# **Using the Updated R Code**

To use the updated R code, there are additional steps because some R packages have changed since the microsimulator was released. Since the R process is for advanced developer and UI users, the additional steps should be familiar to them.

This process has been tested with R versions 4.2.1 and 4.0.5. The process is slightly different for R versions 4.2.x and versions 4.0.x – 4.1.x, because a couple of R packages located in the current default CRAN R repository only work with version 4.2.0 or higher.

1. Choose the version of R you wish to use. If you have not used R before we strongly recommend using the current version at cran.r-project.org (4.2.1 at the time of this writing).
2. Download and install RTools. When the microsimluator was released in 2021 all of the R packages used by the microsimulator were available in the main package repository. However, since that time, two packages have been removed and are only available in the archives. When this occurs, they need to be compiled from their source files (cran.r-project.org/bin/windows/Rtools/). RTools allows the source files to be compiled inside of R.
   1. If running version 4.2.x, use RTools version 4.2.
   2. If running R version 4.0.x or 4.1.x, use RTools version 4.0.
3. R needs a way to find Rtools when it runs. In the \r\_package\_installation folder, you will find a file called .Renviron. This is a plain-text file that sets certain R environment variables when R starts. The path set will allow R to find where Rtools is installed on your computer. Copy the .Renviron file into your main user Documents folder.

Note, if you are already using an .Renviron file in your R setup up but not using Rtools, copy the line from \R\_package\_installation\.Renviron onto a new line in your existing .Renviron file.

1. Download the latest version of RStudio if you are not currently using it. This is technically optional, but RStudio provides a large number of quality of life and usability improvements for R.
2. The microsimulator requires a set of user-installed packages. We have provided scripts to install them in the \r\_package\_installation folder. The scripts will install the packages to your default user-installed package folder. Modify them if you are installing to a different folder.

Run the following script to install the necessary R packages. The script you run depends upon the version of R you are using:

* 1. For R version 4.2.x, run \R\_package\_installation\install\_r\_packages42.R.
  2. For R version 4.0.x – 4.1.x, run \R\_package\_installation\ install\_r\_packages40.R. There are more packages installed from source archives. That is due to some of those packages in the default CRAN repository are not compatible with older versions of R.

1. Step (5) is all you need to do to be able to use the R scripts in the \microsim\_dev\r\_model\_full folder. However, there are additional steps to enable R with the microsimulator UI.
2. Follow the instructions in the user guide for directing the UI to RScript.exe (the default location will look something like C:\Program Files\R\R-4.2.1\bin\RScript.exe). Note, if there is a space in the folder path, surround the entire command in double quotation marks (e.g. “C:\Program Files\R\R-4.2.1\bin\RScript.exe”).
   1. You will need to tell RScript.exe where to look for user-installed packages. In the \R\_package\_installation folder, there is a text file called .RProfile.
   2. Put the .RProfile file in your Documents folder
      1. You will need to modify this file with your user-installed package path. In most cases, this will be simply your user folder (e.g. "C:/Users/<your user name here>").
      2. If you have specified a different user-installed package folder, direct it to that folder instead. You can check the folder with the command:

Rscript.exe -e "Sys.getenv('R\_LIBS\_USER')"

1. A note on missing R packages:
   1. R is a living set of statistical analysis tools that is frequently updated by its user base. That can create issues over time, especially when packages are removed from the CRAN R repository (e.g. “dummies” and “DMwR”) or they are updated and do not work with older versions of R (e.g. randomForest). In these cases, the user will need to note in error logs that a package is not being installed or loaded, and then install the package from its source in the CRAN archive.

For example, the “DMwR” package was removed from the CRAN R repository. However, a version of the package that does work with the microsimulator may be found in its CRAN archive: "https://cran.r-project.org/src/contrib/Archive/DMwR/DMwR\_0.4.1.tar.gz". This file needs to be installed from its source using Rtools and the “cpp” package. The file \R\_package\_installation\install\_r\_packages40.R contains the necessary syntax to install from the source.

Also note that when a source is missing from the repository, it may have other package dependencies. Those will not be automatically installed (packages dependencies are usually installed when the package you want is in the main repository), so you will also need to install the package’s dependencies. In the case of “DMwR”, it requires the packages “xts”, “quantmod”, “abind”, and “ROCR” to be installed first.

# **Programs to update ACS and CPS data**

The folder \data\_update\_code provides the Stata scripts used to update the CPS data for 2017, 2018, and 2020, and the ACS data for 2020. The raw data may be downloaded as plain-text files from their respective websites. Note that the 2017 and 2018 CPS data require a Stata dictionary file, downloaded from NBER. The 2020 data do not require a Stata dictionary file, as they are provided as comma-separated value plain-text files.