# Data replication for *Measuring the Macroeconomic Impact of Carbon Taxes*

Gilbert Metcalf and James Stock

*Last revised: February 20, 2022*

All programs are in Stata

*Run master\_MetcalfStock.do to replicate the results. Change the directory in this file to your local computer.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Replication files and details** | | | |
| 1: [Creating the base dataset](#_Files_to_create) | | | |
| **Task** | **Do file** | **Output file** |
| Define names and IDs for countries to make them comparable across datasets | names.do | names.dta |
| Compile GDP data | gdp.do | gdpdata.dta |
| Compile carbon tax data | ctax.do | ctax\_CTI.dta |
| Compile employment data | employment.do | employment.dta |
| Merge all the above data and run calculations to create the final dataset | merge and calculate 2018.do | ctax\_gdp\_AERPP2018.dta |
| 2: [Replication of AERPP results](#_Replication_of_AERPP) | | |
| Create tables 1 and 2 for Metcalf and Stock (2020) | EUctax\_IRF\_AERPP.do | AERPP\_Tables.xlsx |
| [3: Appendix figure](#_Figures_and_Tables) | | |
| Create final figure | EUctax\_IRF\_5.do | Final figures and plots written to the “results” folder |
|  | EUctax\_IRF\_CIRF\_lin\_tabfig.do |
| **master\_MetcalfStock.do runs all these files and replicates the final results. Change the directory in this file to replicate the results on your device.** | | |

\*Note that there are small discrepancies from the paper results due to a rounding error in the original code.

## **Creating the base dataset:**

### Names

**Do file**: names.do

**Output dataset**: names.dta

**Input file**: names\_2digit\_corrected.xlsx

Corrects names and acronyms of different countries to make them comparable across datasets.

### GDP data

**Do file**: gdp.do

**Output dataset**: gdpdata.dta

**Replicability with 2022 data:**

* Replicable, refer to the Read Me sheet in OECD\_GDP.xlsx, Irish modified GNI.xlsx, and Norway\_mainland\_gdp.xlsx
* Need to reshape the data. Have added a do file: “Rearrange raw data.do” which does this
* For Norway’s GDP data, make sure the file is arranged properly. Compare to the previous dataset.

Compiles GDP data the following datasets:

|  |  |  |
| --- | --- | --- |
| **Data** | **File** | **Source** |
| GDP deflator 2015, 2016 | OECD GDP/US GDP deflator (FRED) | [FRED: Implicit price deflator](https://fred.stlouisfed.org/series/A191RI1A225NBEA) (A191RI1A225NBEA) |
| OECD PPP for each country | OECD GDP/OECD PPP | [OECD PPP](https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm#indicator-chart) |
| Real GDP (LCU) | OECD GDP/real GDP LCU | [World bank GDP constant LCU](https://data.worldbank.org/indicator/NY.GDP.MKTP.KN) |
| GDP deflator in LCU, base year varies | OECD GDP/real GDP deflator LCU | [World bank GDP deflator](https://data.worldbank.org/indicator/NY.GDP.DEFL.ZS) |
| Irish GDP | Irish modified GNI | [GDP: Ireland CSO](https://www.cso.ie/en/statistics/nationalaccounts/nationalincomeandexpenditureannualresults/)  [CPI: Ireland CSO](https://www.cso.ie/en/databases/consumerpriceindex/) |
| Norwegian GDP | Norway\_mainland  \_gdp | [Statistics Norway](https://www.ssb.no/en/statbank/table/09189/tableViewLayout1/) |

### Carbon taxes

**Do file**: ctax.do

**Output data**: ctax\_CTI.dta

**Replicability with 2022 data:**

* These data were compiled by the authors

Compiles carbon tax data, mainly from the [World Bank’s carbon pricing dashboard](https://carbonpricingdashboard.worldbank.org/map_data).

Merges the following datasets:

|  |  |  |
| --- | --- | --- |
| **Data** | **File** | **Source** |
| Share of the jurisdictions’ GHG emissions covered | WB\_CarbonTaxData/share | Data compiled by authors based on information from the [carbon pricing dashboard](https://carbonpricingdashboard.worldbank.org/map_data). Goes on to generate the share of emissions covered by carbon taxes in 2019. |
| Carbon tax rates in local currency | WB\_CarbonTaxData/ rate\_LCU | Data compiled using the [carbon pricing dashboard](https://carbonpricingdashboard.worldbank.org/map_data) |

### Employment

**Do file**: employment.do

**Output file**: emissions 2018

**Input file**: Total employment domestic\_Thousand persons.xlsx”]

Source: [Eurostat](https://ec.europa.eu/eurostat/data/database) (Employment by A\*10 industry breakdowns)

**Replicability:**

* Update the “EUarea..” variable names in global in do file

Merges total employment for the relevant countries and renames them (using names.dta) to maintain consistency with the rest of the data.

### **Merge and Calculate**

**Do file**: merge and calculate 2018.do

**Input files**: gdpdata.dta, ctax\_CTI.dta, employment.dta

**Output**: ctax\_gdp\_2018, ctax\_gdp\_AERPP2018

**Replicability:**

* Update the variable names

This file merges all the above datasets, modifies them, and creates the final dataset for calculations.

## **2. Replication of AERPP results**

**Input**: ctax\_gdp\_AERPP.dta

**Output**: AERPP\_results.xlsx (Table 2)

Replicates the results for Metcalf and Stock (2020).

Do files:

* EUctax\_IRF\_AERPP.do: This is the main program.
* EUctax\_IRF\_AERPP\_out\_r1.do: formatting and writing output, called by main file

NOTE: In March 2020 we found a data bug that makes minor changes to some EU2 results.

So, the EU2 results in the out\AERPP\_results.xlsx spreadsheet don't match Table 2 exactly for EU2, although they do match for the CT20 countries (countries with CT >= $20). There are no qualitative changes. For example, the upper left estimate in Table 2 is 0.10 (SE = 0.43). Using the corrected data, the result is (0.14) (SE = 0.41).

## **3. Appendix figure**

**Input**: ctax\_gdp\_AERPP.dta

Output tables and figures stored in stata/results.

These files create the final figures and tables:

* EUctax\_IRF\_5.do: produces linear IRF plots
* EUctax\_IRF\_CIRF\_lin\_tabfig.do: called by EUctax\_IRF\_5.do

The version in the replication file only runs the results for the full data set ("EU+").

Other notes for these files:

* Levels/differences option controls whether long run effect of the tax on the growth of the variable is 0 (parallel path)
* IRFs are the effect of the tax increase on the growth rate of the dependent variable
* Intervention is an increase of $40, held at that level, covering 30% of emissions (as in the paper)