

README for Reproducibility Packages – 25 February 2026

Project Overview

The reproducibility package reproduces the figures and tables of the paper “**COMPLETING THE AFCFTA MOSAIC: LIBERALIZATION OF SERVICES**” by Karlygash Dairabayeva, Carmen Estrades, and Maryla Maliszewska. Scripts required to reproduce the results in the paper using the raw datasets are located in the categorized folders and generate outputs that are saved under the folder ‘Output’.

Data Availability Statement & Provenance Statements

☐ This paper does not involve analysis of external data (i.e., no data are used or the only data are generated by the authors via simulation in their code).

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.

☐ I certify that the author(s) of the manuscript have documented permission to redistribute/publish the data contained within this replication package.

Summary of Availability

☒ All data are publicly available.

☐ Some data cannot be made publicly available.

☐ No data can be made publicly available.

While at the time of the writing, we cannot share the data for other projects, we can provide access for replication purposes of this study (conditional on the signing of a confidentiality agreement and a security agreement). Individuals interested in accessing the data for replication purposes can contact Maryla Maliszewska (Mmaliszewska@worldbank.org). We will provide reasonable assistance with requests for clarification and replication.

Details on each Data Source

We list the sources of raw data, where to download them, and their names. We extract the needed data for analysis from the source, cleaned them, and maintain the folder structure for easy replication. While we provide some raw data, we lack the license to publish all files.

Datasets

1. The raw data for trade in services was downloaded from the OECD BATIS Database.

Description of the BATIS Database is available at: [The OECD-WTO Balanced Trade in Services Database \(BaTIS\) | OECD](#) . Actual database is [OECD Data Explorer • Balanced trade in services \(BaTIS\)](#).

To replicate the parameters of the search, please choose “Bulk download – all data.” Data was accessed in November, 2025.

Depending on computation capacity, this can take a while because the source data file is large.

Afterwards, in the do file, choose individual AfCFTA countries and World in “Reference area”, select 2005-2023 in “Time period”, select Exports in “Flow”, and select Services in “Service.”

“OECD-WTO_BATIS_BPM6_January2025_bulk.csv”, and

In BATIS dataset, the Reported value, Final value and Balanced value are expressed in million USD. The Reported value is the trade as reported by the relevant statistical authorities. The Final value includes the reported data and all the estimations and adjustment procedures (as defined by the Methodology code) used to ensure complete consistency of the dataset. The Balanced value is the reconciled trade value of reported exports and mirror imports (and vice-versa)

2. Trade in goods and services was taken from “WDIData,” which is publicly available data from the World Bank, World Development Indicators. [World Development Indicators | DataBank](#)

Select Database = World Development Indicators”, Country = “select all”, Series = “Service exports (BoP, current US\$) BX.GSR.NFSV.CD”, “Goods exports (BoP, current US\$) BX.GSR.MRCH.CD”, and “Exports of goods and services (BoP, current US\$) BX.GSR.GNFS.CD,” Time = “1960-2023.”

Download and save as “WDIData.csv” file.

3. The STRI data is an extract of the World Bank-WTO STRI dataset. The full dataset can be downloaded from the Services Trade Policy Database WTO database accessible through <http://i-tip.wto.org/services/> , using the download dropdown menu of the STRI on the selection page.

The OECD Services Trade Restrictiveness Index database contains information on trade restrictions and behind the border regulation in 22 sectors (transport, financial, professional, logistics, audiovisual, construction, telecommunications, distribution, computer). The STRI indicators and database have been updated to 2024 for all sectors. The entries in the database are documented with reference to the sources.

On the website [WB-WTO | I-TIP Services](#), select “STRI” in the Services Trade Policy Database and STRI. Select in Economies – “All economies,” Sectors – select “All sectors” (that includes Professional, Computer, Communications, Construction, Distribution, Financial, Health, Tourism, Transport). Mode of Supply – select “All modes (includes Mode 1, Mode 3 and Mode 4). In Download – select “Selection, csv.”

Download and save as “STRI.csv.”

Computational Requirements

Software requirements

Required software is Stata. The code was run in version 18, but it perfectly works in any previous Stata version. Other software used is Microsoft Excel.

Memory and runtime requirements

The code was run for the last time in a Dell laptop with Windows 11 Enterprise version, 16 GB RAM, and an 11th Gen Intel® Core™ processor, Stata 15. A replicator could expect the whole code to run in less than 10 minutes.

Instructions for Replicators

Folder structure

For full replication of the project, we suggest the following, complete folder structure.

1_DATA

2_Code

Update the folder path to your working directory to run all the do-files. The main do file contains 7 sub do-files.

3_Output

The code in the folder ‘Code’ will reproduce some of results included in the report. Please download codes from folder ‘Code’ and raw data from ‘Data’ and follow the steps.

Open the folder and navigate to codes. Please update the directory to your own, following the code’s direction.

Run a do file to generate the underlying data to create the figures.

All figures in the manuscript are manually created.

CGE model and database.

All simulation results (figures and tables reporting impacts of AfCFTA on GDP, trade, sectoral output, prices, and welfare) are generated with the ENVISAGE global recursive-dynamic CGE model developed at the World Bank. ENVISAGE is calibrated on the standard GTAP global database (version 10, benchmark year 2014). For this research, regions are consolidated into 34 groups (including 29 African countries/regions), and sectors into 21 categories, 10 of which are services. The GTAP database supplies the benchmark social accounting matrices, bilateral trade flows, and applied tariffs for all regions and sectors.

Core trade data source. Bilateral exports and imports of goods and services in GTAP 10 are built primarily from UN Comtrade merchandise trade statistics and international trade in services data, which are then reconciled and balanced across reporters and partners.

Link to national accounts. These trade flows are integrated with each country's input–output or social accounting matrix, which in turn is constructed from national supply–use tables and national accounts (production, consumption, investment, government, etc.).

Coverage and structure. The resulting GTAP 10 Data Base describes, for each of 141 regions and 65 goods and services sectors, production, intermediate and final uses, bilateral trade and international transport margins, plus taxes and subsidies, all in a single balanced dataset for the reference years (2004, 2007, 2011, 2014).

Policy shocks and scenarios.

Calibration of services NTMs: baseline AVEs of restrictions on trade in services are taken from Jafari and Tarr (2015), and the policy shocks in our scenarios apply the percentage AVE reductions estimated by Borchert and Go (2023) to these baseline values by country and sector.

The Excel file in this replication package contains the ENVISAGE output tables for the baseline and AfCFTA scenarios; reproducing these results requires licensed access to the GTAP database and the ENVISAGE model code, which are therefore not redistributed here.

List of Exhibits

The provided code and data reproduce:

- ☐ All numbers provided in text in the paper
- ☒ All tables and figures in the paper

□ Selected tables and figures in the paper, as explained and justified below

Table below provides a mapping between all tables of the paper (including the online appendix) and the codes producing these results.

Exhibit name	Output filename	Code	Notes
Figure 1.	Extracted total services (item code="S") from the BATIS dataset for total exports of services between World-AfCFTA, and World-World in order to calculate: share of world services exports (right-hand axis); Africa's services exports (left-hand axis), US\$ billion. OECD-WTO_BATIS_BPM6_January2025_reduced_nov.dta, Fig1_afr_wld.xls	PART 1. "01_AfCFTA_services_share.do"	Manually copy paste the result from the BATIS raw data file "Fig1_afr_wld.xls", generated by the code into the FINAL excel file, tab "Fig.1" (cells A19-U19). Note: the BATIS bulk dataset is large and has been reduced to "OECD-WTO_BATIS_BPM6_January2025_reduced_nov.dta"
Figure 1.	AfCFTA_rep_services.dta, AfCFTA_rep_services_2021_23.dta Fig2_output.xls	PART 1. "02_africa_wld_x_m.do"	Manually copy-paste the result from the excel file Fig2_output.xls, generated by the code into the FINAL Excel file, tab "Fig.2" (cells B7-E9). The BATIS bulk dataset is large and has been reduced to 2 output files "AfCFTA_rep_services_2021_23.dta" and "AfCFTA_rep_services.dta"
Figure 3.4.	AfCFTA_rep_services.dta, AfCFTA_rep_services_2021_23.dta, BATIS_services_total_Africa_Africa.dta, FIG.3.4_services_bysector_total.xls	PART 3. "03_intraAfCFTA_Trade.do"	Manually copy-paste the result from the excel file FIG.3.4_services_bysector_total.xls, generated by the code into the FINAL Excel file, tab "Fig.3.4." (cells B47-J71). The BATIS bulk dataset is large and has been reduced to 2 output files "AfCFTA_rep_services_2021_23" and "AfCFTA_rep_services." In main excel file, tab."Fig.3.4", the category

			“Other services” was a sum of these services: Manufacturing services on physical inputs owned by others, Insurance and pension services, Maintenance and repair services n.i.e., Personal, cultural, and recreational services, and Charges for the use of intellectual property n.i.e.
Fig.5.			Copied from the report WTO and World Bank. (2023)
Tab.1.	Baseline ad-valorem tariff equivalents (AVEs) of non-tariff measures on services for selected African countries and sectors. These AVEs are directly taken from Jafari and Tarr (2014/2015), “Estimates of Ad Valorem Equivalents of Barriers Against Foreign Suppliers of Services in Eleven Services Sectors and 103 Countries,” World Bank Policy Research Working Paper 7096, and re-tabulated for the countries and sectors used in our CGE model.		Own elaboration based on Jafari and Tarr (2015)
Fig.6.	The left-hand panel of Figure 6 shows the baseline ad-valorem tariff equivalents (AVEs) of non-tariff measures on services, taken from Jafari and Tarr (2015) and mapped to the model’s six services sectors. The right-hand panel reports the percentage reductions (“shocks”) to these AVEs under four liberalization scenarios, which are calibrated from the AVE changes implied by Borchert and Go’s (2023) STRI-based estimates of services trade cost reductions for African countries.	Source of AVE shocks (Borchert and Go, 2023). Scenario-specific changes in AVEs are calibrated from Borchert and Go (2023), who use the World Bank–WTO Services Trade Policy Database to construct Services Trade Restrictions Indices (STRI) for 54 African economies and to estimate the trade-cost (AVE) implications of alternative policy reforms across modes of supply. In our simulations, these estimated percentage reductions in AVEs are applied to the baseline AVEs by sector and country to obtain the shocks shown on the right-hand side of Figure 6.	Own elaboration based on Jafari and Tarr (2015) and Borchert and Go (2023)

Fig. 7. 8. 9.10.11.	Figures 7–11 report results from the ENVISAGE CGE simulations for 2035, expressed as deviations from the Business-as-Usual (BaU) baseline. Figures 7 and 8 show percentage changes in total exports and imports (all goods, and then services only) for the AfCFTA region, comparing simulations with and without the endogenous productivity “kick” associated with stronger competition and scale effects, following the approach used in the World Bank AfCFTA report. Figures 9 and 10 present the same export and import impacts by scenario (Scenarios 1–4 on services liberalization), but in levels (US\$ millions) and again distinguish results without and with productivity effects. Figure 11 reports the percentage change in sectoral output in 2035 under Scenario 1, comparing the case without productivity impacts to the case where the productivity kick is activated, to highlight how productivity-driven efficiency gains amplify output responses across sectors.	All quantitative results in Figures 7–11 and related tables are generated with the ENVISAGE global recursive-dynamic CGE model developed at the World Bank. The “Envisage results” sheets in the Excel file are direct model outputs, shown as percentage deviations from or level differences relative to the Business-as-Usual (BaU) baseline in 2035. ENVISAGE is calibrated on the GTAP 10 Data Base, which assembles and balances reconciled UN trade statistics and national input–output/social accounting data into a consistent global dataset of bilateral trade, gross output, and value added by sector and region. Figure 11 specifically reports percentage deviations of simulated sectoral output in 2035 from the BaU path for Scenario 1, with and without the productivity.	Results from GTAP CGE estimation
Table 2.			Own elaboration based on results of CGE simulation analysis
Table 3.4.5.6.7.	Table 3 reports CGE model outputs rather than direct data. Welfare changes (percentage deviations from BaU in 2035 under Scenario 1, deep services trade liberalization) are equivalent-variation changes in real income computed by the ENVISAGE model calibrated on the GTAP 10 Data Base, using its regional household utility specification. These welfare measures are derived from the calibrated GTAP 10 social accounting data on income, expenditure, and prices and are reported directly in the “Envisage results” sheets of the Excel file.	Tables 4,5,6 show results from previous World Bank (2020, 2022) studies. Table 7 - the sectoral output levels used to calibrate Uganda in ENVISAGE come from the GTAP 10 Data Base, which constructs each country/region’s gross output and value added from official national input–output or supply-use tables and national accounts, reconciled with international trade and price statistics into a consistent global SAM.	Own elaboration based on results of CGE simulation analysis and previous studies World Bank (2020) and World Bank (2022)

Fig.12.13.	Figures 12 and 13 report percentage changes in Uganda's sectoral output and exports in 2035 relative to the BaU baseline under the "full trade reform" scenario; both figures are taken directly from the ENVISAGE simulation results calibrated on the GTAP 10 Data Base for Uganda and correspond to the values reported in the "Envisage results" sheets of the Excel file.		Own elaboration based on results of CGE simulation analysis
ANNEX			
Table A1.			Copied from WB-WTO STRI Methodology.pdf
Table A2. A3.			GTAP
Table B1.B2.B3. B4.			Own elaboration based on AVE data
Fig. B1.			Own elaboration from GTAP 10 database
Table C1.C2.C3.	Tables C2 and C3 report percentage changes in AfCFTA countries' output and exports in 2035 relative to the BaU baseline, for goods and services and for the four services-liberalization scenarios (Scenario 1: minimum STRI; Scenario 2: Mode 1; Scenario 3: Mode 3; Scenario 4: Mode 4). These country-level results are taken directly from the ENVISAGE CGE simulations calibrated on the GTAP 10 Data Base and correspond to the "Envisage results" sheets in the Excel file.	GTAP 10 builds the country-level output and export data it uses from official national and international statistics: national input-output or supply-use tables and national accounts for production and value added, combined with reconciled UN merchandise trade and international trade-in-services statistics for bilateral exports and imports, all balanced into a consistent global social accounting matrix.	Own elaboration based on results of CGE simulation analysis
Fig.C1.C2. C3.	Figures C1–C3 report ENVISAGE CGE simulation results for 2035 expressed as percentage deviations from the BaU baseline. Figure C1 shows sectoral output changes for the AfCFTA region under Scenarios 2–4 (services trade liberalization by modes 1, 3 and 4), with and without productivity impacts. Figures C2 and C3 report country-level welfare changes	GTAP 10 underpins Figures C1–C3 by providing the benchmark economic data on which ENVISAGE is calibrated. It compiles, reconciles, and balances each country/region's national input-output or supply-use tables and national accounts (production, value added, final demand) with UN	Own elaboration based on results of CGE simulation analysis

	under the same scenarios, without and with productivity impacts, respectively. All values are taken directly from the ENVISAGE simulations calibrated on the GTAP 10 Data Base and correspond to the “Envisage results” sheets in the Excel file.	merchandise trade and international trade-in-services statistics to construct a globally consistent social accounting matrix of sectoral output, trade, income, and expenditure.	
Fig. D1.D2.D3.	Figures D1–D3 report ENVISAGE CGE simulation results for 2035, expressed as deviations from the BaU baseline. Figure D1 shows the impact on AfCFTA imports (US\$ million), Figure D2 the impact on exports (US\$ million), and Figure D3 the difference in real-income gains between the non-MFN and MFN market-access scenarios (percentage change relative to BaU). All values are taken directly from the ENVISAGE simulations calibrated on the GTAP 10 Data Base and correspond to the “Envisage results” sheets in the Excel file.	The baseline levels of trade and income used for these deviations come from GTAP 10, which consolidates national input–output/supply-use tables, national accounts, and UN merchandise and services trade statistics into a globally consistent social accounting matrix.	Own elaboration based on results of CGE simulation analysis
Table E1.			Own elaboration