MENAAP Flagship Report

COMPETING IN THE FACE OF CLIMATE RISKS: EVIDENCE FROM FIRMS AND POLICY PRIORITIES IN MENAAP

Reproducibility Package

Content:

1) Data Availability Statement
2) Instructions for Replicators
3) Computational Requirements

1) Data Availability Statement

Most of the data used in this report are publicly available from the sources listed below. Some datasets cannot be made publicly available; these are described below. In such cases, the code required to replicate all exhibits, conditional on access to the underlying data, is provided.

Exhibit	***Source***	***Data Availability***
Map 1.1	Source: Screenshot taken from the Firms and Climate Adaptation Policy Toolkit dashboard URL: https://datanalytics-int.worldbank.org/global-weather-map License: Underlying data not publicly available	Internal (not included)
Figures 1.1 - 1.6	Based on publicly available data and confidential WBG data. The code to replicate the exhibits, conditional on access to all required data, is provided.	
	mena_recent_v2 Source: WBG internal elaboration License: Confidential	Internal (not included)
	WBES_green_tech.dta Source: World Bank Enterprise Surveys URL: https://www.enterprisesurveys.org/en/data Access Date: January 2026 License: Public	Public (included)
	IEA_sectors.csv **IEA_prices.csv** Source: International Energy Agency (IEA) URL: https://www.iea.org/data-and-statistics/data-sets Access Date: January 2026 License: Public	Public (included)
	Power outages WBES indicators (Fig. 1.3b) Source: World Bank Enterprise Surveys website	Public (included)

	URL: https://www.enterprisesurveys.org/en/data/exploretopics/infrastructure-and-climate?subGroup=-1&subtopic=42 Access Date: January 2026 License: Public	
	IEA Energy and Carbon Tracker 2023 (Fig. 1.5a) Source: International Energy Agency (IEA) URL: https://www.iea.org/data-and-statistics/data-product/iea-energy-and-carbon-tracker-2023 Access Date: January 2026 License: Public	Public (included)
Figures 1.7 - 1.8	**all_firms_by_year.csv** **menaap_firms_id.csv** **related_firms_id.csv** Source: FactSet URL: https://www.factset.com Access Date: February 2026 License: Restricted (subscription)	Internal (included)
Figure 2.1	Schematic diagram (no underlying data)	
Figures 2.2 - 2.4 Table 2.1 Figure B2.2.1	**Default EI_new xlsx** **Most_exposed_countries_new_EI_V202601.xlsx** Source: Obtained from Paulina Schulz Antipa and Weronika Celniak who built the World Bank's Border Carbon Adjustment Dashboard URL: https://app.powerbi.com/groups/me/apps/19be3305-5722-4504-ab00-52c5da90be3c/reports/24f394a8-31b3-483a-8f8b-033293ece9f7/5139711b3ca0b06170aa?experience=power-bi Access Date: January 2026 License: Underlying data not publicly available, but included in the reproducibility package	Internal (included)
	BACI_HS22_Y2023_V202501.csv **country_codes_V202501.csv** Source: CEPII-BACI URL: https://www.cepii.fr/CEPII/en/bdd_modele/bdd_modele_item.asp?id=37 Access Date: February 2026 Citation: Gaulier, G. and Zignago, S. (2010) BACI: International Trade Database at the Product-Level. CEPII Working Paper, N. 2010-23. License: Public	Public (included)
	CGE_Exp_MENA_prepos.dta **CGE_Macro Result.xlsx** Source: Simulation results URL: na Access Date: January 2026	Internal (included)

	License: Underlying data not publicly available, but included in the reproducibility package	
	JRC EI.dta Source: Data on EU average emission intensity, taken from the file "Default values transitional period.pdf" of the European Commission - Joint Research Centre URL: https://publications.jrc.ec.europa.eu/repository/handle/JRC134682 Access Date: January 2026 Citation: Vidovic, D., Marmier, A., Zore, L. and Moya, J. (2023). Greenhouse gas emission intensities of the steel, fertilisers, aluminium and cement industries in the EU and its main trading partners, Publications Office of the European Union, Luxembourg, DOI: 10.2760/359533, JRC134682. License: Public	Public (included)
	HS_GTAP.dta **Aggregation_CBAM.xlsx** Source: Global Trade Analysis Project (GTAP) URL: https://www.gtap.agecon.purdue.edu/databases/regions.aspx?Version=11.211 Access Date: January 2026 Citation: Global Trade Analysis Project (2023). GTAP 11 Data Base. Purdue University. License: Public	Public (included)
	indicators_csgroup_c_1990_2022.dta Source: Obtained from the authors of Direct and Indirect trade Indicators: Arvis, J-F, A Burman, Espitia, J-C Maur, D. Rocha, D. Ulybina URL: https://wwwstg.worldbank.org/en/programs/trade-exposure/direct-and-indirect-trade-indicators/eora Access Date: January 2026 Citation: Arvis, J.-F., Burman, A., Espitia, A., Maur, J.-C., Rocha, N., & Ulybina, D. (2025). Measuring exposure and vulnerability to international trade shocks, World Bank Policy Research Working Paper No. 11243. License: Underlying data not publicly available, but included in the reproducibility package	Internal (included)
	sec_des.dta Source: EORA (dta file created from Eora26structure.xlsx) URL: https://worldmrio.com/countrywise/ Access Date: January 2026 License: Public	Public (included)
	WB_Country Classification.dta Source: World Bank Country and lending group classification website (2025)	Public (included)

	URL: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups Access Date: January 2026 License: Public	
Figures 2.5 - 2.9	Based on publicly available data and restricted data. The code to replicate the exhibits, conditional on access to all required data, is provided.	
	fDi_markets_sectors.dta **fdimarkets_exposure_raw.csv** **fdimarkets_cbam_panel_raw.csv** **fdi_country_codes.xlsx** Source: fDi Markets database (Financial Times) URL: https://www.fdimarkets.com Access Date: January 2026 License: Restricted (subscription)	Internal (not included)
	us_cpi.csv Source: International Financial Statistics database, International Monetary Fund (IMF) URL: https://data.worldbank.org/indicator/FP.CPI.TOTL Access Date: January 2026 License: Public	Public (included)
	GMD.csv Source: Global Macro Database URL: https://www.globalmacrodata.com Access Date: March 2025 Citation: Müller, Karsten, Chenzi Xu, Mohamed Lehbib, and Ziliang Chen. 2025. "The Global Macro Database: A New International Macroeconomic Dataset (Version 2026-03)." NBER Working Paper No. 33714. National Bureau of Economic Research. April. https://doi.org/10.3386/w33714 License: Public	Public (included)
	gravity_vars.csv Source: CEPII Gravity Database URL: https://www.cepii.fr/CEPII/en/bdd_modele/bdd_modele_item.asp?id=8 Access Date: March 2025 Citation: Conte, M., P. Cotterlaz and T. Mayer (2022), "The CEPII Gravity database". CEPII Working Paper No. 2022-05, July 2022. License: Public	Public (included)
	mena_country_list.xlsx Source: Authors' own elaboration (list of countries to simplify the coding)	Internal (included)
	cbam_sectors.xlsx	Internal (included)

	Source: Authors' own elaboration (list of sectors to simplify the coding)	
	2017 emission intensity_MENA.xlsx **Default_emission_intensity.xlsx** **JRC_emission_intensity.xlsx** Source: Authors' own elaboration (based on the estimated CBAM Trade Exposure Index reported in Figure 2.2)	Internal (included)
	itpd_go_cbam.csv (Fig. 2.8, Fig. 2.9) Source: International Trade and Production Database for Estimation (build from "ITPD_S_R1_no_names.csv") URL: https://www.usitc.gov/data/gravity/itpds Access Date: January 2026 Citation: Borchert, I., Larch, M., Shikher, S., and Yotov, Y. (2024). Globalization, Trade, and Inequality: Evidence from a New Database. USITC Working Paper 2024-11-A. License: Restricted (subscription)	Public (included)
Figure 3.1	**MENA_Regional_TCP_CT_2026-2036_v2.xlsx** Source: Based on forecast data generated using the Climate Policy Assessment Tool (CPAT) of the International Monetary Fund and World Bank Group (Black et al. 2023) URL: https://www.worldbank.org/en/topic/climatechange/brief/climate-policy-assessment-tool Access Date: January 2026 Citation: Black, S., I. Parry, V. Mylonas, N. Vernon, and K. Zhunussova (2023). The IMF-World Bank Climate Policy Assessment Tool (CPAT): A Model to Help Countries Mitigate Climate Change. IMF Working Paper No. 2023/128 License: Access to CPAT is restricted	Internal (included)
Figure 3.2	Source: Graphic taken from IFC & UNEP (2024), *Cooler Finance: Mobilizing Investment for the Developing World's Sustainable Cooling Needs*, Washington DC. License: Underlying data not publicly available	Internal (not included)
Figure 3A.2	**Figure 3A.2.xlsx** Source: Based on publicly available data from Betz and Ravasan (2016) and Dornel et al. (2020), as well as WBG internal elaboration. Citation: Betz, F., & Ravasan, F. R. (2016). Collateral regimes and missing job creation in the MENA region. EIB Working Papers, No. 2016/03, European Investment Bank. Dornel, A. D., M. Ait Ali Slimane, and K. Mohindra. 2020. "Improving SME Access to Trade Credit and Financing in MENA." MENA Knowledge and Learning Quick Notes 180, World Bank. License: Underlying data not publicly available, but included in the reproducibility package	Internal (included)
Figure 3A.3	**Figure 3A.3.xlsx**	Internal (included)

	Source: WBG internal elaboration based on selected financial press. License: Underlying data not publicly available, but included in the reproducibility package	

2) Instructions for Replicators

Follow the steps below to reproduce the tables and figures in the report.

Map 1.1:

1. Navigate to https://datanalytics-int.worldbank.org/global-weather-map (WBG internal)
2. Select the respective countries and climate indicator (number of extreme heat days)
3. Take a screenshot

Figures 1.1 - 1.6:

1. Obtain access to the dataset "mena_recent_v2" (not included in the reproducibility package)
2. Navigate to "Chapter 1" > "Figure_1.1_1.6" > "data" and place "mena_recent_v2" in this folder.
3. Navigate to the folder "Chapter 1" > "Figure_1.1_1.6" and run "install_packages.R"
4. Open "mena_main.R" in R and edit "base_dir" (line 9) to the directory where the "Figure_1.1_1.6" folder has been saved
5. Run the entire "mena_main.R" code in one go
6. Outputs will be saved in the "figures" and "tables" folders within the "Figure_1.1_1.6" folder
7. Copy the respective data into "Excel_Charts_Reproducibility.xlsx" (in the "Chapter 1" folder) and create the exhibits as follows:

Figure 1.1	Generated by: generate_heat_category_table() Data: tables/heat_exposure_table.csv Final chart: created in "Excel_Charts_Reproducibility.xlsx"
Figure 1.2a	Generated by: run_all_regs() Data: tables\DirectEffects\Recent\CountrySectorFE_Controls \HeatDays_table_difference.html Final chart: created in "Excel_Charts_Reproducibility.xlsx"
Figure 1.2b	Generated by: run_all_regs() Data: tables\Interactions\Recent\CountrySectorFE_Controls\Sales \BasicCharacteristics.html Final chart: created in "Excel_Charts_Reproducibility.xlsx"
Figure 1.3a	Generated by: hd_on_electricity_regressions() Data: tables/Efficiency/hd_on_generatorelecshare.html tables/Efficiency/hd_on_elecconsump.html Final chart: created in "Excel_Charts_Reproducibility.xlsx"
Figure 1.3b	Data on power outages were taken directly from the WBES website Southern EU = average of France, Italy, Spain, and Portugal Final chart: created in "Excel_Charts_Reproducibility.xlsx"
Figure 1.4	Generated by: calculate_adaptation_takeup() Data: tables\AdaptationTakeup\mena_cooling_share.xlsx

	Final chart: created in “Excel_Charts_Reproducibility.xlsx”
Figure 1.5a	Data on energy intensity were taken directly from IEA Energy and Carbon Tracker 2023 Southern EU = average of France, Italy, Spain, and Portugal Final chart: created in “Excel_Charts_Reproducibility.xlsx”
Figure 1.5b	Generated by: calculate_efficiency_dispersion() Data: tables\Efficiency\efficiency_dispersion.csv Final chart: created in “Excel_Charts_Reproducibility.xlsx”
Figure 1.6a	Generated by: generate_quintiles_plot() Data: “Excel_Charts_Reproducibility.xlsx” Final chart: created in R and stored in: figures\Efficiency\ energyefficiency_quintiles.png
Figure 1.6b	Generated by: firm_on_intensity_regressions() Data: tables\Efficiency\gvc_on_intensity.html tables\Efficiency\spw_on_intensity.html Tables\Efficiency\size_age_on_intensity.html Final chart: created in “Excel_Charts_Reproducibility.xlsx”

Figures 1.7 - 1.8:

1. Navigate to the folder “Chapter 1” > “Figure_1.7_1.8” > “scripts”
2. Open “0_master.R” in R and edit “root_dir” (line 9) to the directory where the “Figure_1.7_1.8” folder has been saved
3. Run the entire “0_master.R” code in one go
4. Outputs will be saved in the “figures” folder within the “Figure_1.7_1.8” folder
5. The exhibits are created as follows:

Figure 1.7a	Generated by: 0_master.R Data: Figures - Chapter 1.xlsx Final chart: created in R and stored the “figures” folder (“Figure_1.09a.png”)
Figure 1.7b	Generated by: 0_master.R Data: Figures - Chapter 1.xlsx Final chart: created in R and stored the “figures” folder (“Figure_1.09b.png”)
Figure 1.8	Generated by: 0_master.R Data: Figures - Chapter 1.xlsx Final chart: created in R and stored the “figures” folder (“Figure_1.10.png”)

Figure 2.1

Schematic diagram (no underlying data, no replication)

Figures 2.2 - 2.4 / Table 2.1 / Figure B.2.2.1:

1. Navigate to the folder “Chapter 2” > “Figure_2.2_2.4” > “Code”
2. Open “main.do” in Stata and edit “global main” (line 15) to the directory where the “Chapter 2” folder has been saved
3. Run the entire “main.do” code in one go
4. Outputs will be saved in the “Output” folder within the “Figure_2.2_2.4” folder
5. The exhibits are created as follows:

Figure 2.2	Generated by: Cbam_mass_index.do Data: MENA_CBAM.xlsx Final chart: created in "MENA_CBAM.xlsx" ("fig2.2B", "fig2.2AB" tabs)
Figure 2.3	Generated by: Cbam_mass_index.do Data: MENA_CBAM.xlsx Final chart: created in "MENA_CBAM.xlsx" ("fig 2.3" tab).
Figure 2.4	Generated by: Cbam_mass_index.do Data: MENA_CBAM.xlsx Final chart: created in "MENA_CBAM.xlsx" ("fig 2.4" tab)
Table 2.1	Generated by: cge_ave.do Data: MENA_CBAM.xlsx Final chart: created in "MENA_CBAM.xlsx" ("table2.1" tab)
Figure B.2.2.1	Generated by: gvc_data.do Data: MENA_CS3D.xlsx Final chart: created in "MENA_CS3D.xlsx" ("Fig B2.2.1" tab)

Figures 2.5 - 2.9:

1. Obtain access to the "fDi Markets" database (not included in the reproducibility package)
2. Navigate to "Chapter 2" > "Figure_2.5_2.9" > "data_in" and place the "fDi Markets" database in this folder (keeping the names and folder structure intact).
3. Navigate to the folder "Chapter 2" > "Figure_2.5_2.9" > "scripts"
4. Open "0_directories_and_packages.R" in R and edit "root_dir" (line 8) to the directory where the "Figure_2.5_2.9" folder has been saved
5. Run the entire "0_directories_and_packages.R" code in one go
6. Outputs will be saved in the "figures" and "tables" folders within the "Figure_2.5_2.9" folder
7. The exhibits are created as follows:

Figure 2.5	Generated by: 0_directories_and_packages.R Data: figures_and_tables_raw.xlsx Final chart: created in R and stored the "figures" folder ("Figure_2.5b_InwardFDI_MENA_ByOrigin_nproj.png")
Figure 2.6	Generated by: 0_directories_and_packages.R Data: tables\figures_and_tables_raw.xlsx Final chart: created in "figures_and_tables_raw.xlsx" ("Figure 2.6" tab)
Figure 2.7	Generated by: 0_directories_and_packages.R Data: tables\figures_and_tables_raw.xlsx Final chart: created in "figures_and_tables_raw.xlsx" ("Figure 2.7" tab)
Figure 2.8a	Generated by: 0_directories_and_packages.R Data: figures_and_tables_raw.xlsx Final chart: created in R and stored the "figures" folder ("2.8a_fdi_vs_cbam_exposure_aluminum_logs.png")
Figure 2.8b	Generated by: 0_directories_and_packages.R Data: figures_and_tables_raw.xlsx Final chart: created in R and stored the "figures" folder ("2.8b_fdi_vs_cbam_exposure_ironandsteel_logs.png")
Figure 2.9a	Generated by: 0_directories_and_packages.R

	Data: figures_and_tables_raw.xlsx Final chart: created in R and stored the "figures" folder ("2.9a_fdi_vs_cbam_exposure_cement_logs.png")
Figure 2.9b	Generated by: 0_directories_and_packages.R Data: figures_and_tables_raw.xlsx Final chart: created in R and stored the "figures" folder ("2.9b_fdi_vs_cbam_exposure_fertilizers_logs.png")

Figure 3.1:

1. Navigate to the folder "Chapter 3"
2. The figure is created in "MENA_Regional_TCP_CT_2026-2036_v2.xlsx" ("Fig 3.1" tab)

Figure 3.2:

Graphic taken from IFC & UNEP (2024) (no replication)

Figures 3A.2 - 3A.3:

1. Navigate to the folder "Chapter 3"
2. The figures are created in "Figure 3A.2.xlsx" and "Figure 3A.3"

3) Computational Requirements

Required software are **R** and **Stata**.

The R code was run using the following specifications:

- R version 4.3.2 (2023-10-31 ucrt)
- Platform: x86_64-w64-mingw32/x64 (64-bit)
- Windows 11 x64 (build 26200)
- Matrix products: default

Approximate code runtime: 15 minutes.

The Stata code was run using the following specifications:

- Stata version 18 (but it perfectly works in any previous Stata version)
- Dell laptop, 16 GB RAM, and an 11th Gen Intel ® Core™ processer.
- Windows 11 Enterprise version

Approximate code runtime: 10 minutes.