Replication Instructions for "An Equilibrium Analysis of the Long-Term Care Insurance Market" by Ami Ko.

Data Availability Statement

RAND HRS data (Health and Retirement Study, 1998-2010) were downloaded from https://hrsdata.isr.umich.edu/data-products/rand on September 4, 2015. The downloaded files were RAND HRS Longitudinal File, RAND HRS Family Data, and RAND HRS CAMS Data. The data and codes underlying this research are available in Zenodo at http://doi.org/10.5281/zenodo.5507610.

Computational Requirements

All analysis underlying this research was done using an 18-core Intel- and Windows-based desktop with 128 GB of memory.

Stata (version 15.1) was used.

- Packages used: estout. To install, type in "ssc install [package name], replace".

Matlab (R2018a) was used.

- Toolboxes used: Global Optimization Toolbox (verion 3.4.4), Optimization Toolbox (version 8.1), Parallel Computing Toolbox (version 6.12).
- The main estimation code (Results/Estimation/MAIN.m) took 18 hours. Computation of standard errors was done using 50 bootstrap samples, and each bootstrap sample takes about 70 minutes to run.
- The main counterfactual code (Results/Counterfactuals/MAIN.m) took 5 hours.

Dataset List

All datasets listed below are constructed from RAND HRS data (Health and Retirement Study, 1998-2010).

Data file	Source	Notes
Data/sample_desc.dta	Health and Retirement Study, 1998-2010	Serves as input for Tables and Figures in Section 2
Results/sample/model_estimation_sample.xls	Health and Retirement Study, 1998-2010	Serves as input for Tables and Figures in Section 4
Results/sample/counterfactual_sample.xls	Health and Retirement Study, 1998-2010	Serves as input for Tables and Figures in Section 5

List of Tables and Figures

The table below lists the Tables and Figures in the manuscript produced by either Stata or Matlab programs. All output files are saved in the same folder where their respective Parent program is saved. Stata log files are saved in .pdf formats. Matlab log files are saved in .out formats; they can be opened by standard text editor (Notepad, MS Word etc.)

Table/Figure #	Parent program	Child program	Output file
Table 1	Data/data_analysis.do	-	log_data_analysis.pdf (lines 22-36)
Table 2	Results/sample/summary_stats.do	-	log_summary_stats.pdf (lines 27-34)
Table 3	Results/sample/summary_stats.do	-	log_summary_stats.pdf (lines 40-43)
Table 4	Results/sample/health_transition.m	-	table4.tex
Table 5	Results/Estimation/MAIN.m	Results/Estimation/bootstrap/MAIN.m	log_table5.out
Table 6	Results/Estimation/MAIN.m	Results/Estimation/model_fit/evaluate_model_fit.m	log_table6.out
Table 7	Results/Counterfactuals/MAIN.m	Results/Counterfactuals/selection_analysis_MAIN.m	log_table7.out
Table 8	Results/Counterfactuals/MAIN.m	Results/Counterfactuals/risk_adjustment_display_results.m	log_table8.out
Table 9	Results/Counterfactuals/MAIN.m	Results/Counterfactuals/risk_adjustment_interpolate_sim_data.m	log_table9_1.out, log_table9_2.out
Figure 1	Data/data_analysis.do	-	log_data_analysis.pdf (lines 58, 68)
Figure 3	Results/Estimation/MAIN.m	Results/Estimation/model_fit/evaluate_model_fit.m	figure3.eps
Figure 4	Results/Counterfactuals/MAIN.m	Results/Counterfactuals/selection_analysis_MAIN.m	figure4.eps

Description of Programs

This document explains how to replicate the results in "An Equilibrium Analysis of the Long-Term Care Insurance Market" published in the *Review of Economic Studies*. There are two main folders, **`Data`** and **`Results`**. The folder **`Data`** contains STATA codes that produce the descriptive results reported in Section 2. The folder **`Results`** contains Matlab codes that produce the estimation and counterfactual results reported in Sections 4 and 5.

1. Files/Folders in the **`Data`** folder

   I use RAND HRS (Health and Retirement Study, 1998-2010) data which should be downloaded by the user from https://hrs.isr.umich.edu/.

   `create.sample.do` cleans the raw RAND HRS data and constructs **`sample_desc.dta`**.

   `data_analysis.do` uses the **`sample_desc.dta`** and produces the descriptive results reported in Table 1 and Figure 1.

2. Files/Folders in the **`Results`** folder

There are three subfolders named **sample**, **Estimation**, and **Counterfactuals**.

1) **sample** contains datasets constructed from the RAND HRS data which are used for estimation and counterfactual analysis. It also contains a STATA code named **summary_stats.do** which produces the summary statistics of the estimation sample reported in Tables 2 and 3. It contains a Matlab program named **health_transition.m** which produces summary statistics of the health transition probabilities reported in Table 4.

2) **Estimation** contains Matlab codes that estimate the intergenerational model. The main program in the folder is **Estimation/MAIN.m**. Running this Matlab script will produce the CCP estimation results reported in Table 5. It will also produce the model fit results reported in Figure 3 and Table 6. This main program calls functions contained in the following subfolders, listed in the order of use.

   - **0_primitives** contains codes that prepare the HRS sample for estimation.
   - **first_stage** contains codes that execute the first stage of the CCP estimation.
   - **second_stage** contains the following subfolders that execute the second stage of the CCP estimation.
     - **second_stage/PMLE/1_V_ftn** contains codes that estimate value functions by forward simulation.
     - **second_stage/PMLE/2_v_ftn** contains codes that construct choice-specific value functions.
     - **second_stage/PMLE/3_PMLE** contains codes that estimate the parameters by pseudo maximum likelihood estimation.
   - **bootstrap** contains codes that compute standard errors via the bootstrap.
   - **model_fit** contains codes that produce the model fit results reported in Figure 3 and Table 6.

3) **Counterfactuals** contains Matlab codes that conduct counterfactual experiments. The main program in the folder is **Counterfactuals/MAIN.m**. Running this Matlab script will produce counterfactual results reported in Tables 7, 8, and 9 and Figure 4.

References

Health and Retirement Study, 1998-2010, Public Survey Data, http://hrsonline.isr.umich.edu/.