

Dynare Add On Readme for *Decomposing Risk in Dynamic Stochastic General Equilibrium*

by Hong Lan[†] and Alexander Meyer-Gohde[§]

1 Overview

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This is a quick guide for the add-on for Dynare (see www.dynare.org) in MATLAB to implement our theoretical moments of nonlinear moving average perturbation solution and their decomposition. Tested with Dynare 4.2.4, 4.2.5, 4.3.0, 4.3.1, and 4.3.2, MATLAB 7.9.0 and 7.14.0, and Nonlinear_MA 1.0.7 and Nonlinear_MA 1.0.8.

2 Setup

Add the directory containing the unzipped files to your MATLAB path. Note our nonlinear moving average perturbation solution programs, i.e., Nonlinear_MA, need to be in your MATLAB path as well.

3 Usage

You can now call our set of theoretical moments programs directly from your .mod files by placing

```
[MA_]=nonlinear_MA_mom(M_,MA_,oo_,options_,var_list_);
```

after a call to Dynare's stochastic simulation algorithm and our nonlinear moving average perturbation solution algorithm. E.g.,

```
stoch_simul(order = 3);
```

```
[MA_]=nonlinear_MA(M_,oo_,options_);
```

```
[MA_]=nonlinear_MA_mom(M_,MA_,oo_,options_,var_list_);
```

[†]Humboldt-Universität zu Berlin, Institut für Wirtschaftstheorie II, Spandauer Straße 1, 10178 Berlin, Germany;
Email: lanhong@cms.hu-berlin.de

[§]Humboldt-Universität zu Berlin, Institut für Wirtschaftstheorie II, Spandauer Straße 1, 10178 Berlin, Germany;
Tel.: +49-30-2093 5720; Fax: +49-30-2093 5696; E-Mail: alexander.meyer-gohde@wiwi.hu-berlin.de

would have Dynare produce a third-order approximation, calculating IRFs out 40 periods and have our nonlinear moving average perturbation solution algorithm produce a third-order approximation with our alternative policy function. Our theoretical moments programs would then compute the theoretical moments of our third-order approximation. In general, our programs ‘adapt’ to the options you send to Dynare. So, for example

```
stoch_simul(irf=0, order = 2, periods=100, drop=0);
[MA_]=nonlinear_MA(M_,oo_,options_);
[MA_]=nonlinear_MA_mom(M_,MA_,oo_,options_,var_list_);
```

would first produce a second-order approximation, no impulses, and a 100 period simulation with no initial periods discarded, both from Dynare and under our alternative infinite moving average policy function, then produce the theoretical moments of our second-order approximation.

Should you want to override defaults taken from Dynare or if you would like to print the complete variance decomposition (default is not to), create a structure array (named, e.g., myoptions) in MATLAB and pass it to our programs as follows

```
[MA_]=nonlinear_MA_mom(M_,MA_,oo_,options_,var_list_,myoptions);
```

You can change any default option by adding a field to the structure array with the name of the option (see next section) and setting it equal to the desired value.

If you only want the theoretical moments of a subset of variables, you place the variables after `stoch_simul` as usual in Dynare

```
stoch_simul(order = 3) c y;
[MA_]=nonlinear_MA(M_,oo_,options_);
[MA_]=nonlinear_MA_mom(M_,MA_,oo_,options_,var_list_);
```

Accordingly, if you also want to change any default options and compute theoretical moments only for the subset of variables as indicated to Dynare, then

```
stoch_simul(order = 3) c y;
[MA_]=nonlinear_MA(M_,oo_,options_);
[MA_]=nonlinear_MA_mom(M_,MA_,oo_,options_,var_list_,myoptions);
```

4 Options

Here the set of options are listed. The symbol `***` is the user-defined name of the structure array passed to `nonlinear_MA_mom` as a sixth argument (`myoptions` was the example name used in the previous section).

- `***.nlma_mean_decomp` takes on the value 1 (decompose the mean of our third order approximation) or 0 (don't decompose the mean). Default is 1.
- `***.nlma_var_decomp` takes on the value 1 (decompose the variance of our third order approximation) or 0 (don't decompose the variance). Default is 1.
- `***.nlma_complete_var_decomp` takes on the value 1 (print the complete decomposition of the variance of our third order approximation) or 0 (don't print the complete decomposition of the variance). Default is 0.

Note that the options listed above apply only if the order of approximation is set to 3 in Dynare's `stoch_simul` command, as we only decompose theoretical moments of third order approximation. Otherwise `nonlinear_MA_mom` only computes theoretical moments and all the options regarding decomposition would be ignored.

5 Example

Placing

```
stoch_simul(irf=100, order = 3, periods=200, drop=50);
my_nonlinear_MA_options.plot_simulations=0;
my_nonlinear_MA_options.shock_scale=-10;
my_nonlinear_MA_options.plot_irf=0;
my_nonlinear_MA_options.nlma_mean_decomp=0;
my_nonlinear_MA_options.nlma_complete_var_decomp=1;
[MA_]=nonlinear_MA(M_,oo_,options_,my_nonlinear_MA_options);
[MA_]=nonlinear_MA_mom(M_,MA_,oo_,options_,var_list_,my_nonlinear_MA_options);
```

at the end of your `.mod` file, our nonlinear moving average solution programs will

- not plot the simulation (200 periods long) that it calculates;
- will calculate impulse responses to negative 10 standard deviation shocks,
- but will not plot these impulses.

and our theoretical moments programs will

- produce theoretical moments of our third-order approximation,
- but will not decompose the mean of our third-order approximation;
- will decompose the variance of our third-order approximation,
- and will print the complete decomposition of the variance.