

README

“The Macroeconomics of Clean Energy Subsidies”

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Overview

The code provided in this replication package reproduces all figures and calculations in the paper and the appendix. The model simulations are run from Mainfile.m, which calls other subfiles and Dynare. In addition, two calibration calculations are done using data from the Energy Information Administration (EIA). These calculations are performed in Excel.

Data Availability and Provenance Statement

We certify that the authors have legitimate access to and the permissions to use the data in this study. All data sources are publicly available and included in this replication package.

Details on Each Data Source

This replication package uses one external data source the Monthly Energy Review from the Energy Information Administration (EIA, 2023). All relevant data are included in the file ‘Data Calculations.xlsx’ and can be downloaded from <https://www.eia.gov/totalenergy/data/monthly/>. Specifically, we use data from Tables 1.1, 11.1, and C.1. Further details are provided in the ‘audit’ tab of the excel file.¹

Data name	Data files	Location	Provided	Citation
Monthly Energy Review	See ‘Data Calculations.xlsx’. All tabs to the right of ‘data-->’	data/	TRUE	EIA (2023)

Dataset List

See above.

¹ Energy Information Administration (2023): “Monthly Energy Review,” <https://www.eia.gov/totalenergy/data/monthly/> (accessed 9/21/23).

Computational Requirements

The code in this replication package requires Matlab, Dynare, and Excel.

Software Requirements

- All results can be replicated by running 'Mainfile.m' section by section. Before doing so, it is necessary to change the working directory (line 5) and the path to Dynare (line 6).
- Excel (last run with version [16.101.3](#))
 - o Two calculations are done in the excel file 'Data Calculations.xlsx.' These are then entered by hand into 'Mainfile.m.' Specifically, cell K13 in the excel file is entered into line 41 in 'Mainfile.m,' and cell G6 is entered into line 37 in 'Mainfile.m.'
- Matlab (last run with version [R2024b](#)) + Dynare (last run with [4.6.2](#))
 - o The total running time for the analysis was 13 hours, 15 minutes, and 23 seconds. The results were last run on a virtual machine running Windows 11 Education (version 24H2), equipped with an AMD EPYC 7543 32-Core Processor, 40 GB of RAM, and an NVIDIA A40-2Q vGPU (2 GB). To avoid file access conflicts, we strongly recommend executing the code from a local directory rather than a synchronized cloud folder (e.g., Dropbox).

Details

- Mainfile.m: m file that reproduces all the analyses by calling the following files.
 - o ModelFinal.mod: Dynare file that solves the model.
 - o calibratem.m: m file that calibrates the damage parameter m.
 - o WelfarePOP.m: m file that calculates lifetime utility for a given sequence of consumption and dirty energy use.
 - o CEVPOP.m: m file that calculates the CEV for two given lifetime utilities.
 - o Policy_Exp_Welfare.m: m file that calculates the negative of social welfare to be minimized to solve for the second-best green subsidy and the first-best dirty tax.

List of tables and programs

The provided code reproduces all numerical results in the paper, excluding those cited from other studies or directly observable from the figures. It also fully reproduces all tables and figures.

The table below provides the sources for all tables and figures. All outputs are produced using ‘Mainfile.m.’

Figure/Table	Line number	Output file
Table 1	27-41, 115, 233	calibration.mat
Figure 1 top left	164-184	/Output/IRA/eps1/Energy.pdf
Figure 1 top right	164-184	/Output/IRA/eps1/Macro.pdf
Figure 1 bottom left	281-301	/Output/IRA/eps2/Energy.pdf
Figure 1 bottom right	281-301	/Output/IRA/eps2/Macro.pdf
Figure 2 top left	409-435	/Output/SBO/eps2/Energy.pdf
Figure 2 top middle	409-435	/Output/SBO/eps2/Macro.pdf
Figure 2 top right	409-435	/Output/SBO/eps2/SBCleanSubsidy.pdf
Figure 2 bottom left	544-585	/Output/Tax/eps2/Energy.pdf
Figure 2 bottom middle	544-585	/Output/Tax/eps2/FBDirtyTax
Figure 2 bottom right	544-585	/Output/Tax/eps2/FBCarbonTax.pdf

The following table provides the sources for all other numerical results reported in the text that are not featured in a table or figure. All such values are calculated in ‘Mainfile.m’ and saved in ‘for_paper.mat.’

Number	Line number	Output variable
Low EoS dirty increase 1.6%	159	Ep1EComp
Low EoS CEV -0.16%	140-141	CEVep1IRA
High EoS dirty reduction 6.6%	277	Ep2EComp
High EoS CEV 0.0%	258-259	CEVep2IRA
Second best clean subsidy schedule	341-343	tauc_shock_best_alternate
Second best clean subsidy dirty reduction 5.9%	397	SBOEComp_ep2
Second best clean subsidy CEV 0.06%	395-396	CEVep2SBO
First best dirty tax schedule	476-478	taud_shock_best_alternate
First best dirty tax dirty reduction 54.4%	532	TAXEComp_ep2
First best dirty tax dirty CEV 0.75%	530-531	CEVep2TAX
Cutoff value 1.09	44	cutoff_eps