

The zipped folder contains the Fortran 95 programs that solve the limited stock market participation model described in Section 3 of the main text. The Fortran programs includes comments that explain the purpose of each variable and maps the fortran variables into the names used in the text.

Please read the following explanation carefully to be able to use these programs.

- Each program works and converges with the current parameterization. There is no guarantee that either one will work if you change the parameter values in the program significantly from their current values. In particular, do not try to change the dampening factors in the iterations to speed up the code; they are there for a reason.
- The codes were compiled with Absoft V10.1 for Mac OS compiler with optimization switches turned on (-o3, auto parallel). On a Mac Pro Workstation with an 8-Core 3.2Ghz Xeon Processor it takes about 9 hours 15 minutes for the CONS model and 13 hours and 35 minutes for the GHH model.
- MAIN\_CONS.f90: This program solves the baseline CONS model. It is composed of a main program and 7 modules separated according to their functions (in reverse order in the code):
  - I. MainEQ: Main program: The first 350 lines of this module initialize variables and functions to some plausible starting values. This module also saves a copy of all essential functions on the hard disk after every iteration in the EQB loop. So, if the program needs to be stopped for some reason, it could be restarted from that iteration and the program would read the saved function values from the hard disk. The first part of this program contains different options about how to restart the program after it has stopped. This program also does the major updating of equilibrium functions.
  - II. Module: BellmanALL: contains three subroutines that solve the Bellman equation for a representative agent (BellmanRA), for a stockholder (BellmanHABS), and a non-stockholder (BellmanHABN).
  - III. Module: Mbondsolver: contains two subroutines that solve the bond market clearing problem (for a given stock pricing function), and returns market clearing bond pricing function.
  - IV. Module: MaximHAB: contains three subroutines that solve the maximization step (portfolio choice) of the Bellman equation solver in (II) for a representative agent (maximRA), a stockholder (maximEVS), and a non-stockholder (maximEZN).
  - V. Module: My\_firmHAB: contains subroutines that are needed to solve the firm's dynamic investment choice problem, and to update the stock pricing function.

- VI. Module: My\_procsHAB: contains a large number of subroutines and functions that are used repeatedly in different parts of the program (such as for spline construction, I/O functions, etc.)
- VII. Module: MyparamsHAB: This is the data module where all GLOBAL variables are defined and many of them are initialized.
- VIII. Module: Nrtype: contains definitions of variables and kind variables from Numerical recipes.
- The program for the model with endogenous labor supply (MAIN\_LABSUP.f90) has the same basic structure as above. The main difference is that now there is a new equilibrium function (LABSUP) which gives the total labor supply in the economy is state (K, B, Z). This function is also updated (slowly!) in MainHAB when the utility function is Cobb-Douglas. Since we are updating on one more equilibrium function the updating is slower to prevent a crash. For GHH preferences labor supply only depends on the wage rate so this updating is easier and more robust. The output files also include separate labor supply decisions for each group as well as aggregate labor supply.
  - The output files of this program are in two categories:
    - a. The files that end with \*\_TMP.dat are the output files that is written over after every iteration to the EQB loop (ie., the main loop in which all equilibrium functions are updated in each iteration). These files are useful for checking if the program appears to produce plausible looking value functions, decision rules, etc. along the way. The dimensions of all the files written to the disk (e.g., equilibrium functions and decision rules) can be found by checking the subroutines “myecho\_3” and “myecho\_4” within the main program inside the module “my\_procsHAB”.
    - b. For each file ending with \*\_TMP, there is a corresponding one with the same file name without the TMP at the end. These are the final files (value functions, decision rules, stock and bond pricing functions, and laws of motion for K and B) that should be used for simulating the model, by drawing a sequence of random draws from an AR(1) process.

(08/04/2009)