Heterogeneity in labor mobility and unemployment flows across countries – "Read me" document for replication

Jonathan Créchet[*]

March 2023

[*]Department of Economics, University of Ottawa; jcrechet@uottawa.ca.

This "ReadMe.pdf" document describes the replication files and the steps for replication. The parent folder has the following subfolders: "_Results", "Stata", "R", and "Matlab". The folders "Stata" and "R" consist of datasets and programs producing statistics for the model's calibration and quantitative analysis. The folder "Matlab" contains programs for the quantitative analysis of the baseline model presented in section 3 and the full model presented in section 4. These programs' outputs (figures and tables) are saved in the subfolder "_Results".

These programs come with a .dta file "CPS_data.dta" generated using the online web interface associated with the CPS harmonized data files provided by IPUMS CPS (Flood et al. (2022), see https://cps.ipums.org/cps/), with a series of .csv files from OECD.stat (https://stats.oecd.org/#), and the Excel replication file for Elsby, Hobijn, and Şahin (2013) (available from Bart Hobijn's website at https://www.barthobijn.net/ResearchHobijn.html).

The codes has been executed using the following configuration:

OS: Microsoft Windows 11 Pro
Processor: 12th Gen Intel(R) Core(TM) i9-12900HK, 2500 Mhz, 14 Cores, 20 Logical Processors
RAM: 32.0 GB
Local Disk capacity: 1024 GB
Stata/SE 15.1
Matlab R2022b
Matlab toolboxes: Global Optimization, Optimization, Parallel Computing.

The following steps can be followed for replicating the results:

1. **Run Stata programs**

   - Open/Unzip the file with the raw dataset files. Drop the data file "CPS_data.dta" in the subfolder "Stata/Dta". Drop the .csv files contained in the data folder "OECD.stat" and the Excel file "UnemploymentDynamicsInTheOECD.xlsm" in "Stata/Raw_data".

   - Open Stata program file "Stata/0_main.do" and fill in global macro path "mypath", which specifies the path to the folder containing the replication files. Note that this path must be specified in subsequent steps as well.

   - The do file specifies the following macro: "working_dir", "R_directory", "Matlab_directory", and "Results_path". "working_dir": folder where Stata files are located; "R_directory": folder with R files; "Matlab_directory": Matlab files; and

"Results_path", the path to the subfolder "_Results", where figures and tables are saved.

- Run "0_main.do".

- This program executes the do files "1_worker_flows", "2_wages", and "3_cross_country". "1_worker_flows" compute monthly transition probabilities from the CPS dataset "CPS_data.dta" for the sample period September 1995 - December 2018— aggregate and by age, unemployment-duration, and job-tenure groups. The age and u-duration flows are seasonally adjusted and quarterly averaged. The resulting files are exported in .csv format to the folder "R/Data" (CPS_flows, CPS_flows_age, CPS_flows_uduration, CPS_flows_tenure). The Stata program also executes "2_wages.do", which uses CPS IPUMS ORG files to provide an estimate of the log hourly wage variance in the U.S. employed population (age 20-60, 1995-2018). Finally, "3_cross_country": (i) builds a dataset with cross-country statistics used in the model's calibration and quantitative analysis using OECD.stat data, and (ii) produces figure 3 in the main text, using data from Elsby, Hobijn, and Şahin (2013).

2. **Run R programs**

- Requires the following libraries: matlib, zoo.

- Open the R file "_Main.R", specify the string variable "mypath" indicating the path to the location of the replication folder.

- run the R program "_Main.R". This program calls: (i) "aggregate_flows.R" (time-aggregation (Shimer, 2012) correction of transition rates based on an eigen-decomposition of worker-flow transition matrices); (ii) "age_profiles.R" (time-aggregation correction and estimation of age profiles); (iii) "uduration_profiles" (estimation of unemployment-duration profiles); (iv) "tenure_profiles" (estimation of tenure profiles).

- The R programs export the csv files CPS_age_profiles, CPS_udur_profiles, and CPS_tenure_profiles to the folder "Matlab/Data".

- The profiles are estimated by OLS, controlling for quarter*year fixed effects.

- **Please note that when adjusting worker flows by age, the transition matrix eigendecompositions yield either nonreal or negative eigenvalues for ten quarterly date-age combinations (out of 4,325 data points).** These data points are treated as missing in the age-profile OLS estimations.

3. **Run Matlab programs for the baseline model analysis**

   - Requires the toolboxes: Optimization, Parallel computing.

   - Go to folder "Matlab/Baseline_model".

   - Run "Main.m" after specifying the correct directory path.

   - This program computes the steady-state UE and EU flow elasticities in the uniform mobility (UM) and heterogeneous mobility (HM) models presented in section 3. Note that computing the HM elasticities might take a bit of time as this requires calibrating the HM model multiple times (i.e., for 50 values of b in the interval $[0.55, 0.95]$, see main text) using a nonlinear function minimizer ('fmincon').

   - Run "Figures.m" to produce figures 1 and 2 in .eps and .png format (Figure_1 and Figure_2).

   - Close the Matlab session.

   - These programs run in about **40 minutes** on the machine with the configuration described in the above.

4. **Run Matlab programs for the quantitative model analysis**

   - Requires the toolboxes: Global optimization, Parallel computing.

   - Go to folder "Matlab/Full_model". Make sure that the Matlab session from the previous step is ended. Open "Main.m" and fill in the parent directory path. Enter as well the path to the subfolder with Matlab data ("Matlab/Data") where .csv files from the previous steps have been saved.

   - Run the script file "Main.do".

   - The file "Main.do" does the following things/run the following Matlab programs:

     (i) specifies the model's and algorithm's parameters;

     (ii) imports the data produced in the previous steps and produces statistics used in the quantitative analysis;

     (iii) performs the benchmark model equilibrium computation given parameter values presented in section 5.2 (table 1) and produce tables and figures for calibration outcomes (subsection 5.2);

     (iv) runs the elasticity decomposition presented in section 6.1 ("Decomposition.mat");

    (v) computes and calibrates alternative models used for the accounting exercise in section 6.2 ("Alternative_models.mat");

  (vi) performs the accounting exercise ("Accounting.mat");

(vii) conducts the Europe-U.S. secular unemployment change decomposition presented in a supplementary appendix ("Secular_urate.mat").

- The supplementary appendix gives details related to the algorithm used for computing the steady-state equilibrium state-variable distributions.

- The script file "calibration_benchmark.mat" located in the folder "Full_model/Calibration" contains the code that has been used for calibrating the model. Running this code is not required for replicating the quantitative results, as the parameter values from the calibration are already specified in the "SetParameters.mat" file.

- These programs run in about **80 minutes** on the machine with the configuration described in the above.

5. Go to the subfolder "Replication/_files/_Results" and compile the latex files "Results_tables" and "Results_figures".

References

Sarah Flood, Miriam King, Renae Rodgers, Steven Ruggles, J. Robert Warren and Michael Westberry. Integrated Public Use Microdata Series, Current Population Survey: Version 10.0 [dataset]. Minneapolis, MN: IPUMS, 2022. https://doi.org/10.18128/D030.V10.0

Elsby, Michael WL, Bart Hobijn, and Ayşegül Şahin. "Unemployment Dynamics in the OECD." Review of Economics and Statistics 95, no. 2 (2013): 530-548.

Shimer, Robert. "Reassessing the ins and outs of unemployment." Review of Economic Dynamics 15, no. 2 (2012): 127-148.