

This file describes the steps necessary to use the materials in this package to replicate all results in "Using Price Incentives to Bound Welfare from Pay as You Go Solar Electricity" by Megan Lang, World Bank Policy Research Working Paper WPS\_\_\_\_\_.

## Overview

The package contains three folders: Code, Data, and Output. The code contains all .R files necessary to produce the outputs in the main paper and the appendix. The Data folder contains all data files necessary for the code to run. The Output folder is where all Tables and Figures outputted from the code are saved.

## Data Availability

There are three data sources used in the paper, described below.

Administrative data from BBOXX Ltd:

1. Customer-level data on system size adopted, date of adoption, who was offered the price incentives, and all customer payments in the study period. These data start in March, 2018 and continue through February, 2019. The customer-level data is proprietary and can only be obtained by signing a data sharing agreement with BBOXX Ltd.

- **Source:** BBOXX Ltd.
- **URL:** NA
- **Access year:** March 2019
- **Filename 1:** Final\_90days.csv
- **Filename 2:** ipa\_bboxx.csv
- **Filename 3:** IPA\_IDs.csv
- **Filename 4:** KE\_Monthly.Rda
- **Filename 5:** KE\_Pmts.Rda
- **Filename 6:** raw\_kenya\_large.csv
- **Filename 7:** raw\_rwanda\_large.csv
- **Filename 8:** RW\_Monthly.Rda
- **Filename 9:** RW\_Pmts.Rda
- **Filename 10:** use.Rda
- **Filename 11:** weights2.csv
- **Filename 12:** weights2\_Kenya.csv

Nationally representative data: 2) The Integrated Household Living Conditions Survey from 2017 can be located at <https://www.statistics.gov.rw/datasource/integrated-household-living-conditions-survey-eicv>. Note

that this household survey is comprehensive and the paper uses a relatively small subset of the datasets included in the .zip file. Below, the source, URL, and access year are common for all datasets listed that are used in producing outputs in the paper.

- **Source:** National Institute of Statistics Rwanda
- **URL:** <https://microdata.statistics.gov.rw/index.php/catalog/82>
- **Citation:** National Institute of Statistics of Rwanda (December 2017). "Integrated Household Living Conditions Survey(2016-2017), Version 0.1 of the public use dataset". provided by the National Data Archive.
- **License:** This is a public use files, accessible to all.
- **Access year:** April 2025
- **Filename 1:** cs\_S0\_S5\_Household.dta
- **Filename 2:** cs\_S8A3\_expenditure.dta
- **Filename 3:** cs\_S8B\_expenditure.dta
- **Filename 4:** cs\_S1\_S2\_S3\_S4\_S6A\_S6E\_Person.dta

### 3. The 2015-2016 Kenya Integrated Household Budget Survey.

- **Source:** Kenya National Data Archive
- **URL:** <https://statistics.knbs.or.ke/nada/index.php/catalog/13/get-microdata>
- **Citation:** Kenya National Bureau of Statistics (2016). "Kenya Integrated Household Budget Survey 2015-2016". provided by the Kenya National Data Archive.
- **License:** This is a public use files, accessible to all.
- **Access year:** April 2025
- **Filename 1:** Consumption\_aggregate.dta
- **Filename 2:** Energy\_use.dta

Phone survey data: 4) Data from a phone survey conducted with BBOX customers who were part of the experiment in winter 2019. The anonymized version of this survey can be downloaded at the link below.

- **Source:** Primary survey data
- **URL:** <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/ATY3PU>
- **Citation:** Lang, Megan. 2025. "Partial Replication Data for 'The Role of Market Frictions in Demand for Prepaid Electricity';" Harvard Dataverse. <https://doi.org/10.7910/DVN/ATY3PU>
- **License:** Public domain CC0 1.0
- **Access year:** April 2019

- **Filename 1:** ipa\_sur.csv

## Statement about Rights

I certify that the author(s) of the manuscript have legitimate access to and permission to use the data used in this manuscript.

## Instructions for Replicators

New users should follow these steps to run the package successfully:

- Users must first download all publicly available data listed above. They should go to the mentioned links, download the listed files, and place them in the Data folder.
- Ensure all required software and dependencies are installed as listed in lines 7-24 of 'Replication - non-proprietary data.R'.
- Run 'Replication - non-proprietary data.R'.
- Note that should users obtain access to the proprietary data, they should download the phone survey data at the mentioned link, unzip the folder, and save the file called "ipa\_sur.csv" as "phone\_survey.csv" in the data folder.

## List of Exhibits

The script 'Replication - non-proprietary data.R' does not produce any tables or figures, it simply produces a few statistics used to provide context in the paper, which rely on publicly available data. The script 'Replication - proprietary data.R' details all data cleaning and analysis for results produced using the proprietary data from the solar company, should a researcher obtain access to the proprietary data independently. Note that Figure 1, Figure A3, and Table A6 are not data-based and are therefore not listed here. Figure A1 is reproduced from a different paper.

| Exhibit name | Output filename      | Script                                        | Notes |
|--------------|----------------------|-----------------------------------------------|-------|
| Table 1      | PooledATEs.tex       | 'Replication - proprietary data.R', Line 400  |       |
| Table 2      | welfare.tex          | 'Replication - proprietary data.R', Line 645  |       |
| Figure 2     | hetRW.png, hetKE.png | 'Replication - proprietary data.R', Line 513  |       |
| Figure 3     | RWWelfare.png,       |                                               |       |
|              | KEWelfare.png        | 'Replication - proprietary data.R', Line 1012 |       |
| Figure A2    | preKE.png, preRW.png | 'Replication - proprietary data.R', Line 377  |       |
| Figure A4    | useKE.png, useRW.png | 'Replication - proprietary data.R', Line 1254 |       |
| Figure A5    | tmt_pct.png          | 'Replication - proprietary data.R', Line 1525 |       |
| Figure A6    | pct_low.png,         |                                               |       |
|              | pct_high.png         | 'Replication - proprietary data.R', Line 1539 |       |

| Exhibit name | Output filename      | Script                                        | Notes |
|--------------|----------------------|-----------------------------------------------|-------|
| Figure A7    | isKE.png, is.RW.png  | 'Replication - proprietary data.R', Line 1615 |       |
| Figure A8    | KE_SDUse.png,        |                                               |       |
|              | RW_SDUse.png         | 'Replication - proprietary data.R', Line 1306 |       |
| Table A1     | balanceKE.tex        | 'Replication - proprietary data.R', Line 109  |       |
| Table A2     | balanceRW.tex        | 'Replication - proprietary data.R', Line 244  |       |
| Table A3     | pooledATEs_noFeb.tex | 'Replication - proprietary data.R', Line 1395 |       |
| Table A4     | HetLiqATEs.tex       | 'Replication - proprietary data.R', Line 1086 |       |
| Table A5     | CEwelfare.tex        | 'Replication - proprietary data.R', Line 1730 |       |
| Table A7     | FullpooledATEs.tex   | 'Replication - proprietary data.R', Line 2192 |       |
| Table A8     | FullATEs.tex         | 'Replication - proprietary data.R', Line 2277 |       |

## Requirements

### Software Requirements

- **R version 4.3.0**

### Memory and Runtime and Storage Requirements

Runs in 1.5 hours.

## Folder Structure

Unzip the data folder provided when downloading the Integrated Household Living Standard Survey from the National Institute of Statistics Rwanda website. Save the resulting folder under the "Data" folder in the replication package. Create a folder in the Data folder named "KIHBS" to save the relevant datasets from the Kenya Integrated Household Budget Survey. Open the code file directly from the directory. Doing so ensures that the filepaths will automatically be set such that the code runs.