

# Readme file- Reproducible package

## **Readme File for Replication of the Paper: “Do Formal Loans Boost SME Performance? Key Takeaways from a Meta-Analysis”**

This readme file was created to guide the reproducibility package for the meta-analysis on the impact of formal loans on SME performance outcomes.

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### **Overview**

This project investigates the impact of formal loans on the performance of small and medium-sized enterprises (SMEs), a sector that accounts for over 90% of businesses globally and is critical for job creation. Despite facing significant credit constraints, with a financial gap estimated between 5.7 to 8 trillion, loans to these enterprises have increased substantially in recent years. However, empirical evidence on the effectiveness of formal loans in improving key metrics such as employment, sales, and profits remains limited.

Using a meta-analysis approach, this study compiles and synthesizes data from multiple studies on formal loans for SMEs. The findings indicate a positive and significant effect of these loans, reflecting an increase of 12% in employment, 18.3% in sales, and 23.1% in profits.

### **Data Availability**

All information used as input for the analysis presented in this document was publicly available. When data was missing, we reached out to the original authors to inquire about the missing data. We explained the objective of collecting this information and the possibility of including their study as part of the meta-analysis.

## Data Sources

Data was directly extracted from the final set of studies. For studies with missing data, we contacted the authors to request the missing information. The file **Input\_Data.xlsx** allows tracking of the specific table from which the data was obtained.

**Note:** The only transformation we applied, as described in the main document, was in cases where the outcome variable was reported in levels, so the point estimate was in levels as well. Since we needed to convert all coefficients to percentage changes, we divided both the coefficients and the standard errors by the control mean. If a check is required, please refer to **Input\_Data.xlsx**, where the original and transformed data are available, and compare them to the coefficient reported in the original.

## Statement about Rights

We certify that the authors of the manuscript are using publicly available data, and when inquiring about additional data was required, the original authors of the studies analyzed were notified about the use of the data in this manuscript.

## Instructions for Replicators

### Code

As the reader can see from the [folder structure](#) section, there is a Code folder with five (5) R scripts. This folder contains a main script (also known as master script) that is needed to run all the codes in a compiled way.

The codes are structured based on the outcome of interest. After using the main script to run the (01-processing-data.R script), the replicator can run the replication package separately for each specific outcome (i.e., employment, sales, or profits).

- 00-main.R
- 01-processing-data.R
- 02.1-Data Analysis -Employment.R
- 02.2 Data Analysis -Sales.R
- 02.3 Data Analysis -Profit.R

## Computational settings

The script was developed and tested using **R version 4.4.1 (2024-06-14 ucrt)** on a **64-bit Windows system** (MinGW environment) with **32 GB of RAM (32000 MB)**. While the script ran successfully in this environment, we expect it would also run with less RAM.

Under the described settings, the reproducibility package takes around **15** minutes to run from beginning to end. After running the main script to execute the other scripts, you will get the execution time in this format: “Execution time: X minutes and Y seconds”.

## List of Exhibits

| Exhibit Name                                                                      | Output file name                 | Script                                                                                         | Note                         |
|-----------------------------------------------------------------------------------|----------------------------------|------------------------------------------------------------------------------------------------|------------------------------|
| Figure 1: Estimated Effects of Formal Loans on SME Employment                     | fig1_forestplot_Employment.png   | 02.1-Data Analysis -Employment.R<br><b>Code section:</b> Baggr (Rachael Meager, Witold Wiecek) | Found in /Outputs/Employment |
| Figure 2: Predictive Distribution of the Effect of Formal Loans on SME Employment | fig2_predictive_distribution.png | 02.1-Data Analysis -Employment.R<br><b>Code section:</b> 4. Predictive distribution            | Found in /Outputs/Employment |
| Figure 3: Estimated Effects of Formal Loans on SME Sales                          | fig3_forestplot_Sales.png        | 02.2 Data Analysis -Sales.R<br><b>Code section:</b> Baggr (Rachael Meager, Witold Wiecek)      | Found in /Outputs/Sales      |
| Figure 4: Predictive Distribution of the Effect of Formal Loans on SMEs Sales     | fig4_predictive_distribution.png | 02.2 Data Analysis -Sales.R<br><b>Code section:</b> 2. Predictive distribution                 | Found in /Outputs/Sales      |

| Exhibit Name                                                                                      | Output file name                   | Script                                                                                          | Note                           |
|---------------------------------------------------------------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------|
| Figure 5: Estimated Effects of Formal Loans on SME Profits                                        | fig5__forestplot__Profit.png       | 02.3 Data Analysis -Profit.R<br><b>Code section:</b> Baggr (Rachael Meager, Witold Wiecek)      | Found in /Out-puts/ Profit     |
| Figure 6: Predictive Distribution of the Effect of Formal Loans on SMEs Profit                    | fig6__predictive__distribution.png | 02.3 Data Analysis -Profit.R<br><b>Code section:</b> 2. Predictive distribution                 | Found in /Out-puts/ Profit     |
| Figure 7: Subgroup Analysis on SME Employment                                                     | fig7__Subgroup__Employment.png     | 02.1-Data Analysis -Employment.R<br><b>Code section:</b> 1. Sub group analysis                  | Found in /Out-puts/ Employment |
| Table 2 Meta Regression                                                                           | Tab_2__Meta__Regression.xlsx       | 02.1-Data Analysis -Employment.R<br><b>Code section:</b> 3. Meta-regression                     | Found in /Out-puts/ Employment |
| Figure A2: Average Effects of Formal Loans on SME Employment Across Different Prior Distributions | figA2__Priors__Employment.png      | 02.1-Data Analysis -Employment.R<br><b>Code section:</b> 2. Robustness Checks: Different priors | Found in /Out-puts/ Employment |
| Figure A3: Average Effects of Formal Loans on SME Sales Across Different Prior Distributions      | figA3__Priors__Sales.png           | 02.2 Data Analysis -Sales.R<br><b>Code section:</b> 1. Robustness Checks: Different priors      | Found in /Out-puts/ Sales      |

| Exhibit Name                                                                                  | Output file name                   | Script                                                                                         | Note                          |
|-----------------------------------------------------------------------------------------------|------------------------------------|------------------------------------------------------------------------------------------------|-------------------------------|
| Figure A4: Average Effects of Formal Loans on SME Profit Across Different Prior Distributions | figA4__Priors__Profit.png          | 02.3 Data Analysis -Profit.R<br><b>Code section:</b><br>1. Robustness Checks: Different priors | Found in /Out-puts/Profit     |
| Figure A5: Subgroup Analysis of SME Employment Effects by Loan Funding Source                 | figA5__Annexes__Employment.png     | 02.1-Data Analysis -Employment.R<br><b>Code section:</b><br>1. Sub group analysis              | Found in /Out-puts/Employment |
| Figure A6: Heterogenous Effects by Journal Rank                                               | figA6__JournalQ__Employment.png    | 02.1-Data Analysis -Employment.R<br><b>Code section:</b><br>1. Sub group analysis              | Found in /Out-puts/Employment |
| Figure A7: Heterogenous Effects by Methodology                                                | figA7__Methodology__Employment.png | 02.1-Data Analysis -Employment.R<br><b>Code section:</b><br>1. Sub group analysis              | Found in /Out-puts/Employment |

## Folder structure

```

C:/Users/wb381032/WBG/Miriam Bruhn - SME Finance Lab/Reproducibility Packages/Reproducibility
+-- Code
|   +-- 00-main.R
|   +-- 01-processing-data.R
|   +-- 02.1-Data Analysis -Employment.R
|   +-- 02.2 Data Analysis -Sales.R
|   \-- 02.3 Data Analysis -Profit.R
+-- Data
|   +-- Cost-effectiveness.xlsx
|   +-- Intermediate
|   |   +-- df_employment.xlsx

```

```

| | +-- df_profit.xlsx
| | \-- df_sales.xlsx
| \-- Raw
|     +-- CLASS_B.xlsx
|     +-- Exchange Rates.xls
|     \-- Input_Data.xlsx
+-- Final Set of Studies
| +-- Akcigit et al. (2024).pdf
| +-- Alibhai et al. (2022).pdf
| +-- Amamou et al. (2023).pdf
| +-- Arraiz et al. (2014).pdf
| +-- Asdrubali, P., & Signore, S. (2015)..pdf
| +-- Bach (2014).pdf
| +-- Banerjee, A. V., & Duflo, E. (2014).pdf
| +-- Bazzi et al. (2023).pdf
| +-- Bertoni et al (2019).pdf
| +-- Bertoni et al (2023).pdf
| +-- Bertoni et al. (2019) - Supplemental -EIF_cip-implementation-status.pdf
| +-- Bertoni et al. (2023) - Appendix.docx
| +-- Brown, J. D., & Earle, J. S. (2017).pdf
| +-- Brown, J.D. Earle, J.S. and Lup, D. (2005).pdf
| +-- Bruhn et al. (2025).pdf
| +-- Bryan, G., Karlan, D., & Osman, A. (2024).pdf
| +-- Cai and Szeidl (2024).pdf
| +-- Cassano et al. (2013).pdf
| +-- Clemente et al. (2023).pdf
| +-- Da Silva et al. (2009).pdf
| +-- De Negri et al. (2017).pdf
| +-- Eslava, M., Maffioli, A., & Meléndez, M. (2014).pdf
| +-- Grimaldi, D., & Ornelas, J. R. H. (2024).pdf
| +-- Horvath & Lang (2021).pdf
| +-- Jiménez et al. (2018).pdf
| +-- Lelarge, Sraer, and Thesmar (2010).pdf
| +-- Oh et al. (2009).pdf
| +-- Pires, Linhares, Russell (2017).pdf
| \-- Tan (2009).pdf
+-- Manuscript
| +-- Bruhn Formal Loans.sg1_v4.docx
| \-- Bruhn Formal Loans.sg1_v4.pdf
+-- Outputs
| +-- Employment
| | +-- BHM_Employment.xlsx
| | +-- Df_Subgroup_Employment.xlsx

```

```

| | +-- Different_Priors_Employment.xlsx
| | +-- Employment_predictive_distribution.xlsx
| | +-- fig1_forestplot_Employment.png
| | +-- fig2_predictive_distribution.png
| | +-- fig7_Subgroup_Employment.png
| | +-- figA2_Priors_Employment.png
| | +-- figA5_Annexes_Employment.png
| | +-- figA6_JournalQ_Employment.png
| | +-- figA7_Methodology.png
| | +-- REML_Employment.xlsx
| | \-- Tab_2_Meta_Regression.xlsx
| +-- Profit
| | +-- BHM_Profit.xlsx
| | +-- Different_Priors_Profit.xlsx
| | +-- fig5_forestplot_Profit.png
| | +-- fig6_predictive_distribution.png
| | +-- figA4_Priors_Profit.png
| | +-- Profit_predictive_distribution.xlsx
| | \-- REML_Profit.xlsx
| \-- Sales
| | +-- BHM_Sales.xlsx
| | +-- Different_Priors_Sales.xlsx
| | +-- fig3_forestplot_Sales.png
| | +-- fig4_predictive_distribution.png
| | +-- figA3_Priors_Sales.png
| | +-- REML_Sales.xlsx
| | \-- Sales_predictive_distribution.xlsx
\-- Readme
  +-- Readme file.html
  +-- Readme file.qmd
  +-- Readme file.rmarkdown
  +-- Readme file_files
  | \-- libs
  | | +-- bootstrap
  | | | +-- bootstrap-icons.css
  | | | +-- bootstrap-icons.woff
  | | | +-- bootstrap.min.css
  | | | \-- bootstrap.min.js
  | | +-- clipboard
  | | | \-- clipboard.min.js
  | | \-- quarto-html
  | | +-- anchor.min.js
  | | +-- popper.min.js

```

```
|          +-- quarto-syntax-highlighting.css
|          +-- quarto.js
|          +-- tippy.css
|          \-- tippy.umd.min.js
+-- Readme-file.pdf
\-- Readme-file.rmarkdown
```