



Technology Sophistication Across Establishments

Second Submission: PP_WLD_2025_516

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This review verifies the reproducibility of the exhibits included in the paper “*Technology Sophistication Across Establishments*”.

Contents in this review:

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2. List of exhibits and reproducibility status
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Main findings

- **Every exhibit in the main section of the paper and 10 randomly selected exhibits in the appendix were reproduced accurately**
- The code was successfully executed on a new computer after:
 1. Updating the working directory.
- The output demonstrates consistent stability across multiple runs. Specifically, executing the code two times consecutively yielded identical results.
- The code takes approximately 30 minutes to run.
- We conducted our reproducibility analysis based on the paper shared by the authors.
- **Verification Process and Data Handling:**
 - The reproducibility package relies on 3 types of data: open, accessible (Forthcoming on World Bank Microdata Library) and restricted data (available only from the authors).
 - Open data is included in the public reproducibility package.
 - Reviewers used forthcoming/accessible provided directly by the authors to conduct the reproducibility verification, and this is not included in the public reproducibility package. The data is forthcoming on the World Bank Microdata Library.
 - Reviewers verified the package using a combination of direct verification and virtual verification, as they did not have access to the restricted data.
 - *data_hash_report.csv* lists the SHA256 hashes of all files in the Data folder to support data integrity checks. Users who acquire the forthcoming/accessible/limited-access/restricted data can use this file to verify that the data has not been altered.

- **Reproducibility Summary:**

- **Data:** Some data is restricted and has not been included in the reproducibility package. For more details, please refer to the README file.
- **Code:** All code files (from cleaning to analysis) are included in the reproducibility package.
- **Outputs:** All outputs are generated by code included in the reproducibility package.
- **Dependencies environment:** The reviewers created a new environment using the latest versions of dependencies available at the moment of the review.

List of exhibits and reproducibility status

Results in the Main Section of the Paper

- **Figure 1** Does not show analysis results.
- **Figure 2** Does not show analysis results.
- **Figure 3** Reproduced.
- **Figure 4** Reproduced.
- **Figure 5** Reproduced.
- **Figure 6** Reproduced.
- **Figure 7** Reproduced.
- **Figure 8** Reproduced.
- **Figure 9** Reproduced.
- **Figure 10** Reproduced.
- **Figure 11** Reproduced.
- **Table 1** Does not show analysis results.
- **Table 2** Reproduced. This table was verified using a combination of direct verification and virtual verification, as some underlying data are restricted and could not be shared directly.
- **Table 3** Reproduced. This table was verified using a combination of direct verification and virtual verification, as some underlying data are restricted and could not be shared directly.
- **Table 4** Reproduced.
- **Table 5** Reproduced.
- **Table 6** Reproduced. This table was verified using a combination of direct verification and virtual verification, as some underlying data are restricted and could not be shared directly.
- **Table 7** Reproduced. This table was verified using a combination of direct verification and virtual verification, as some underlying data are restricted and could not be shared directly.

- **Table 8 Reproduced.**
- **Table 9 Reproduced.** This table was verified using a combination of direct verification and virtual verification, as some underlying data are restricted and could not be shared directly.
- **Table 10 Reproduced.** This table was verified using a combination of direct verification and virtual verification, as some underlying data are restricted and could not be shared directly.

Results in the Annex

For the Appendix, we did not review every exhibit. Instead, we randomly selected 10 exhibits from the remaining datasets to assess the appendix. Our review was based on those 10 exhibits. Since they were chosen randomly, we are operating under the assumption that if all randomly selected exhibits are reproducible, then the rest should be as well. The seed used to generate the random selection was 402759, the Stata version used was 18, and the exhibits selected were: Figures A12, A13, A14, Tables A23, A27, A30, A32, Figure C1, Tables C4, and C9.

- **Figure A12 Reproduced.**
- **Figure A13 Reproduced.**
- **Figure A14 Reproduced.**
- **Table A23 Reproduced.** This table was verified using a combination of direct verification and virtual verification against the table A22 in the code output, as some underlying data are restricted and could not be shared directly.
- **Table A27 Reproduced.** The table was verified against table A26 in the code output.
- **Table A30 Reproduced.** The table was verified against table A29 in the code output.
- **Table A32 Reproduced.** This table was verified using a combination of direct verification and virtual verification, as some underlying data are restricted and could not be shared directly.
- **Figure C1 Reproduced.** This figure was verified against figure C3 in the code output.
- **Table C4 Reproduced.** This table was verified using a combination of direct verification and virtual verification, as some underlying data are restricted and could not be shared directly.
- **Table C9 Reproduced.** This table was verified using a combination of direct verification and virtual verification, as some underlying data are restricted and could not be shared directly.

Reproduction Environment

Paper exhibits were reproduced on a computer with the following specifications:

- OS: Windows 11 Enterprise
- Processor: INTEL(R) XEON(R) PLATINUM 8562Y+ 2.80 GHz (2 processors)
- Memory available: 32.0 GB
- Software version: Stata 18.5 MP