Replication Package for

Reforming China's Public Pension System: Fiscal Sustainability and the Challenge of Formality-Based Inequality

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September 2025

A Layout

The replication has a main directory, containing two main folders to run the experiment and generate the figures and tables in the main text and appendix.

- `.../Plots` contains data and files written in Matlab to generate plots of the data and results in the paper;
- `.../Model` contains files written in Fortran 90 for simulation of the quantitative model to generate the associated figures and tables.

The files listed in this document in the format `XX` are the directories contained in the replication folder.

Section B gives a description of the directories in the `.../Plots` folder. Section C gives a description of the directories in the `.../Model` folder.

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B Data and Figures

Full description of the data sources can be found in the associated *Online Appendix*.

- `.../Plots/Data`

  Contains data and scripts to reproduce Figures 1/2/3/4/14 in main text of the paper and Figures A1 in the online appendix.

  To reproduce Figure X, run script `Figure_X.m`.

- `.../Plots/Model/Aggregate`

  Contains data and scripts to reproduce the plots impacts of the reforms on fiscal budget and household behavior, which includes the following files:

  - `.../Plot_Agg_Bench.m` produces Figures 5/6/7/8/9/12on impacts under the benchmark model;
  - `.../Plot_Agg_by_fert.m` produces panels of Figures 15 on impacts under alternative fertility projection variants;
  - `.../Plot_Agg_by_tr.m` produces panels of Figures 17 on impacts under alternative assumptions of intergenerational transfers;
  - `.../Plot_Agg_by_longrun.m` produces panels of Figures 19 on impacts under alternative trends of long-run wage growth and internal returns of pension accounts;
  - `.../Plot_Agg_by_pref.m` produces panels of Figures 21 on impacts under alternative assumptions of preference parameters.

- `.../Plots/Model/Welfare`

  Contains data and scripts to reproduce the plots on welfare impacts of the reforms, which includes the following files:

- `.../Plot_CEV_Bench.m` produces Figures 10 and panels of Figures 11 on welfare impacts under the benchmark model;
- `.../Plot_CEV_by_refy.m` produces panels of Figures 13 on welfare impacts under alternative reference years;
- `.../Plot_CEV_by_fert.m` produces panels of Figures 16 on welfare impacts under alternative fertility projection variants;
- `.../Plot_CEV_by_tr.m` produces panels of Figures 18 on welfare impacts under alternative assumptions of intergenerational transfers;
- `.../Plot_CEV_by_longrun.m` produces panels of Figures 20 on welfare impacts under alternative trends of long-run wage growth and internal returns of pension accounts;
- `.../Plot_CEV_by_pref.m` produces panels of Figures 22 on welfare impacts under alternative assumptions of preference parameters.

C Quantitative Model

C.1 Directories

- `.../Model/model_bm` contains files for the benchmark case: with intergenerational monetary transfers, mid-variant population projection, long-run wage growth 2%, equal internal returns to the social-pooling and individual pension accounts, discount factor $\beta = 0.96$, and risk aversion $\sigma = 4$;
- `.../Model/model_lf` contains files for the case where the low-variant of population projection is used, corresponding to Section 6.2 in the paper;
- `.../Model/model_notr` contains files for the case where intergenerational monetary transfers are shut down, corresponding to Section 6.3 in the paper;

- `.../Model/model_alt` contains files for the case where formal workers make higher intergenerational transfers to their parents, corresponding to Section 6.3 in the paper;
- `.../Model/model_w1` contains files for the case where long-run wage growth is 1.5%, corresponding to Section 6.4 in the paper;
- `.../Model/model_w2` contains files for the case where long-run wage growth is 2.5%, corresponding to Section 6.4 in the paper;
- `.../Model/model_r1` contains files for the case where internal return to individual account is 20% higher than that of the social-pooling account, corresponding to Section 6.4 in the paper;
- `.../Model/model_r2` contains files for the case where internal return to individual account is 20% lower than that of the social-pooling account, corresponding to Section 6.4 in the paper;
- `.../Model/model_RA2` contains files for the case where risk aversion parameter $\sigma = 2$, corresponding to Section 6.5 in the paper;
- `.../Model/model_RA8` contains files for the case where risk aversion parameter $\sigma = 8$, corresponding to Section 6.5 in the paper;
- `.../Model/model_d92` contains files for the case where discount factor parameter $\beta = 0.92$, corresponding to Section 6.5 in the paper;
- `.../Model/model_d100` contains files for the case where discount factor parameter $\beta = 1.0$, corresponding to Section 6.5 in the paper.

C.2 Files in the folder

- the files are the same across each directory, which include

- `.../main.f90` is the main file where user can switch cases to run different policy scenarios. The cases are detailed in Section C.3.
- `.../mod_load_case.f90` loads corresponding policy parameters once the user sets `pol_case` in `.../main.f90`.
- `.../mod_parameters.f90` summarizes model parameters.
- `.../mod_globvar.f90` summarizes the global variable used in the solution and simulation of the model.
- `.../mod_funcs.f90` stores functions used for the solution and simulation of the model.
- `.../mod_initialize.f90` sets up the environment for solution of the model.
- `.../mod_bellman.f90` computes the Bellman equation.
- `.../mod_solution.f90` solves the life cycle decision problem by backward induction.
- `.../mod_projection.f90` simulates the economy as multiple cohorts given demographic, macro, and policy trends.
- `.../mod_simulation.f90` simulates life cyle of a given cohort.
- `.../mod_tools.f90` stores extra subroutines used in the program.

C.3 Simulation cases

Users can choose from several policy environment by defining `pol_case` variable.

- `pol_case = "Pre2024Reform  "` simulates the economy under the policy before the 2024 reform.
- `pol_case = "2024Reform     "` simulates the economy under the policy announced in 2024 September.

- `pol_case = "Rm_Wage_Idx     "` simulates the economy where pension benefits are indexed to CPI only and no other accompanying policy is adopted.

- `pol_case = "Rm_Wage_Idx_LS "` simulates the economy where pension benefits are indexed to CPI only and the government balances the budget using lump-sum transfers.

- `pol_case = "Rm_Wage_Idx_Tax"` simulates the economy where pension benefits are indexed to CPI only and the government balances the budget by changing contribution rates.

- `pol_case = "Exp_Inf         "` simulates the economy where resident pension is raised and no other accompanying policy is adopted.

- `pol_case = "Exp_Inf_LS      "` simulates the economy where resident pension is raised and government balances budget using lump-sum transfers.

- `pol_case = "Exp_Inf_Tax     "` simulates the economy where the resident pension is raised and the government balances the budget by changing contribution rates.

- `pol_case = "CTax            "` simulates the economy where the payroll pension contribution is replaced with the consumption tax and no other accompanying policy is adopted.

- `pol_case = "CTax_LS         "` simulates the economy where the payroll pension contribution is replaced by the consumption tax and the government balances budget using lump-sum transfers.