

Replication File Readme for

“Consumer Credit with Over-Optimistic Borrowers”

(Exler, Livshits, MacGee, Tertilt)

This file documents how to replicate the tables and figures in the paper. Replication can be achieved via “one button solution,” see [Replication Steps](#). Outputs are either simulated (i.e. numerical outcomes from quantitative model) or empirical (i.e. estimates from SCF data).

The replication is confirmed to run on a standard desktop machine. Details on hardware and software are provided in [Hardware and Software Requirements](#).

The folder structure and all (sub)routines are explained in [Folder Structure and List of Outputs](#). That section also lists the outputs created by each subroutine.

Each numerical experiment is identified with a unique experiment ID in the input file and all output files, see [List of Experiments](#).

The numerical model solution features three-year periods but all measures reported in the paper are converted into annual values during postprocessing, see [Conversion](#).

Replication Steps

1. Extract replication files.
2. Execute Matlab code *runELMT.m*.
3. All output saved to */output*.

Hardware and Software Requirements

The replication is demonstrated to work on a computer with Windows 10, Matlab R2023a, Stata 15. We provide compiled Fortran executables so that users do not have to compile Fortran codes. If users still want to compile the Fortran codes again, we recommend the Intel Fortran Compilers included in the Intel HPC Toolkit. Expected runtimes are:

Desktop Machine: approx. 150 mins
(4 cores@3.4GHz, 8GB RAM, 256GB SSD)

Computational Cluster: approx. 25 mins
(28 cores@2.4GHz, 128GB RAM, 500GB SSD)

Data Availability

The data is publicly available from the SCF: <https://www.federalreserve.gov/econres/scfindex.htm> and also included in the replication file.

Folder Structure and List of Outputs

The following folders and files are included in the replication file.

Folder / File	Description
<i>/fortrancode</i>	<p>Fortran Code to solve and simulate the model.</p> <ul style="list-style-type: none">• <i>PricingDown.f90</i> is Fortran 90 code file to generate executables to be used in model solution.• <i>PricingRevisedDown.exe</i> is standard executable.• <i>PricingRevisedDown with Dump.exe</i> generates additional outputs <i>DebtDumpGoofy.txt</i>, <i>DebtDumpRealist.txt</i> with all debt holdings in ergodic distribution. Those are needed to calculate cross subsidization and the coefficient of variation of the interest rate. <p>Input: Executable takes <i>inputRevised.txt</i> to specify all parameter inputs as described in <i>inputRevised.info</i> based on three-year periods.</p> <p>Output: Code generates various output files. Outputs needed to replicate paper are in <i>NewOrderPlus.txt</i>. All output files report three-year values and need to be processed, see <i>/postprocessing</i>.</p> <p><i>/fortrancode</i> also contains example input files for benchmark calculation for both non-college and college.</p>
<i>/fullrun</i>	<p>Complete set of experiments with necessary input files that solves benchmark and all counterfactuals used in the paper. Output files are generated in corresponding subfolders, identified by experiment ID and an abbreviated description in the folder name, see List of Experiments. To execute all experiments, run <i>runELMT.m</i>.</p>
<i>/output</i>	<p>All tables and figures are saved here.</p>
<i>/scfdata</i>	<p>Contains SCF 2016 and 2019 data (Main Survey Data STATA from https://www.federalreserve.gov/econres/files/scf2016s.zip https://www.federalreserve.gov/econres/files/scf2019s.zip)</p>
<i>/postprocessing</i>	<p>Includes code files and excel sheets to produce tables and figures in paper. All files use model output in <i>/fullrun</i> or <i>/scfdata</i> and will automatically execute.</p>
<i>/cross_subsidization.m</i>	<p>Calculates and plots distribution of cross-subsidization.</p> <p>Input: <i>/fullrun/50000*_benchmark_dump/DebtDump*.txt</i> and <i>NewOrderPlus.txt</i>.</p> <p>Output: Figure 2 and CV(r) in Table 2.</p>

<i>/policyexperiments.m</i>	Plots results of type score dependent debt-to-income limits. Input: <i>NewOrderPlus.txt</i> from <i>fullrun/65*_score-di*</i> folders. Output: Figure 3 and Figure 4.
<i>/run_experiments.m</i>	Executes all experiments in <i>/fullrun</i> using fortran executable. Input: <i>inputRevised.txt</i> files in <i>/fullrun</i> subfolders. Output: Table 2 and all outputs in <i>/fullrun</i> subfolders, e.g. <i>NewOrderPlus.txt</i> or <i>DebtDump*.txt</i> .
<i>/type_score_distribution.m</i>	Simulates and plots type score distributions. Input: <i>InputDependent.txt</i> from <i>/fullrun/600000_benchmark</i> . Output: Figure 1 and Table A6.
<i>/lifecycleprofiles.m</i>	Calculates and plots life cycle profile of earnings. Input: Hubbard, Skinner, Zeldes (1994): Table A.2 Output: Figure A1.
<i>/findStataExecutable.m</i>	Finds Stata executable for processing <i>unusual_income.do</i> Input: <i>p16i6.dta</i> and <i>p19i6.dta</i> from <i>/scfdata</i> . Output: Table A1.
<i>/tablestemplate.xlsx</i>	Template for excel sheet that transforms model outputs to annual values and generates tables. Final sheet: <i>outputs/tables.xlsx</i> . For details, see <i>readme</i> sheet in that file. Input: several <i>NewOrderPlus.txt</i> from <i>/fullrun</i> automatically collected in <i>output_collect</i> sheet. Output: Tables 3, 4, 5, 6, 7, A2, A3, A4, A5.
<i>/unusual_income.do</i>	Stata file to compute unusual income realizations from SCF. Input: <i>p16i6.dta</i> and <i>p19i6.dta</i> from <i>/scfdata/</i> . Output: Table A1.

List of Experiments

This is the list of experiments included in */fullrun*.

Folder Name	Experiment ID	Experiment Description
600001_benchmark_hs	600001	Calibrated benchmark economy, non-college
600002_benchmark_col	600002	Calibrated benchmark economy, college (non-college vs. college omitted from now on: *)

50000*_benchmark_dump	50000*	Calibrated benchmark economy with additional output files of debt holdings in ergodic distribution
61000*_decomp_onlyreal	61000*	Decomposition: 0% behavioral agents
61001*_decomp_onlygoofy	61001*	Decomposition: 100% behavioral agents
61002*_decomp_educgoofy	61002*	Decomposition: 100% “educated” behavioral agents: worse income risk, rational (correct) expectations
62005*_garnish_50	62005*	Counterfactual: 50% garnishment
63010-_r-borrow_1pp	63010*	Counterfactual: proportional lending cost + 1 percentage point
65XXYY*_score-di_XX_sYY	65XXYY*	Counterfactual: Debt-to-income limit at XX% (three-year values) for type score < 0.YY
27**XX_robust_psiX.X	27**XX	Robustness: benchmark but degree of overoptimism = X.X
28****_robust_lambda_half_**	281115 282207	Robustness: benchmark but halved fraction of behavioral: 15% for non-college, 7% for college
28****_robust_lambda_double_**	281162 282230	Robustness: benchmark but double fraction of behavioral: 62% for non-college, 30% for college
07**20_robust_psi2.0_**-di_33_s100	071120 072220	Robustness: debt-to-income limit at 33% (triannual) for all type scores, degree of overoptimism = 2
08****_robust_lambda_double_**-di_33_s100	081162 082230	Robustness: debt-to-income limit at 33% (triannual) for all type scores, double fraction of behavioral agents
17**20_robust_psi2.0_**-di_33_s65	171120 172220	Robustness: debt-to-income limit at 33% (triannual) for type scores < 0.65, degree of overoptimism = 2
18****_robust_lambda_double_**-di_33_s100	181162 182230	Robustness: debt-to-income limit at 33% (triannual) for type scores < 0.65, double fraction of behavioral agents
37**20_robust_psi2.0_**-1pp	371120 372220	Robustness: proportional lending cost + 1 percentage point, degree of overoptimism = 2
38****_robust_lambda_double_**-1pp	381162 382230	Robustness: proportional lending cost + 1 percentage point, double fraction of behavioral agents

47**20_robust_psi2.0_**_ garnish50	471120 472220	Robustness: 50% garnishment, degree of overoptimism = 2
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48****_robust_lambda double_hs_garnish50	481162 482230	Robustness: 50% garnishment, double fraction of behavioral agents
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Conversion

Annual and three-year values are represented by x_1 and x_3 , respectively.

- Debt-to-earnings: $x_1 = x_3 * 3$
- Filings: $x_1 = x_3 / 3$
- Interest Rates $x_1 = (1+x_3)^{(1/3)} - 1$
- Total Borrowers $x_1 = x_3$
- Filing too late $x_1 = x_3 / 3$
- Overborrowing as fraction of outstanding debt: $x_1 = x_3 / \text{total debt (three years)}$