.m.

Rulessimulator library (finding the minimum adjustment)

Mainsimulator_EFS collects initial values and results of the simulations with the varying rates of adjustment.

Loopf_EFS solves the macroeconomic and fiscal variables for programs that lasts tau periods.

Structural budget adjustment (x) that lasts tau years.

Note: **Mainsimulator_EFS** has already selected the feasible interval of x.

At least 0.5 pps per year until the MTO is reached, unless exceptional circumstances.

Discard program

Debttest tests compliance with the 60 %/GDP debt rule.
Deftest tests whether there is more than 3 years from achieving the 3 % nominal deficit to GDP ratio.

DR_test tests the debt convergence rule (**Loopf_EFS** -> **Mainsimulator_EFS**)

Mainsimulator_EFS collects the results from the simulation. It adjusts the length of the program, and eventually picks the minimum program.

Debt ratio below 60 % and the program has lasted no longer than 3 years from achieving the 3 % nominal deficit, or from the beginning of the program.

Accept program

Debt ratio above 60 % and the program has lasted no longer than 3 years from achieving the 3 % nominal deficit.

Debt reduction benchmark is fulfilled.

Accept program

Discard program

Discard program

Check if the flexibility guidance applies (in the no policy change benchmark)

Flexibility program

Yes: adjust x accordingly in the preventive arm (the 3 % nominal deficit achieved)

No: do not adjust x

Use the simulator model to solve the macroeconomic and fiscal variables.

Huom. Solve_BPsvar estimates Blanchardin and Perotti (2002) structural policy shocks.

solveprogramshocks_BP_OGreg calculates structural shocks so that the program meets the preconditions: 1. structural balance adjusts at x, 2. the ratio of revenue and expenditure measures is fixed, 3. expectations regarding SB adjustment are unbiased, and 4. structural GDP shocks follow (Yexog) variable.

Interest correction program calculates how the interest expenditures change during the program and adjusts the fiscal measures accordingly.

Programsolver_BP2002_RULEsims program and **Nopolicychange toolbox** can be used to calibrate and solve the endogenous variables along the no policy change benchmark path.

Programsolver_BP2002_RULEsims_endoTRAT2 endogenizes the Tratexog variable to match the given ratio of revenue and expenditure measures
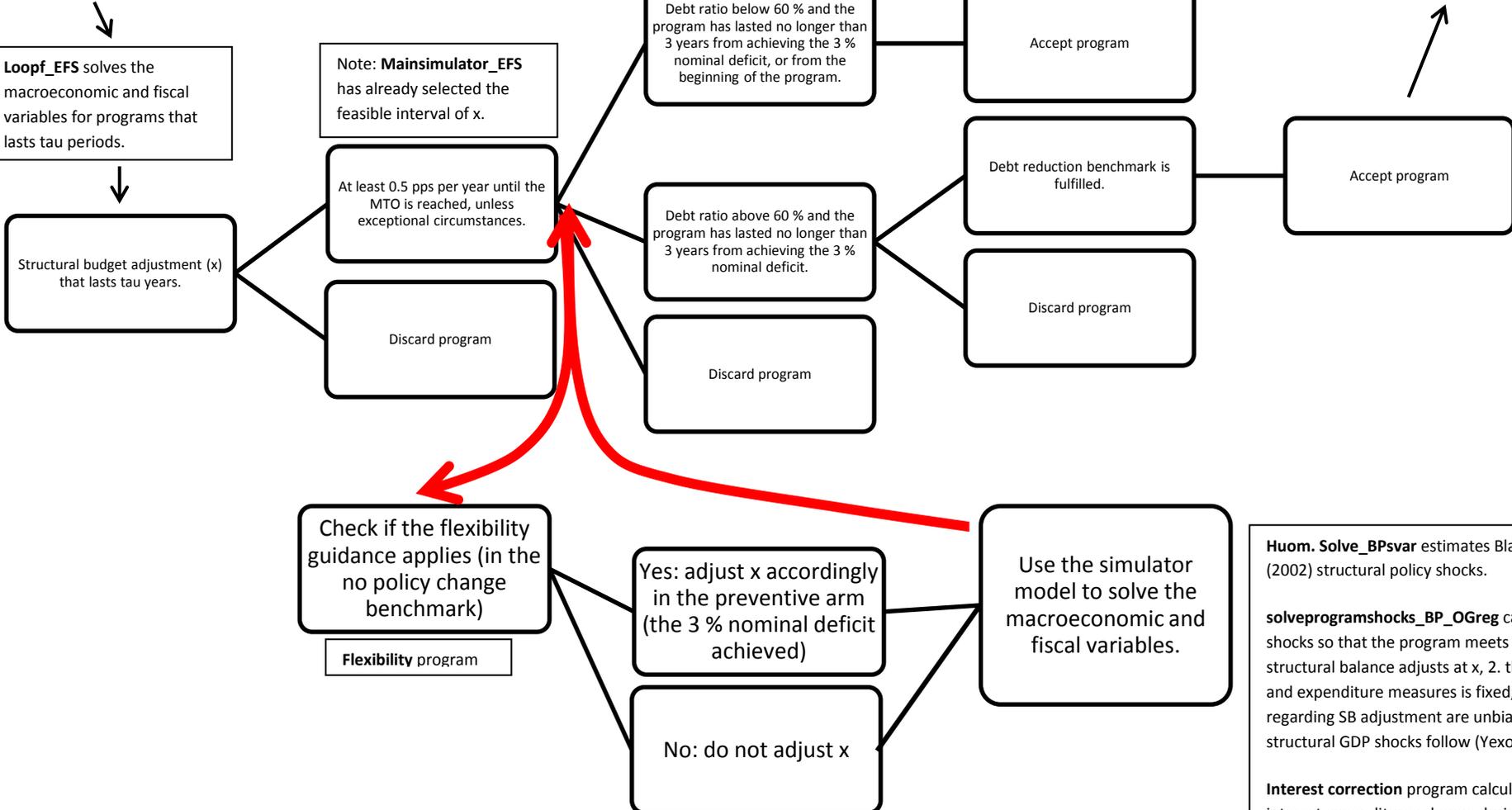
Code packages:

1. **AGcodes.zip: A separate package that solves the underlying Auerbach Gorodnichenko model. The package includes user instructions. The unzipped package's folder should be linked to the simulator model both in AG_initvals.m or AG_initvals_EFS.m.**
2. **Exogenous_adjustment.zip. The package can be used to report paths of macroeconomic and fiscal variables for a given adjustment path of structural balance.**
3. **Nopolicychange.zip. This package is used to calibrate the no policy change scenario. The package should be used together with package 2.**
4. **Rulessimulator.zip. This package solves the minimum fiscal adjustment. The package should be used together with package 2.**