



Revisiting Public Capital Needs: An Analysis of Growth-Maximizing Investment with Efficiency and Congestion Effects

Third Submission: RR_WLD_2025_435

Ankriti Singh

reproducibility@worldbank.org

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This review verifies the reproducibility of the exhibits included in the paper “*Revisiting Public Capital Needs: An Analysis of Growth-Maximizing Investment with Efficiency and Congestion Effects*”.

Contents in this review:

1. Main findings
2. List of exhibits and reproducibility status
3. Reproduction Environment

Main findings

- **Every exhibit in the main section of the paper has been reproduced accurately.**
- The code was successfully executed on a new computer after:
 1. Updating the working directories.
- The output demonstrates consistent stability across multiple runs. Specifically, executing the code two times consecutively yielded identical results.
- The code takes approximately 2 hours to run.
- We conducted our reproducibility analysis based on the paper shared by the authors in the package.
- **Verification Process and Data Handling:**
 - The reproducibility package relies on 3 types of data: open, accessible (public but not included in the reproducibility package), and limited-access (available to World Bank staff).
 - Open data is included in the public reproducibility package.
 - Reviewers used forthcoming/accessible/restricted data provided directly by the authors to conduct the reproducibility verification, and this is not included in the public reproducibility package.
 - *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 not yet publicly available but is expected to be made available through the World Bank Development Data Hub in the future.
- **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** **Reproduced.** Exhibit compared against code outputs Histo_Optimal_Ratio_[economy].png
- **Figure 2** **Reproduced.** Exhibit compared against code outputs Excess_[economy]_Scenario_D.png
- **Figure 3** **Reproduced.** Exhibit compared against code outputs Excess_[economy]_Scenario_D.png and Excess_[economy]_Scenario_C.png.
- **Figure 4** **Results reproduced.** Exhibit compared against "Figures" tab in the Excess_inv.xlsx
- **Table 1** **Does not apply.** This table is not an output of the code.
- **Table 2** **Results reproduced.** Table was manually created using results from the console of 01. Descriptive Statistics.R.
- **Table 3** **Results reproduced.** Table was manually created using results from the console of 01. Descriptive Statistics.R.
- **Table 4** **Results reproduced.** Table was manually created using results from the console of 02. Model_All_countries.R
- **Table 5** **Results reproduced.** Table was manually created using results from the console of 03. Model By Regions.R
- **Table 6** **Results reproduced.** Table was manually created using results from the console of 04. Mixed_Effect_Model By Regions.R
- **Table 7** **Results reproduced.** Table was manually created using results from the console of 05. Optimal_Investment_All_countries.R
- **Table 8** **Results reproduced.** Table was manually created using results from the console of 06. Optimal_Investment_by_Region_Spec3.R
- **Table 9** **Results reproduced.** Table was manually created using results from the console of 07. Optimal_Investment_by_Region_Spec3_Potential_Growth.R
- **Table 9A** **Results reproduced.** Table was manually created using results from the console of 08. Optimal_Investment_by_Region_Spec4.R
- **Table 10** **Results reproduced.** Compared against the table in Mean_text.xlsx.

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 (4 processors)
- Memory available: 32 GB
- Software version: Stata 18.0 MP, R 4.0.0, python 3.10.18