README

Overview

This replication package provides datasets and replication code to reproduce the figures and tables in the following article:

> Gross, Daniel P. and James J. Feigenbaum. "Answering the Call of Automation: How the Labor Market Adjusted to the Mechanization of Telephone Operation." Forthcoming at the *Quarterly Journal of Economics*.

The replication files have been prepared to be run with Stata and R. Figures 1-5 and Tables 1-3 and 7-8 are coded in Stata and have been confirmed to execute for Stata version 18. The "_run_all.do" file in the "Code" directory will run all of the code to create these figures and tables. Tables 4-6 are coded in R. The "Table 4, 5, 6.R" file in the "Code" directory will run the code to create these tables, and can be run independently of the Stata code.

Data Availability and Provenance Statements

The information used in this analysis combines data from four main sources. The first is a manually-collected sample of dial cutovers across the continental U.S., which we collected from historical newspaper accounts. The second is a list of dial cutovers in large cities (population 50,000 and over) from AT&T's company's corporate archives. The third is complete count census data from IPUMS USA. The fourth is genealogical data obtained from FamilySearch. Most of the analysis is performed on (i) a linked sample of telephone operators and other women, and (ii) a city x demographic group panel created from the complete count files.

Statement about Rights

- We certify that we have legitimate access to and permission to use the data used in this manuscript.
- We certify that we have documented permission to redistribute/publish the data contained within this replication package.

License for Data

The data are licensed under a Creative Commons/CC-BY license.

Dataset list

The following table provides a list of all datasets included in this replication package (stored within the "Data" directory) and their provenance.

Dataset list

Directory	Filename	Description	Source/derived from
Census Data	1940 Occscores.dta	Custom occupation scores (calculated specifically for women with 1940 wages)	IPUMS USA Complete Count data
Census Data	City Characteristics, 1910.dta	City sample w/ 1910 city characteristics	IPUMS USA Complete Count data
Census Data	City Populations.dta	City panel providing decadal population	IPUMS USA Complete Count data
Census Data	City-Demographic Panel.dta	City x demographic group panel	IPUMS USA Complete Count data
Census Data	Complete Count (1910).dta	IPUMA USA complete count extract, 1910	IPUMS USA Complete Count data
Census Data	Complete Count (1920).dta	IPUMA USA complete count extract, 1920	IPUMS USA Complete Count data
Census Data	Complete Count (1930).dta	IPUMA USA complete count extract, 1930	IPUMS USA Complete Count data
Census Data	Complete Count (1940).dta	IPUMA USA complete count extract, 1940	IPUMS USA Complete Count data
Census Data	Serial-City (1910).dta	Household-city crosswalk, 1910	IPUMS USA Complete Count data
Census Data	Serial-City (1920).dta	Household-city crosswalk, 1920	IPUMS USA Complete Count data
Census Data	Serial-City (1930).dta	Household-city crosswalk, 1930	IPUMS USA Complete Count data
Census Data	Serial-City (1940).dta	Household-city crosswalk, 1940	IPUMS USA Complete Count data
Cutover Data	Dial Telephones in Bell System.xlsx	AT&T annual dial telephone share	AT&T archival records
Cutover Data	Cutovers (from AT&T Records).dta	Dataset of cutovers from AT&T records	AT&T archival records
Cutover Data	Cutovers (from Newspapers).dta	Dataset of cutovers from newspapers	Manual data collection
Geographic Data	Census Regions.dta	Crosswalk of states to census regions	NHGIS 2000 boundary files
Geographic Data	US States Shapefile (coords).dta	State outlines for mapping (coordinates)	NHGIS 2000 boundary files
Geographic Data	US States Shapefile (data).dta	State outlines for mapping (data)	NHGIS 2000 boundary files
Linked Data	Linked Women.csv	Individual-level Linked dataset of telephone operators and control women from 1920-1930 and 1930-1940	IPUMS USA Complete Count data and FamilySearch.org

Computational requirements

Software Requirements

- Stata (code was last run with version 18)
- User-written Stata packages:
  - egenmore
  - estout
  - reghdfe
  - spmap
  - Statastates
- R 4.2.1
- R packages
  - R.utils 2.12.3
  - broom 1.0.5
  - data.table 1.15.0
  - dplyr 1.1.4
  - fixest 0.11.2
  - stringr 1.5.1

Memory and Runtime Requirements

The code was last run on a **4-core Intel-based desktop computer** with **Windows 10** and **64 GB of RAM**. Approximate time needed to reproduce the analyses on this computer was 10 minutes.

Description of programs/code

- Files in the "Code" directory create all the tables and figures in the body of the paper. These files are named according to the tables and figures they produce. Input data is stored in the "Data" directory, and all output gets saved to the "Output" directory, with the filename corresponding to the table or figure produced. The "Table 1.do" and Table 2.do" files output data to the "Output/Descriptive Tables.xlsx" spreadsheet, where there are worksheets that create specially-formatted tables using these data, with worksheet names corresponding to the table produced.
- The "Code" directory has a "modules" subdirectory with do-files which are called by several of the figure- and table-producing do-files, to prepare population and cutover data for use in analysis, set figure graphing options, etc.

- The “Code/_run_all.do” file will execute all do-files. This file also sets global macros which will be invoked in other do-files.
- The “Code/Table 4, 5, 6.R” file will create remaining tables.

License for Code

The code is licensed under a Creative Commons/CC-BY license.

Instructions to Replicators

- Run the “Code/_run_all.do” file to execute all Stata programs.
- Run the “Code/Table 4, 5, 6.R” file to execute all R programs.

List of programs, tables, and figures

The provided code reproduces nearly all selected tables and figures in the paper. A few tables and figures are not reproduced in this replication package, for reasons discussed above (data to be released separately or not authorized to be shared).

Figure/Table	Program	Output file	Note
Figure 1	Figure 1.do	Figure 1.png	Coded in Stata
Figure 2	Figure 2.do	Figure 2.png	Coded in Stata
Figure 3(A)	Figure 3(A), 3(B).do	Figure 3(A).png	Coded in Stata
Figure 3(B)	Figure 3(A), 3(B).do	Figure 3(B).png	Coded in Stata
Figure 4(A)	Figure 4(A), 5(A), 5(B).do	Figure 4(A).png	Coded in Stata
Figure 4(B)	Figure 4(B), 5(C), 5(D).do	Figure 4(B).png	Coded in Stata
Figure 5(A)	Figure 4(A), 5(A), 5(B).do	Figure 5(A).png	Coded in Stata
Figure 5(B)	Figure 4(A), 5(A), 5(B).do	Figure 5(B).png	Coded in Stata
Figure 5(C)	Figure 4(B), 5(C), 5(D).do	Figure 5(C).png	Coded in Stata
Figure 5(D)	Figure 4(B), 5(C), 5(D).do	Figure 5(D).png	Coded in Stata
Table 1	Table 1.do	Figure 1.png	Coded in Stata
Table 2	Table 2.do	Figure 2.png	Coded in Stata
Table 3	Table 3.do	Figure 3.png	Coded in Stata
Table 4(A)	Table 4, 5, 6.R	Table 4(A).tex	Coded in R
Table 4(B)	Table 4, 5, 6.R	Table 4(B).tex	Coded in R
Table 4(C)	Table 4, 5, 6.R	Table 4(C).tex	Coded in R
Table 5(A)	Table 4, 5, 6.R	Table 5(A).tex	Coded in R
Table 5(B)	Table 4, 5, 6.R	Table 5(B).tex	Coded in R
Table 5(C)	Table 4, 5, 6.R	Table 5(C).tex	Coded in R
Table 6(A)	Table 4, 5, 6.R	Table 6(A).tex	Coded in R
Table 6(B)	Table 4, 5, 6.R	Table 6(B).tex	Coded in R
Table 6(C)	Table 4, 5, 6.R	Table 6(C).tex	Coded in R
Table 7(A)	Table 7, 8.do	Table 7(A).tex	Coded in Stata
Table 7(B)	Table 7, 8.do	Table 7(B).tex	Coded in Stata
Table 7(C)	Table 7, 8.do	Table 7(C).tex	Coded in Stata
Table 8(A)	Table 7, 8.do	Table 8(A).tex	Coded in Stata
Table 8(B)	Table 7, 8.do	Table 8(B).tex	Coded in Stata
Table 8(C)	Table 7, 8.do	Table 8(C).tex	Coded in Stata

References

AT&T. 1937. “First Dial Cutover and Per Cent Dial Stations of Total Stations (as of 12-31-37) in Cities of 50,000 Population or Over.” In Freeman (1937), *History of the Development of the Panel Machine Switching System*, available at the AT&T Archives and History Center (Warren, NJ), Box 106-10-02-07.

Manson, Steven, Jonathan Schroeder, David Van Riper, Tracy Kugler, and Steven Ruggles. 2022. IPUMS National Historical Geographic Information System: Version 17.0 [dataset]. Minneapolis, MN. http://doi.org/10.18128/D050.V17.0.

Ruggles, Steven, Sarah Flood, Ronald Goeken, Josiah Grover, Erin Meyer, Jose Pacas, and Matthew Sobek. 2019. IPUMS USA: Version 9.0 [dataset]. Minneapolis, MN https://doi.org/10.18128/D010.V9.0.