Readme for replicating *Forward-looking household climate vulnerability curves to inform poverty reduction policy* by Calcutt, Hill and Vinha (2024)

Replication

Introduction

The reproducibility package described here replicates the analysis in *Forward-looking household climate vulnerability curves to inform poverty reduction policy* by Calcutt, Hill and Vinha (2024) (the note). This is an application of Gascoigne et al. (2024) and uses the datasets and results from the analyses contained in the paper. The reproducibility package for the Gascoigne et al. (2024) paper is available at https://reproducibility.worldbank.org/index.php/catalog/301/study-description. This replication package includes only the relevant outputs from Gascoigne et al. (2024) necessary to perform the analyses.

Citation of note

Calcutt,Evie; Hill, Ruth; Vinha, Katja. *Forward-looking household climate vulnerability curves to inform poverty reduction policy.* Washington, D.C. : World Bank Group.

Computational specifications

The replication requires Excel and Stata.

The code was run on Stata 16.1 on a machine with 16 GB of RAM and an Intel(R) Core(TM) i7-6700 CPU @ 3.40GHz processor. It takes about seven minutes to complete the do file. However, it requires that the full model from Gascoigne et al. (2024) has been run as some of the output from the model is used as input for the simulations. The model takes about 40 hours to run with the above computer specifications.

Detailed Instructions

In order to replicate the tables and figures in the note:

1. Copy the folder "**Drought_Welfare_SSA**" with all the files and folders intact to where you want to run it from

2. Open the folder "**Drought_Welfare_SSA**" and open *Policy_extensions.do*

3. Change line 11 to indicate where **Drought_Welfare_SSA** folder is located
   Line 11: local main_directory_name **C:/to path**

4. Execute the code which will (automatically) do the following:
   a. Install the following packages if not already installed: grstyle, palettes, colrspace, carryforward, distinct, unique, geonear
   b. The code will execute the following 3 steps. No additional input from the replicator required.

Step 1: Generate figures 1 and 2.

Step 2: Generate figure 3

Step 3: Generate figures 4 and 5

Replicated figures

The figures used in the note are in *Figures-> Policy_note* and are labelled by their figure number in the note. The outputs are .jpg and .eps files created by Stata.

Data Sources and Availability

The analysis uses the following data.

1. Simulated poverty rates and poverty gaps from Gascoigne et al. (2024) for the seven countries (Ethiopia, Lesotho, Malawi, Mozambique, Nigeria, Zambia and Zimbabwe). These are available in the package.
2. For the Ethiopia simulation, it uses the household dataset and NDVI data processed in Gascoigne et al. (2024). The household dataset is not publicly available and not included in the package. Ruth Hill (rhill@worldbank.org) can be contacted for details. The gridded NDVI data can be found at: https://datacatalog.worldbank.org/int/search/dataset/0066862/gridded_monthly_normalized_difference_vegetation_index_ndvi_for_africa.
3. For the Malawi simulation, it uses the household survey datasets used in Gascoigne et al. (2024) and soil moisture data processed in Gascoigne et al. (2024). The household dataset is not publicly available and not included in the package. Ruth Hill (rhill@worldbank.org) can be contacted for details. The gridded SWI data can be found at: https://datacatalog.worldbank.org/int/search/dataset/0066864/gridded_dekadal_soil_water_index_swi_for_africa
4. For both simulations, contextual data produced for Gascoigne et al. (2024) are used. In the table below are links to the location of these data

Table A: Location of hazard and contextual data

Data set	Location of data	Folder location
		NOTE: Country abbreviations used for country specific datasets: ETH: Ethiopia, MWI: Malawi,
GADM – Database of Global Administrative Areas (Admin0–Admin6)	https://datacatalog.worldbank.org/int/search/dataset/0066860/gridded_global_administrative_areas_gadm_for_africa	./Input_data>Remote_Sensed>SSA>gadm_admin_urg005_mapping>`country_abbreviation'_gadm_admin_urg005_mapping
GAUL – Global Administrative Unit Layers (Gaul0–Gaul1)	https://datacatalog.worldbank.org/int/search/dataset/0066860/gridded_global_administrative_areas_gadm_for_africa	./Input_data>Remote_Sensed>SSA>country_mapping>`country_abbreviation'_gaul1_asap_urg005_mapping

Crop coverage – Copernicus Global Land Cover Layers	https://datacatalog.worldbank.org/int/search/dataset/0066869/gridded_crop_coverage_for_africa	./Input_data>Remote_Sensed>SSA>crop_coverage>country_mapping>'country_abbreviation'_CROPCOV19_mapping
Crop calendar	https://datacatalog.worldbank.org/int/search/dataset/0066842/crop_calendar_for_africa	./Input_data>Remote_Sensed>SSA>merge_variable_data>crop_calendar_gaul1 (subnational) ./Input_data>Data_Integration>SSA>crop_calendar_gaul_asap1
Travel Time to Markets – International Food Policy Research Institute (IFPRI)	https://datacatalog.worldbank.org/int/search/dataset/0066865/gridded_travel_time_to_market_for_africa	./Input_data>Remote_Sensed>SSA>time_to_market>country_mapping>`country_abbreviation '_ttm_urg005_mapping
Global Agro-Ecological Zones (GAEZ)	https://datacatalog.worldbank.org/int/search/dataset/0066857/gridded_global_agroecological_zones_gaez_for_africa	./Input_data>Remote_Sensed>SSA>agro_ecological_zone>country_mapping>`country_abbreviation'_aez_urg005_mapping
Livelihood zones	https://datacatalog.worldbank.org/int/search/dataset/0066861/gridded_livelihood_zones_for_africa	./Input_data>Remote_Sensed>SSA>livelihood_zone>country_mapping>`country_abbreviation'_livelihood_urg005_db

Source: World Bank compilation.

5. The note also uses payout schedules for the Ethiopia simulation which are constructed by the authors. The assumptions and construction of the payouts are in *Input_Data>For_Simulations>Ethiopia>ETH_Payouts.xlsx*. These are not actual payouts for any existing policy but are based on an existing index insurance policy in place and derived by the authors based on their understanding of how the product is structured. The historical NDVI data come from the execution of the Ethiopia script.

Data statement

- All data are publicly available.
- Some data cannot be made publicly available.
- No data can be made publicly available.

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.

Folder structure

The reproducibility package is structured follows that of Gascoigne et al. (2024). The structure must be kept intact for the main script to execute properly. In this abridged version, within the main folder Drought_Welfare_SSA there are 5 different folders.

1. Do_Files
   There is a folder *Policy_note* which has the do files for the three above tasks. If implementing also using the Gascoigne et al. (2024) script this folder (*Policy_note*) would need to be added to the *Do_files* folder in the main package.
2. Input_Data
   Input_Data , has four different folders
   1. Data_Integration
      The folder has in the Country folder, the cleaned-up version of the Ethiopia household survey (from Gascoigne et al. (2024); basic_11_16.dta) as well as the district centroid location (coordinates2.csv). In the SSA folder are the start and stop dekads of the growing seasons (crop_calendar_gaul_asap1.csv) as well as a matrix (year+_dekad_2002_2020.dta) for expanding the datasets to cover all dekads in the study period. See Table A for source.
   2. Household_Survey
      The folder has a subfolder for each country—Ethiopia and Malawi. For Malawi the household survey datasets used in Gascoigne et al. (2024) are included. For Ethiopia the dataset is generated in the first step of the Ethiopia analysis.
   3. Remote_Sensed
      The folder has a folder SSA which includes 8 different subfolders with the weather and contextual variables. These are the same data as in Gascoigne et al. (2024). The source of these data are in Table A.
   4. For_Simulations
      The folder is an addition to the main model and includes information on the payouts that are used in the exercise (for Ethiopia). These are derived in the Excel sheet based on an example payout scheme based on an existing index insurance product sold in East Africa.
3. Processed_Data
   There is a separate subfolder for each country and for the pooled sample. These are generated by the code
4. Results
   The Results folder contains the results from the main paper but here they are used as inputs for figures 1 and 2. These are not the results of the present analysis.
5. Figures
   Includes the figures for the note.

List of tables/figures and programs

Table/Figure	**Program** ***Do_files>Policy_note>***	**Line**	**Output file** ***Figures>Policy_note***
Figure 1	Comparisons_v2.do	35	Figure_1.jpg

Figure 2a	Comparisons_v2.do	62	Figure_2a.jpg
Figure 2b	Comparisons_v2.do	76	Figure_2b.jpg
Figure 3a	Ethiopia>Ethiopia_EP_curves_scenario1.do	297	Figure_3a.jpg
Figure 3b	Ethiopia>Ethiopia_EP_curves_scenario1.do	310	Figure_3b.jpg
Figure 4	Malawi>Malawi_EP_curves_scenario2_v2.do	392	Figure_4.jpg
Figure 5	Malawi>Malawi_EP_curves_scenario2_v2.do	403	Figure_5.jpg