

A Macroeconomic Approach to Optimal Unemployment Insurance: Applications

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## Description of Data and Programs

This document describes the data and programs used to obtain all the results in the article and online appendices. The data are stored in Excel (version 15.33) workbooks. The programs are executed with Stata (version 14) and Matlab (release R2017a). Excel, Stata, and Matlab are run on macOS Sierra.

### Data

There are three Excel workbooks.

- DATA\_RECRUITER\_PRODUCER\_RATIO.XLSX contains the data used to construct the alternative measures of recruiter-producer ratio. The data are used by CONSTRUCT\_RECRUITER\_PRODUCER\_RATIO.M. The workbook contains five worksheets.
  - CES contains US data from the BLS Current Employment Statistics (CES) survey for 1990--2014.
  - JOLTS contains US data from the BLS Job Openings and Labor Turnover Survey (JOLTS) for 2001--2014.
  - BARNICHON (2010) contains the help-wanted index constructed by Barnichon (2010) for the United States, 1990--2014.
  - CPS contains US data from the BLS Current Population Survey (CPS) for 1990--2014.

- NBER contains US recession dates constructed by the NBER business-cycle dating committee.
- DATA\_REPLACEMENT\_RATE.XLSX contains the data used to construct the effective replacement rate of the UI program in the United States. The data are used by CONSTRUCT\_REPLACEMENT\_RATE.DO. A readme sheet at the beginning of the workbook describes the different sheets and explains the sources of the data.
- STATISTICS.XLSX contains the effective UI replacement rate and the measures of recruiter-producer ratio constructed in the paper. It also contains intermediate statistics, constructed in the process. This workbook contains seven worksheets.
  - EFFECTIVE REPLACEMENT RATE contains the effective UI replacement rate constructed by CONSTRUCT\_REPLACEMENT\_RATE.DO.
  - VACANCIES contains the number of vacancies obtained by rescaling the help-wanted index from Barnichon (2010) using vacancies measured in JOLTS data. This series is constructed by CONSTRUCT\_RECRUITER\_PRODUCER\_RATIO.M.
  - VACANCY-UNEMPLOYMENT RATIO is obtained by dividing the series in VACANCIES by the unemployment level in CPS data. This series is constructed by CONSTRUCT\_RECRUITER\_PRODUCER\_RATIO.M.
  - LABOR MARKET FLOWS contains series for the monthly job-finding rate, monthly job-separation rate, and monthly vacancy-filling rate. Some of the series are constructed from CPS data and others from JOLTS data. These series are constructed by CONSTRUCT\_RECRUITER\_PRODUCER\_RATIO.M.
  - RECRUITER-PRODUCER RATIO contains the four series for the recruiter-producer ratio. These series are constructed by CONSTRUCT\_RECRUITER\_PRODUCER\_RATIO.M.
  - UNEMPLOYMENT RATE reports the unemployment rate from CPS data.
  - TAU-U RATIO is obtained by dividing the synthetic recruiter-producer ratio in RECRUITER-PRODUCER RATIO by the series in UNEMPLOYMENT RATE. This series is constructed by CONSTRUCT\_RECRUITER\_PRODUCER\_RATIO.M.

## Programs

There are several Matlab programs and one Stata program.

- `CONSTRUCT_REPLACEMENT_RATE.DO` constructs the effective replacement rate of the UI program in the United States for 1990--2014. The procedure to construct the effective replacement rate is described in Section II.B and Online Appendix C.
- `FORMAT_FIGURE.M`, `FORMAT_SIMULATION.M`, and `FORMAT_BIG.M` contain code to format the Matlab figures.
- `QUARTER.M` transforms a monthly time series into a quarterly time series.
- `CONSTRUCT_RECRUITER_PRODUCER_RATIO.M` constructs the three alternative measures of recruiter-producer ratio, the synthetic measure of recruiter-producer ratio, as well as intermediate statistics. The procedures to construct the various measures of recruiter-producer ratio and the intermediate statistics are described in Section II.A and Online Appendix B.
- `PLOT_STATISTICS.M` uses the data in `STATISTICS.XLSX` to produce several figures from the article and online appendices:
  - Figure 1: panels A and B
  - Figure 2
  - Figure 3
  - Figure 5
  - Figure 6
  - Figure A1: panels A, B, C, and D
- `SOLVE_FORMULA.M` uses the sufficient statistics in `STATISTICS.XLSX` and the sufficient-statistic formula in the article to solve for the optimal UI replacement rate in the United States over the 1990--2014 period. The formula and procedure to solve it are described in Section IV.B. The results are displayed in Figure 7. The program also performs the sensitivity analysis described in Section IV.C and Online Appendix F. The results of the sensitivity analysis are reported in Figure 8.
- `SIMULATION_UI.M` simulates the job-rationing model of Michaillat (2012) under various UI programs: when UI is given by the exact optimal formula (formula (11)); when UI is

given by the approximate optimal formula (formula (21)); when UI is given by the Baily-Chetty formula; and when UI is constant at a replacement rate of 42%. The simulations allow us to assess the accuracy of the approximate formula (21) and to compute the welfare gains from optimal UI. The simulations are described in Sections IV.D and IV.E and in Online Appendix H. The calibration of the simulation model is described in Online Appendix G. The program produces several figures from the article and online appendices:

- Figure 9
- Figure 10
- Figure A2