Instructions for code accompanying
"Sales and Monetary Policy"

Bernardo Guimaraes and Kevin D. Sheedy
London School of Economics

19th January 2010

Prerequisites

This code is written for use with *MATLAB*. It makes use of routines from McCallum's toolkit for solving rational expectations models. The toolkit is freely available for download from `www.tepper.cmu.edu/faculty-research/faculty-directory/bennett-mccallum/matlab-files-for-re-calculations/index.aspx`. The path to the directory in which the McCallum toolkit files are placed should be set in the file `solvedyn.m`.

The solution method and equations are explained in the appendix of the paper. Equation numbers refer to those in the appendix of the paper.

Contents

Main code

- `salesimpresp.m` — calculates the impulse response functions of output and prices to a monetary policy shock (the equations of the log-linearized model are given in appendices A and G)

- `salespricepath.m` — generates a random sample of individual price paths (the distribution from which these paths are drawn is characterized using the results of Lemma 4 in appendix E)

- `matchtargets.m` — finds parameter values matching the calibration targets

Subroutines

- `solvess.m` — finds the steady state values of μ, χ, s, and $\bar{s}$ as a function of the parameters ϵ, η, λ, and σ, following the steps given in the first part of appendix A.
- `solvedyn.m` — finds the rational expectations equilibrium of the log-linearized dynamic model, returning the reduced form, a VAR process (the equations in the case of the one-sector model are in the second part of appendix A, for the two-sector model the equations are given in appendix G)
- `equilaux.m` — calculates ψ [equation A.10a], x [equation A.7], Δ [equation A.8], and δ [equation A.10b]
- `findmu.m` — solves for the markup ratio μ [the solution of $\mathfrak{R}(\mu; \epsilon, \eta) = 0$, see equation A.1]
- `findchi.m` — solves for the quantity ratio χ [equation A.4]
- `finds.m` — solves for the sale frequency s [equation A.5]
- `zroot.m` — calculates the root $\mathfrak{z}(\mu; \epsilon, \eta)$ of a quadratic equation [see equation A.3]
- `resultant.m` — computes the determinant of the resultant matrix $\mathfrak{R}(\mu; \epsilon, \eta)$ [equation A.1]
- `critfunc.m` — criterion function calculating the distance of the model's predictions from the calibration targets

Replication

The code is set up so that all cases considered in the paper are nested and can be analysed using the same routines:

1. Standard model without sales : Special case of two-sector model with size of sale sector equal to 0% of economy ($\sigma = 0$)
2. One-sector model with sales : Special case of two-sector model with size of sale sector equal to 100% of economy ($\sigma = 1$)
3. Two-sector model with sales : General case ($0 < \sigma < 1$)

The numerical results in the paper can be replicated as follows:

- Table 1: Call `matchtargets.m` with the calibration targets from the table, setting $\bar{s} = s$ to restrict attention to the one-sector model of sales.

- Figure 5: Call `salesimpresp.m` with parameters from Tables 1 and 2, setting $\sigma = 1$ to restrict attention to the one-sector model of sales. This generates the impulse responses in the sales model. The responses in the standard model can be obtained by calling `salesimpresp.m` with $\sigma = 0$ (i.e. a sale sector with zero size)

- Figure 6: These graphs are obtained in two steps. First, for every combination of μ, χ, s and α considered, call `matchtargets.m` to obtain the matching parameters (setting $\bar{s} = s$ to work with a pure one-sector model). Second, call `salesimpresp.m` twice, with $\sigma = 1$ to get the output response in the (one-sector) sales model, and with $\sigma = 0$ to get the response in the standard model without sales. Cumulate the output responses for the two models and take the ratio.

- Figure 7: Call `salespricepath.m` with parameters from Tables 1 and 2, setting $\sigma = 1$ (one-sector model). The program generates a random sample of price paths from among all firms in the economy (all conditional on one realization of a sequence of aggregate shocks). Figure 7 is one realization of such a price path.

- Table 3: Call `matchtargets.m` with the calibration targets from the table.

- Figure 8: Call `salesimpresp.m` with parameters from Tables 2 and 3. This produces the impulse responses in the (two-sector) sales model. The impulse responses in the standard model are obtained by calling `salesimpresp.m` with $\sigma = 0$.