

Codes for the paper “The economics of water scarcity in the Americas”, 27 October 2025

Authors: Jon Frost, Carlos Madeira and Serafin Martinez

These codes use the original data sources to aid in replicating the analysis in the paper.

All data files (.dta and .do) are in Stata format.

The views expressed in the paper are those of the authors and do not necessarily reflect those of the BIS, the World Bank Group or the Central Bank of Chile. All errors are our own. All codes and data correspond to exercises performed in October of 2024 or before.

Relative to previous versions of the README and codes, this version has an extended version of Table A.2 and has a slightly different structure with folders for Codes, Data, Outputs. There are sub-folders for different datasets (CSV, Excel, Stata) and outputs (graphs, tables, Stata and Excel files).

List of Codes in the zip file “Codes.zip”

Data formatting:

“Main_WaterScarcity_FMM_2025.do” is the main file that runs all the sub-codes from beginning to end.

Data formatting:

“format_UNIDO.do” formats the entire INDSTAT Revision 2 dataset.

“format_Aquastat.do” selects 23 variables from the raw Aquastat data archive “AQUASTAT Statistics Bulk Download (English).csv” and imports these to Stata format.

“format_country_names.do” and “format_country_names2.do” simplify the country names of the datasets to make it easier to join Aquastat, World Bank and UNIDO datasets.

“format_PWT.do” formats the Penn-World Tables data.

“format_WB.do” formats 25 variables from World Bank Data, including inflation, GDP growth, sectoral growth, GDP pc PPP and others.

“format_WB2.do” formats 10 variables from World Bank Data related to electricity use, fossil and nuclear energy shares, and the share of renewable energy (hydro and non-hydro).

“UNIDO_labels.do” formats the variable names for the UNIDO dataset.

“ISIC_labels.do” formats the manufacturing industry label names for the UNIDO dataset.

Summary statistics and graphical analysis:

“Water_demand_pop_GDPpc.do” creates Table 1 of a water demand model linear regression and its projections for water demand across countries in 2050.

"Summary_aquastat_WB_stats.do" creates Table 2 with summary statistics for macro variables (GDP growth, inflation, investment) and freshwater withdrawal measures.

"Graph1_example.do" creates Graph 1 with total water resources per capita.

"Water_analysis_Aquastat.do" creates Graph 2 (daily water use per capita), Graph 3 (share of water withdrawal across sectors), Graph 4 (freshwater withdrawal as % of total resources) and Graph 5 (change in freshwater withdrawal rates between 2000 and 2020).

"List_countries_aquastat_WB.do" shows the number of countries by development category (advanced economies (AEs), emerging markets and developing economies (EMDEs)): it creates Table A.1.

"Water_analysis_New.do" creates Graph A.1 (ratio of dollar value added to the volume of water used) and Graph A.2 (ratio of dollar value added to the volume of water used by economic sector).

Regression models:

"Regressions_growth_investment_water.do" creates Tables 3, 4, 5 and 6, with the baseline effects of freshwater withdrawal on GDP growth, investment and inflation.

"Water_analysis_More_regressions.do" creates Table 7 with regressions of sectoral shares of GDP (agriculture, forestry, fishing; industry; services) on freshwater withdrawal.

"Water_UNIDO.do" creates Table 8 with real manufacturing growth regressions associated with water withdrawal measures.

"Regressions_Water_pricing.do" creates Table A.2 and Table A.3 with the statistical correlation between freshwater withdrawal and water pricing in OECD countries. Graph 6 on water pricing across OECD countries was created from the same dataset, but the code is not shown here (directly created in Excel).

"Regressions_PWT.do" creates Table A.4 with the effects of freshwater withdrawal on the level of real GDP and investment growth.

"QR_Regressions_growth_investment.do" creates Table A.5, Table A.7 and Table A.8, with the panel quantile regressions for the effect of freshwater withdrawal on real GDP growth, investment and inflation.

"Regressions_electricity.do" creates Table A.6 with the estimates of freshwater withdrawal on the hydroelectricity production.

“Data_CSV.7z”: this file contains the CSV datasets from Aquastat (8 megabytes).

“Data_Excel.7z”: this file contains all the Excel files imported to Stata (65 megabytes).

“Data_Stata.7z”: this contains the Penn-World tables and an auxiliary datafile with country names, continents and iso codes. (3 megabytes).

Please download the datasets from their original sources in these links:

[World Bank Open Data | Data](#)

[IMF Data Home](#)

[FAO AQUASTAT Dissemination System](#)

[World Population Prospects](#)

[Dataset | Aquastat | World Bank Data360](#)

[Home | SDG 6 Data](#)

[Home | UNIDO Statistics Portal](#)

[PWT 10.01 | Penn World Table | Groningen Growth and Development Centre | University of Groningen](#)

Note: Graph 6 of the paper was not built from a downloaded dataset. It was built based on values of Figure 2.1 and Figure 2.4 of this OECD document (pages 45 and 48): [Pricing Water Resources and Water and Sanitation Services \(EN\)](#)

Organisation for Economic Co-operation and Development (OECD) (2010), “Pricing Water Resources and Water and Sanitation Services,” OECD, Paris.

Datasets use for the paper “The economics of water scarcity in the Americas”, October 2025

Authors: Jon Frost, Carlos Madeira and Serafin Martinez

These codes use the original data sources to aid in replicating the analysis in the paper.

All files (.dta and .do) are in Stata format, except for the raw datasets.

The views expressed in the paper are those of the authors and do not necessarily reflect those of the BIS, the World Bank Group or the Central Bank of Chile. All errors are our own. All codes and data correspond to exercises performed in October of 2024 or before.

The README, codes and data files are available in Mendeley Data.

Note: Unfortunately, I do not know how to program codes that directly download data files from API and then update them in real time. This implies that all the data files were only downloaded once.

"Data_CSV.7z": this file contains the CSV datasets from Aquastat (8 megabytes).

"Data_Excel.7z": this file contains all the Excel files imported to Stata (65 megabytes).

"Data_Stata.7z": this contains the Penn-World tables and an auxiliary datafile with country names, continents and iso codes. (3 megabytes).

Filename: "FRED CPIAUCSL.xls" is the Consumer Price Index (CPI) of the US.

Source: FRED. [Federal Reserve Economic Data](#) | [FRED](#) | [St. Louis Fed](#)

URL: <https://fred.stlouisfed.org/>

Access Date: 28/01/2024.

License: I believe (although I do not know precisely the legal term) that the FRED files can be freely used by users, as long as the source is recognized.

List of World Bank panel time series downloaded from World Bank Data, [World Bank Open Data](#) | [Data](#):

Filename(s): The original file names of the World Bank excel files are a long list of numbers and letters denoting the download date, name of the API and database variable. Those file names were changed to correspond to the name of the variables. Each file has the original Metadata – Countries and Metadata – Indicators explaining the concept of each variable (this Metadata was in the World Bank download file).

Source: World Bank.

URL: <https://data.worldbank.org/>

Access Date: The datasets were downloaded between January 2024 and October 2024.

License: I believe (although I do not know precisely the legal term) that the World Bank Open Data files can be freely used by users, as long as the source is recognized.

"WB Agriculture Forestry Fishing as a fraction of GDP.xls" has the Agriculture-Forestry-Fishing as a fraction of GDP. Access date: April 2024.

"WB Agriculture Forestry Fishing real annual growth.xls" has the Agriculture Forestry Fishing real annual growth rates. Access date: April 2024.

"WB Aquastat water stress.xls" has the water stress variable published by the World Bank based on Aquastat data. Access date: March 2024.

"WB CPI inflation.xls" has the CPI inflation rates. Access date: January 2024.

"WB Electric power transmission and distribution losses as fraction of output.xls" has the electric power transmission and distribution losses as fraction of output. Access date: April 2024.

"WB Food production index.xls" has the real food production index. Access date: May 2024.

"WB freshwater withdrawal Agriculture.xls" has the freshwater withdrawal of the agriculture sector. Access date: April 2024.

"WB freshwater withdrawal DomesticServices.xls" has the freshwater withdrawal of the services sector. Access date: April 2024.

"WB freshwater withdrawal Industry.xls" has the freshwater withdrawal of the industry sector. Access date: April 2024.

"WB freshwater withdrawals as a fraction of available internal resources.xls" has the freshwater withdrawals as a fraction of available internal resources. Access date: April 2024.

"WB GDP growth at constant local currency.xls" has the GDP growth at constant local currency. Access date: January 2024.

"WB GDP pc PPP constant 2017 USD.xls" has the GDP per capita PPP in constant 2017 USD. Access date: January 2024.

"WB Gross capital formation as a fraction of GDP.xls" has the gross capital formation as a fraction of GDP. Access date: April 2024.

"WB Gross capital formation real annual growth.xls" has the gross capital formation real annual growth.. Access date: April 2024.

"WB Gross fixed capital formation as a fraction of GDP.xls" has the gross fixed capital formation as a fraction of GDP. Access date: April 2024.

"WB Gross fixed capital formation of private sector.xls" has the gross fixed capital formation of private sector. Access date: April 2024.

"WB Gross fixed capital formation real annual growth.xls" has the gross fixed capital formation real annual growth. Access date: April 2024.

"WB Industry as a fraction of GDP.xls" has the industry activity as a fraction of GDP. Access date: April 2024.

"WB Industry real annual growth.xls" has the industry real annual growth. Access date: April 2024.

"WB Manufacturing as a fraction of GDP.xls" has the manufacturing as a fraction of GDP. Access date: April 2024.

"WB Manufacturing real annual growth.xls" has the manufacturing real annual growth. Access date: April 2024.

"WB Population.xls" has the national population of each country. Access date: March 2024.

"WB Services as a fraction of GDP.xls" has the services as a fraction of GDP. Access date: April 2024.

"WB Services real annual growth.xls" has the services real annual growth. Access date: April 2024.

"WB Total natural resources rents as a fraction of GDP.xls" has the total natural resources rents as a fraction of GDP. Access date: April 2024.

"WB WaterProductivity.xls" has the water productivity. Access date: April 2024.

"WB electricity from fossil fuels in %.xls" has the electricity production from oil, gas and coal sources (% of total). Access date: August 2024.

"WB electric power losses in %.xls" has the electric power transmission and distribution losses (% of output). Access date: August 2024.

"WB electricity from coal in %.xls" has the electricity production from coal sources (% of total). Access date: August 2024.

"WB electricity from hydro in %.xls" has the electricity production from hydroelectric sources (% of total). Access date: August 2024.

"WB electricity from nuclear in %.xls" has the electricity production from nuclear sources (% of total). Access date: August 2024.

"WB electricity from oil sources in %.xls" has the electricity production from oil sources (% of total). Access date: August 2024.

"WB electricity from renewable non hydro sources in %.xls" has the electricity production from renewable sources, excluding hydroelectric (% of total). Access date: August 2024.

"WB electricity from renewable non hydro sources in Kwh.xls" has the electricity production from renewable sources, excluding hydroelectric (kWh). Access date: August 2024.

"WB USDxr.xls" has the Official exchange rate (LCU per US\$, period average). Access date: August 2024.

"WB access to electricity.xls" has the access to electricity (% of population). Access date: August 2024.

"API_CC.EST_DS2_en_excel_v2_402383.xls" has the Control of Corruption World Governance Indicator (Estimate). Access date: June 2024.

"API_GE.EST_DS2_en_excel_v2_424793.xls" has the Government Effectiveness World Governance Indicator (Estimate). Access date: June 2024.

"API_PV.EST_DS2_en_excel_v2_427160.xls" has the Political Stability World Governance Indicator (Estimate). Access date: June 2024.

"API_RL.EST_DS2_en_excel_v2_406588.xls" has the Rule of Law World Governance Indicator (Estimate). Access date: June 2024.

"API_RQ.EST_DS2_en_excel_v2_327322.xls" has the Regulatory Quality World Governance Indicator (Estimate). Access date: June 2024.

"API_VA.EST_DS2_en_excel_v2_445466.xls" has the Voice & Accountability World Governance Indicator (Estimate). Access date: June 2024.

Filename: "AQUASTAT Statistics Bulk Download (English).csv".

Source: Aquastat (FAO, United Nations). [FAO AQUASTAT Dissemination System](#)

URL: <https://data.apps.fao.org/aquastat/?lang=en> The filters applied were all countries and all variables.

Access Date: January 2024.

License: I believe (although I do not know precisely the legal term) that the Aquastat FAO UN files can be freely used by users, as long as the source is recognized.

Datasets downloaded from the SDG 6 United Nations Sustainable Development Goal website:

Filename: "sdg6data_download10Mar2024_641_642.xlsx" has the variables of subsections 641 and 642 related water use efficiency, levels of water stress and freshwater withdrawal for each country.

Source: SDG 6 tables (United Nations). [Home | SDG 6 Data](#) . It corresponds to all countries and all variables of section 6.4.1 and 6.4.2.

URL: <https://www.sdg6data.org/en/node/1>

Access Date: The datasets were downloaded in March 2024.

License: I believe (although I do not know precisely the legal term) that the SDG 6 United Nations data files can be freely used by users, as long as the source is recognized.

Filename 1: "INDSTAT2 national_currency.xlsx" is the INDSTAT revision 2 dataset in national currency with manufacturing (23 industries) real index and value added across countries since 1960. It is in Stata format. The filters were all countries, all years, no metadata included, statistics in national currency.

Filename 2: "INDSTAT2 national_currency metadata.xlsx" is the INDSTAT revision 2 dataset in national currency with manufacturing (23 industries) real index and value added across countries since 1960. It is in Stata format. The filters are all countries, all years, all metadata included, statistics in national currency.

Source: UNIDO (United Nations). [Home | UNIDO Statistics Portal](#)

URL: <https://stat.unido.org/>

Access Date: January 2024. The filters were all countries, all years, no metadata included, statistics in national currency.

License: I believe (although I do not know precisely the legal term) that the UNIDO UN files can be freely used by users, as long as the source is recognized.

Filename: "UN_PPP2024_Output_PopTot.xlsx" is the UN projections dataset for population until 2100.

Source: United Nations. [World Population Prospects](#)

URL: [UN PPP2024 Output PopTot.xlsx](#)

Access Date: September 2024. Filters were “Probabilistic Projections (PPP scenarios) – (Population – Both sexes XLSX)”.

License: Creative Commons license CC BY 3.0 IGO.

Filename: "CountryDataMatching_vs0.dta" has the iso codes, continents and regions of each country.

URL: User written.

Access Date: October 2024.

License: It has no license and can be freely used by users.

Filename: "ISO 3166 Codes.xlsx" has the iso codes, country names and UN number classification for the UNIDO data.

URL: User written.

Access Date: January 2024.

License: It has no license and can be freely used by users.

Filename: "pwt91_na_data.dta" has the 9.1 version of the Penn-World Tables.

URL: [PWT 10.01 | Penn World Table | Groningen Growth and Development Centre | University of Groningen](#)

Access Date: June 2019.

License: I believe (although I do not know precisely the legal term) that the University of Groningen files can be freely used by users, as long as the source is recognized.

Filename: "pwt1001.dta" has the 10.01 version of the Penn-World Tables.

URL: [PWT 10.01 | Penn World Table | Groningen Growth and Development Centre | University of Groningen](#)

Access Date: January 2024.

License: I believe (although I do not know precisely the legal term) that the University of Groningen files can be freely used by users, as long as the source is recognized.

Clarification on outputs for the paper “The economics of water scarcity in the Americas”, October 2025

Authors: Jon Frost, Carlos Madeira and Serafin Martinez

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The README, codes and data files are available in Mendeley Data.

Summary table of codes and outputs:

Code	Ouputs
Water_demand_pop_GDPpc.do	Table 1
Summary_aquastat_WB_stats.do	Table 2
Regressions_growth_investment_water.do	Tables 3, 4, 5 and 6
Water_analysis_More_regressions.do	Table 7
Water_UNIDO.do	Table 8
List_countries_aquastat_WB.do	Table A.1
Regressions_Water_pricing.do	Tables A.2, A.2 (part 2) and A.3
Regressions_PWT.do	Table A.4
QR_Regressions_growth_investment.do	Tables A.5, A.7 and A.8
Regressions_eletricity.do	Table A.6
Graph1_example.do	Graph 1
Water_analysis_Aquastat.do	Graphs 2, 3 and 4
Water_analysis_New.do	Graphs A.1 and A.2

Note: Graph 6 of the paper was not built from a downloaded dataset. It was built based on values of Figure 2.1 and Figure 2.4 of this OECD document (pages 45 and 48): [Pricing Water Resources and Water and Sanitation Services \(EN\)](#)

Organisation for Economic Co-operation and Development (OECD) (2010), “Pricing Water Resources and Water and Sanitation Services,” OECD, Paris.

Summary statistics and graphical analysis (6 codes):

"Water_demand_pop_GDPpc.do" creates Table 1 of a water demand model linear regression and its projections for water demand across countries in 2050.

"Summary_aquastat_WB_stats.do" creates Table 2 with summary statistics for macro variables (GDP growth, inflation, investment) and freshwater withdrawal measures.

"Graph1_example.do" creates Graph 1 with total water resources per capita.

"Water_analysis_Aquastat.do" creates Graph 2 (daily water use per capita), Graph 3 (share of water withdrawal across sectors), Graph 4 (freshwater withdrawal as % of total resources) and Graph 5 (change in freshwater withdrawal rates between 2000 and 2020).

"List_countries_aquastat_WB.do" shows the number of countries by development category (advanced economies (AEs), emerging markets and developing economies (EMDEs)): it creates Table A.1.

"Water_analysis_New.do" creates Graph A.1 (ratio of dollar value added to the volume of water used) and Graph A.2 (ratio of dollar value added to the volume of water used by economic sector).

Regression models (7 codes):

"Regressions_growth_investment_water.do" creates Tables 3, 4, 5 and 6, with the baseline effects of freshwater withdrawal on GDP growth, investment and inflation.

"Water_analysis_More_regressions.do" creates Table 7 with regressions of sectoral shares of GDP (agriculture, forestry, fishing; industry; services) on freshwater withdrawal.

"Water_UNIDO.do" creates Table 8 with real manufacturing growth regressions associated with water withdrawal measures.

"Regressions_Water_pricing.do" creates Table A.2 and Table A.3 with the statistical correlation between freshwater withdrawal and water pricing in OECD countries. Graph 6 on water pricing across OECD countries was created from the same dataset, but the code is not shown here (directly created in Excel).

"Regressions_PWT.do" creates Table A.4 with the effects of freshwater withdrawal on the level of real GDP and investment growth.

"QR_Regressions_growth_investment.do" creates Table A.5, Table A.7 and Table A.8, with the panel quantile regressions for the effect of freshwater withdrawal on real GDP growth, investment and inflation.

"Regressions_electricity.do" creates Table A.6 with the estimates of freshwater withdrawal on the hydroelectricity production.