

## Template README and Guidance

### Overview

The replication package contains the application used to estimate  $\delta$  and  $\beta$  for Nunn (2007). The results are shown in Table 1 and Figure 2, 3, 4, and 5. The package contains a MATLAB Application, as well as a standalone version that can be run without the use of MATLAB. The replicator should expect the code to run for up to 15 minutes.

### Data Availability and Provenance Statements

The dataset used in the replication package contains a subset of the columns from the dataset used in Nunn (2007). The raw dataset can be found at <https://scholar.harvard.edu/nunn/pages/data-0>.

### Statement about Rights

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

### Summary of Availability

The replication package contains only one dataset. The dataset used for this application is in .xlsx form and contains the following subset of the columns in the original file with renamed column names:

- ln\_xci renamed to y
- Qc renamed to X
- frac\_lib\_diff renamed to Z
- skill1\_times\_at\_hk renamed to control\_1
- capital\_times\_at\_kap renamed to control\_2
- country\_name
- industry\_code
- industry\_description
- benchmark\_country: Added column that indicates which columns belong to the benchmark country (which is the United States in this dataset)

## Computational requirements

### Software Requirements

The MATLAB Application was created using MATLAB 2021b and requires the Global Optimization Toolbox.

The Standalone Application does not require any additional software

### Controlled Randomness

- Random seed is set at line 5 of program “Source Code/estimate\_parameters.m “

### Memory and Runtime Requirements

INSTRUCTIONS: Memory and compute-time requirements may also be relevant or even critical. Some example text follows. It may be useful to break this out by Table/Figure/section of processing. For instance, some estimation routines might run for weeks, but data prep and creating figures might only take a few minutes.

### Summary

Approximate time needed to reproduce the analyses on a standard 2021 desktop machine <30 minutes.

### Details

The code was last run on a 4-core Intel-based laptop with Windows 10 version 19043.1110.

## Description of programs/code

The replication package contains three folders:

- **1 matlab application:** This folder contains the MATLAB Application and the necessary data from Nunn (2007) to replicate Figure 2-5. The requirement for this application is the “Global Optimization Toolbox”
- **2 standalone application:** This folder contains a standalone application that does not require the MATLAB Software and the necessary data from Nunn (2007) .
- **3 source code:** This folder contains the source code that was used to create the applications. By running “estimation\_app.mlapp” in the directory “/3 replication package/3 source code” the application can be replicated. To run the application the other files submitted in the directory need to be present.

- **4 table 1 matlab replication script:** This folder contains matlab scripts to replicate the values found in Table 1.

## Instructions to Replicators

### Installing the Interaction Estimation Application

**1 matlab application:** This folder contains the MATLAB Application and the necessary data from Nunn (2007).

The requirement for this application is the “Global Optimization Toolbox”.

To run application, follow these steps:

1. Install the application by opening the “Interaction Estimation Application” file in Matlab.
2. The app should then appear in the “Apps” Tab. Run the application by selecting “Interaction Estimation Application”.
3. After opening the application, a new window opens. In the “Specifications” section you can select whether to use controls in the estimation of the parameters, as well as choosing custom values for ( $\tau$ ) if desired.
4. After selecting the specifications, click run and the figures will be populated within 10 minutes.

**2 standalone application:** This folder contains a standalone application that does not require the MATLAB Software and the necessary data from Nunn (2007) .

To run the application, follow these steps:

1. Open the application MyAppInstaller\_web.exe.
2. In the second step choose the installation folder to be in “./3 replication package/2 standalone application”
3. In the next step use the default path for the MATLAB runtime installer if prompted.
4. Complete the installation.
5. After completing the installation, navigate to “./3 replication package/2 standalone application/application” and open “InteractionEstimationApplication.exe”.

6. After opening the application, a new window opens. In the “Specifications” section you can select whether to use controls in the estimation of the parameters, as well as choosing custom values for ( $\tau$ ) if desired.
7. After selecting the specifications, click run and the figures will be populated within 15 minutes.

## Replicating the Figures

**Table 1** can be replicated by running the MATLAB script “table\_1\_cov\_matrix\_identification.m” in folder “4 table 1 matlab replication script”. The results found in Table 1 are displayed in the command window. The approximate runtime is less than 5 minutes.

**Figure 1** is a theoretical figure, as such no replication materials were provided

**Figure 2** can be replicated by running the Interaction Estimation Application (either by using the standalone application or the matlab installer, see above)

- without checking the box to use controls
- without checking the box for custom values of Tau

The figure in the paper appears in the first box on the left-hand side. The approximate runtime is less than 15 minutes.

**Figure 3** can be replicated by running the Interaction Estimation Application (either by using the standalone application or the matlab installer, see above)

- without checking the box to use controls
- without checking the box for custom values of Tau

The figure in the paper appears in the second box on the right-hand side. The approximate runtime is less than 15 minutes.

**Figure 4** can be replicated by running the Interaction Estimation Application (either by using the standalone application or the matlab installer, see above)

- checking the box to use controls

- without checking the box for custom values of Tau

The figure in the paper appears in the first box on the left-hand side. The approximate runtime is less than 15 minutes.

**Figure 5** can be replicated by running the Interaction Estimation Application (either by using the standalone application or the matlab installer, see above)

- checking the box to use controls
- without checking the box for custom values of Tau

The figure in the paper appears in the second box on the right-hand side. The approximate runtime is less than 15 minutes.

Software used: MATLAB 2021b

MATLAB Requirements: Global Optimization Toolbox

Operating System: Windows 10

### List of tables and programs

The provided code reproduces the data used in Table 1 and Figure 2, 3, 4, and 5 in the paper.

### References

Nunn, Nathan (2007). Relationship-Specificity, Incomplete Contracts and the Pattern of Trade. Quarterly Journal of Economics, 122 (2), pp. 569-600.