README and Guidance for
The Effect of Wealth on Worker Productivity

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Abstract

The code in this replication package constructs all analysis and generate the data for the all figures, tables and statistics in the paper. Each subfolder of the replication package corresponds to a subsection of the paper and should be run independently. It is highly suggested to run codes for each section in a parallel way on a server as explained in the document.

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Data Availability and Provenance Statements

☒ This paper does not involve analysis of external data (i.e., no data are used or the only data are generated by the authors via simulation in their code).

Computational requirements

Software Requirements

- Matlab (code was run with Matlab Release 2018b)

- Portions of the code use bash scripting, which may require Linux.

Controlled Randomness

- Monte Carlo simulations use random numbers, always provided by pseudo-random number generators (`rand`). For reproducibility, the results of those simulations are all saved in `Replication Package/01 SteadyState/Arch Sim`.

Memory and Runtime Requirements

Summary Approximate time needed to reproduce the analyses on a standard (CURRENT YEAR) desktop machine:

☐ <10 minutes
☐ 10-60 minutes
☐ 1-2 hours
☐ 2-8 hours
☐ 8-24 hours
☐ 1-3 days
☐ 3-14 days
☐ > 14 days
☒ Not feasible to run on a desktop machine, as described below.

Details Portions of the code were last run on a **cluster, consuming 12,000 core-hours**.

Description of programs/code

- Programs in `Replication Package/01 SteadyState`: they generate, figures, statistics and tables in section 4.1 and 4.2. Figures are saved

in `Replication Package/01 SteadyState/ResultsSS`. `SS_master.m` runs all the analysis in order. Subfolder `Replication Package/01 SteadyState/Arch Sim` contains the results (`.mat`) from last Monte Carlo simulation.

- Programs in `Replication Package/ 02 UI_steadystate`: they generate, figures, statistics and tables in section 4.3, 4.4 and 4.5. Figures are saved in `Replication Package/ 02 UI_steadystate/Results1`. First `AMB_01` to `AMB_35` need to be run on a server simultaneously (bash scripts are provided), then copy the results (`.mat` files) in the current folder and run `UI_master.m`.

- Programs in `Replication Package/ 03 DividendTax`: they generate, figures in the first half of Appendix D. Figures are saved in `Replication Package/ 03 DividendTax/Results1`. First `AMB_01` to `AMB_31` need to be run on a server simultaneously (bash scripts are provided), then copy the results (`.mat` files) in the current folder and run `DW_01_comp.m`.

- Programs in `Replication Package/04 PropDividend`: they generate, figures in the second half of Appendix D. Figures are saved in `Replication Package/04 PropDividend/Results1`. First `AMB_01` to `AMB_31` need to be run on a server simultaneously (bash scripts are provided), then copy the results (`.mat` files) in the current folder and run `PD_01_comp.m`.

- Programs in `Replication Package/05 EndogCapital`: they generate, figures in Appendix E. Figures are saved in `Replication Package/05 EndogCapital/Results1`. First `AMB_01` to `AMB_31` need to be run on a server simultaneously (bash scripts are provided), then copy the results (`.mat` files) in the current folder and run `Cap_01_comp.m`.

- Programs in `Replication Package/06 ChangeProd`: they generate, figures in Appendix F. Figures are saved in `Replication Package/06 ChangeProd`. `prod_master.m` runs all the analysis in order.

- Programs in `Replication Package/07 SeverancePay`: they generate, figures in the first half of Online Appendix. Figures are saved in `Replication Package/07 SeverancePay/Results1`. First `SAMB_01` to `SAMB_23` need to be run on a server simultaneously (bash scripts are provided), then copy the results (`.mat` files) in the current folder and run `SP_01_comp.m`.

- Programs in `Replication Package/07 SeverancePay`: they generate, figures in the first half of Online Appendix. Figures are saved in `Replication Package/07 SeverancePay/Results1`. First `SAMB_01` to `SAMB_23` need to be run on a server simultaneously (bash scripts are provided), then copy the results (`.mat` files) in the current folder and run `SP_01_comp.m`.

- Programs in `Replication Package/08 BPSP`: they generate, figures in the second half of Online Appendix. Figures are saved in `Replication Package/08 BPSP/Results1`. To run this, first copy `Agg_DB_32.mat` and `AggRWE_DB32` from `Replication Package/ 02 UI_steadystate` and `Agg_SP_32.mat` from `Replication Package/07 SeverancePay` to `Replication Package/08 BPSP` and then run `PBSP.m`.

Instructions to Replicators

This replication package consists of 8 subfolders (explained above). Each of these subfolders create figures, statistics or tables in different sections of the paper. Subfolders 02, 03, 04, 05 and 07 requires a cluster to run `.m` files in a simultaneous way. Once those `.m` files are run on the server, results (`.mat` files) should be copied to the each subfolder. Next, there is a master file (as explained above), within each subfolder taking care of the rest and produce results. Below are some details regarding running the codes:

Details

- Note that the set of `.m` files within each subfolder is specific to that folder and designed for the relevant analysis in the paper.

- `.m` files in subfolders 02, 03, 04, 05 and 07 need to be run on a cluster. Subfolder 02 contains 35 `.m` files, subfolders 03, 04, 05 each contains `.m` files and subfolder 07 contains 23 `.m` files.

- Within each of these subfolders, there are two bash scripts which can be used as a guide on how we ran them on a cluster.

  [-] The first bash script, `submit-template.sge`, contains the specification of nodes required, approximate run time, memory required, the path of programme to be called, where to save the results, etc. This script might need to be written differently depending on which cluster or server is being used.

  [-] The second script, `submit-all.sge` is a loop which allows for simultaneous submission of all scripts within each subfolder. This script calls `submit-template.sge` and run it for each of `.m` files within each subfolder.

- Subfolder 01, only requires running the `SS_master.m` file and it will take care of the rest. It can be run on a laptop or desktop computer and approximately requires 24 hours. To speed up, one could copy `NAMB01_85.mat` from `Replication Package/ 02 UI_steadystate` to `Replication Package/01 SteadyState` and run the `SS_master.m` from line 15 onward.

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- Subfolder 06, only requires running `prod_master.m`. This may though take almost a week or more, if a laptop or desktop computer is used. Alternatively, to speed up, one could run `LAMB_18.m` and `HAMB_18.m` simultaneously on a server and then copy `LNAMB01_85.mat` and `LNAMB01_85.mat` to this subfolder and run `prod_master.m` from line 17 onward. To run `LAMB_18.m` and `HAMB_18.m` on a server, we have provided a bash script, `submit-noloop.sge` as an example in this folder. This script might need to be written differently depending on which cluster or server is being used.

- Subfolder 08, only builds on the results which are already produced in subfolders 02 and 07. First, copy `Agg_DB_32.mat` and `AggRWE_DB32` from `Replication Package/ 02 UI_steadystate` and `Agg_SP_32.mat` from `Replication Package/07 SeverancePay` to `Replication Package/08 BPSP` and then run `PBSP.m`.

List of tables and programs

The provided code reproduces:

☒ All numbers provided in text in the paper
☒ All tables and figures in the paper
☐ Selected tables and figures in the paper, as explained and justified below.

Figure/Table #	Program	Line Number	Output file	Note
Fig 1a, 1b, 2a, 2b, 2c, 3b	`Replication Package/01 SteadyState/SS_01_BenFig.m`	8-110	`.eps` saved in `01.../.../ResultsSS`	
Fig 3a, Table 2	`Replication Package/01 SteadyState/SS_03_MCSim.m`	244-290	`.eps` saved in `02.../.../ResultsSS`	Table is printed in 38h command window
Fig 5a	`Replication Package/01 SteadyState/SS_04_TSsim.m`	201-223	`.eps` saved in `02.../.../ResultsSS`	
Fig 5b	`Replication Package/01 SteadyState/SS_04_CSsim.m`	230-237	`.eps` saved in `02.../.../ResultsSS`	
Fig 6a, 6c, 7a, 7b, 7c, 8a, 8b	`Replication Package/02 UI_steadystate UI_01_comp.m`	733-839	`.eps` saved in `02.../.../Results1`	

Figure/Table #	Program	Line Number	Output file	Note
Fig 6b	`Replication Package/02 UI_steadystate UI_01_comp.m`	6-28	`.eps` saved in `02.../.../Results1`	
Fig 8c, 9a, 9b, 10a, 10b, 10c, table 3, 11a, 11b	`Replication Package/02 UI_steadystate UI_03_welfare.m`	241-373	`.eps` saved in `02.../.../Results1`	Table is printed in teh command window
Fig D1a, D1b, D2a, D2b, D2c	`/Replication Package/03 DividendTax/DW_01_comp.m`	781-845	`.eps` saved in `03.../.../Results1`	
Fig D3a, D3b, D4a, D4b, D4c	`/Replication Package/04 PropDividend/PD_01_comp.m`	781-845	`.eps` saved in `04.../.../Results1`	
Fig E1a, E1b, E2a, E2b, E2c	`/Replication Package/05 EndogCapital/Cap_01_comp.m`	781-845	`.eps` saved in `05.../.../Results1`	
Fig F1a, F1b, F1c	`/Replication Package/06 ChangeProd/prod_master.m`	22-75	`.eps` saved in `06.../.../Results1`	
Online Appendix Fig 1a, 1b, 1c	`/Replication Package/07 SeverancePay/prod_master.m`	551-601	`.eps` saved in `07.../.../Results1`	
Online Appendix Fig 2a, 2b, 3a, 3b, 3c	`/Replication Package/08 BPSP/PBSB.m`	272-350	`.eps` saved in `08.../.../Results1`	