

Replication Instructions

The results of the paper can be generated using the already processed data (stored in `/@ImportExport/data`) by running the following notebooks:¹

1. **Small Open Economy Model:** `'model_soe.ipynb'` generates the results in Section 2 and Section 3. Specifically, Table 1, Table 2, and Figures 3, 4, 5, 6, 7, 8, 15, 16, 17
2. **Data:** `'data_plots.ipynb'` generates results in Section 1 and Section 5. Specifically, Figures 1, 2, 10, 11, 19, 20
3. **Quantitative model for world economy:** Following three notebooks generate results in Section 4 and Section 6
 - a. `'model_world_economy_longrun.ipynb'`: Long run results (Table 2 and Figure 9)
 - b. `'model_world_economy_fiscal_shock_dynamics.ipynb'`: Quantitative model with fiscal shocks (Figure 14).
 - c. `'model_world_economy_covid_shock_dynamics.ipynb'`: Quantitative model with covid shocks (Figures 12, 13, 18, 21).

The tables generated are stored in `/@ImportExport/results/tables` and the figures are stored in `/@ImportExport/results/figures`.

To download and prepare the data from scratch, run the following notebooks in order. These notebooks take as input the raw files from `/@ImportExport/data/raw` (details of the raw files are provided below)

1. **Data Preparation:** Following notebooks download the data from IMF, OECD, prepares a master dataset for analysis, and computes the inputs for calibration of model parameters for all 26 countries (See Section D.1 for further details):
 - a. `'data_prep_imf.ipynb'`: This code downloads fiscal and current account balances from IMF along with other aggregate series including GDP, exchange rates, consumption
 - b. `'data_prep_oecd.ipynb'`: This code downloads private savings and net investment data from OECD
 - c. `'data_prep_shortrun.ipynb'`: This code cleans and merges the downloaded and raw data together to prepare a master dataset for analysis
 - d. `'data_analysis_shortrun.ipynb'`: This code computes the excess private savings, excess current account and excess investment series. It generates Table 4
2. **Calibration:** `'model_calibrate_countries.ipynb'` calibrates the parameters for the set of 26 countries in the sample and generates Table 5 (See Section E.1 for calibration details)

The data files and calibration dictionaries are stored in `/@ImportExport/data/output`

¹ These notebooks can be run in any order if they call the files in `/@ImportExport/data`. However, if the data is prepared from scratch, then the notebooks should be run in order given above as the notebooks can be interdependent.

Details of Raw Files:

Following files are used as inputs for data preparation and calibration of parameters. The files are stored in */@ImportExport/data/raw*

1. *country_list.xlsx*: This file contains the list of countries, their IMF codes, OECD Codes, and World Bank Codes, and economic grouping provided by IMF.²
2. *IMFCodes.xlsx*: Contains IMF IFS and BoP codes for the main variables used in the analysis
3. *Canada_data.xlsx*: This file contains data for Canada and includes fiscal balances, GDP and Consumption series (from IMF IFS)³
4. *QASA_TABLE801.xlsx*: This file contains the data for sectoral gross savings and consumption of fixed capital downloaded directly from OECD Quarterly National Accounts.⁴
5. *QPSD_GrossDebt.xlsx*: This file contains the data for gross debt and its constituents downloaded from World Bank's Quarterly Public Sector Debt database.⁵
6. *WDI.xlsx*: This file contains annual data for openness and government spending downloaded from World Development Indicators
7. *Covid_data.csv* containing covid lockdown stringency index and deaths for set of 26 countries in the sample.⁶
8. *IMF_Fiscal_Monitor.xlsx*: This file contains the annual data for General Government Net Debt data.⁷
9. *SCF Lorenz Curve.xlsx*: This file contains the wealth distribution downloaded from Survey of Consumer Finances 2019.⁸
10. *JPMorgan_distribution.xlsx*: This file contains the average checking account balance for the top 20% and bottom 80% households. The data is provided by JPMorgan Chase Institute.

Results:

The results in the paper (all tables and figures) are stored in */@ImportExport/results* folder. In addition, */@ImportExport/figures* contain temporary figures or additional results not included in the paper.

² <http://www.imf.org/external/datamapper/FMEconGroup.xlsx>

³ <https://data.imf.org/?sk=4c514d48-b6ba-49ed-8ab9-52b0c1a0179b&sld=1409151240976>

⁴ https://stats.oecd.org/Index.aspx?DataSetCode=QASA_TABLE801

⁵ <https://databank.worldbank.org/source/Quarterly-Public-Sector-Debt/>

⁶ <https://ourworldindata.org/coronavirus>

⁷ <https://www.imf.org/en/Topics/imf-and-covid19/Fiscal-Policies-Database-in-Response-to-COVID-19>

⁸ <https://www.federalreserve.gov/econres/scfindex.htm>

Details for data preparation and calibration notebooks:

1. `'data_prep_imf.ipynb'`: This notebook downloads IMF data on current account (from IMF Balance of Payment statistics) and fiscal positions (from IMF International Financial Statistics). Input files needed are
 - a. `country_list.xlsx`
 - b. `IMFCodes.xlsx`
 - c. `Canada_data.xlsx`and stores:
 - a. `IMF_data_by_country.pkl` where all variables are stored in LCU billions
2. `'data_prep_oecd.ipynb'`: This notebook downloads OECD data on private savings and net investment. Requires providing FRED API key for the US data. Input files needed are
 - a. `country_list.xlsx`
 - b. `QASA_TABLE801.xlsx`and stores:
 - a. `data_oecd_savings.xlsx` containing the private savings series in LCU billions
 - b. `data_oecd_investment.xlsx` containing the net investment series in LCU billions
3. `'data_prep_shorrun.ipynb'`: This notebook merges the data from IMF, OECD, gross debt from World Bank QPSD, Covid stringency index and creates a raw dataset ready for the main analysis. Input files needed are:
 - a. `country_list.xlsx`
 - b. `IMF_data_by_country.pkl`
 - c. `data_oecd_savings.xlsx`
 - d. `data_oecd_investment.xlsx`
 - e. `QPSD_GrossDebt.xlsx`
 - f. `QASA_TABLE801.xlsx`
 - g. `covid_data.csv`and stores:
 - a. `twin_deficits_raw_data.xlsx`
4. `'data_analysis_shorrun.ipynb'`: This notebook runs the main analysis to compute the excess variables for the set of countries that have data on current account and fiscal balances. This also prepares the data for calibrating model parameters. Input files needed are:
 - a. `country_list.xlsx`
 - b. `WDI.xlsx`
 - c. `twin_deficits_raw_data.xlsx`
 - d. `IMF_Fiscal_Monitor.xlsx`and stores:
 - a. `passthrough.xlsx` containing the passthrough coefficient during Covid era

- b. *twin_deficit_time_series.xlsx* time series data for 26 countries plus the set of 16 countries in Rest of the World (See Table 4 for countries in ROW). All values in LCU billions, except for ROW (which is in USD billions)
 - c. *model_input_world_economy.xlsx* containing excess variables (private savings, current account, and investment) for 26 countries and ROW. All excess variables are expressed in % of annual GDP.
 - d. *trend_values_world_economy.xlsx* that contains pre-Covid trend values. All excess variables are expressed in % of annual GDP
 - e. *country_data_for_calibration.xlsx* contains the sample of countries and their characteristics

and generates

 - a. *"Table 4: Countries in our sample and their characteristics.xlsx"*

- 5. *'model_calibrate_countries.ipynb'*: This notebooks calibrates the model parameters for the set of 26 countries in the sample. The user has the option to run the "Symmetric Model" calibration by setting `symmetric = 1` and the "Quantitative Model" calibration by setting `symmetric = 0`. The input files needed are:
 - a. *country_data_for_calibration.xlsx*

and stores calibrated parameters as dictionaries for the two cases:

 - a. *country_calibrations_symmetric_tax1.pkl* containing calibrated parameters for the "Symmetric Model"
 - b. *country_calibrations_asymmetric_tax1.pkl* containing calibrated parameters for the "Quantitative Model"

and generates:

 - a. *"Table 5: Calibration Outcomes.xlsx"*