Help for JBendge 1.0 beta

Viktor Winschel
University of Mannheim

Markus Krätzig
Universität zu Berlin

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1 Specify Model

1.1 Model Class

The general form of the JBendge model is

$$
\begin{aligned}
0 &= f(s, x, z) \\
z &= Eh(s, x, e, s', x') \\
s' &= g(s, x, e) \\
y &= m(s, x) + \epsilon
\end{aligned}
$$

where s are the states, x the policy variables, y the measurement variables, e the random state shocks, ϵ the measurement shocks, f the first order conditions, h the expectation functions and g the state transitions. The measurement function m is part of the state space system g^* and m^* implied by

the model solution $x^*(s)$.

$$s' = g(s, x^*(s), e) = g^*(s, e)$$
$$y = m(s, x^*(s)) + \epsilon = m^*(s)) + \epsilon$$

Primes denote the next period variables. By now we can handle only models with one lead.

1.2 Example Model

The model is written into the "Type Equation" panel which you can see by choosing the "Specify $\rightarrow$ Specify Model" menu. There you can give in all functions separated by ";".
The first order conditions have to be given without an equal ("=") symbol, for example the Euler equation f of the standard growth model is

```
C^(theta * (1 - tau) - 1) *
(1 - L)^((1 - theta) * (1 - tau)) - beta * Z;
```

The expectation variable Z is defined by the equation h

```
Z = C_f^(theta * (1 - tau) - 1) *
(1 - L_f)^((1 - theta) * (1 - tau)) *
(1 - delta + alpha * e^A_f * (K_f / L_f)^(alpha - 1));
```

where C is a policy variable for which we have a closed form solution from the intratemporal trade off between labor L and consumption C. This is given as a definition denoted by ":="

```
C := theta / (1 - theta) * (1 - L) *
(1 - alpha) * e^A * (K / L)^alpha;
```

Definition expressions are substituted before any calculation is done. Another one is given by

```
C_f := theta / (1 - theta) * (1 - L_f) *
(1 - alpha) * e^A_f * (K_f / L_f)^alpha;
```

Forward definitions will be added automatically in 1.0 . Here you also can new see how to mark future variables: you have to add a _f. Another definition in this model is the production function

```
YDEF := e^A * K^alpha * L^(1 - alpha);
```

The state transitions g are given by

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```
A_f = rho * A + E_s;
K_f = e^A * K^alpha * L^(1 - alpha) - C + (1 - delta) * K;
```

The measurement equations are given by

```
Y = YDEF + M_y;
LAB = L + M_l;
INVEST = YDEF - C + M_i;
```

Finally there is a Euler error defined by

```
R1 = 1 - (beta * Z / (1 - L)^((1 - theta) * (1 - tau))) ^
(1 / (theta * (1 - tau) - 1)) / C;
```

In general you can give in your model with any symbols, beside some predefined one, like $e^x = \exp(x)$, or pi or Pi. A more complete list will be given in the help system of JBendge.) In general you have to mark the symbols accordingly in the "Configure Functions" and "Configure Symbols" panel in the "Specify → Specify Model" menu.   new

However, we have implemented a heuristic based on the following scheme to automatically detect your model unambiguously.

1.3   Symbol Classification

The building blocks of JBendge models are:

- parameters

- variables : state, forward state, state shock, expectation, policy, forward policy, measurement, measurement shock, defined, error

- functions : first order condition, state transition, expectation, measurement, error, definition

If you stick to the following scheme all your symbols will be recognized correctly:

1. parameters start with lower-case letters   abc

2. variables start with upper-case letters   ABC

3. definitions are marked by ":=" → defined variable   :=

4. first order conditions have no "="   no=

5. error variables start with "R" → error function   R

6. expected variables start with "Z" → expectation function   Z

7. measurement shocks start with "M" → measurement function   M

8. state shocks start with "E"   E

9. state equations are the ones not yet classified → state variables are on the left hand side

10. variables ending with _f are state and policy variables   _f

By that convention all parameters, variables and functions can be classified automatically and you do not need to do it in the "Configure Functions" and "Configure Symbols" panels.

2 Contact

The JBendge website is at
http://jbendge.sourceforge.net/

The website to subscribe to the JBendge-news mailing list is at
https://lists.sourceforge.net/lists/listinfo/jbendge-news

The Jbendge-news mailing list itself is
JBendge-news@lists.sourceforge.net

Bug report, support and features request and public forums are at
http://sourceforge.net/projects/jbendge

Further software from the JStatCom family is at
http://www.jstatcom.com/
http://www.jmulti.de/

The authors email addresses and websites are

Viktor Winschel
winschel@rumms.uni-mannheim.de
http://webrum.uni-mannheim.de/vwl/winschel/

Markus Krätzig
mk@mk-home.de
http://www.mk-home.de/