Replication Materials for "Are There Environmental Benefits from Driving Electric Vehicles? The Importance of Local Factors"

Stephen P. Holland Erin T. Mansur Nicholas Z. Muller
Andrew J. Yates

June 15, 2016

This document describes how to replicate Tables 1-7 and Figures 1-3 in the paper.

All Tables Except Table 6

Data and Programs

Data and programs for all Tables except Table 6 are included in the folder "MD Veh calcs posted". This folder contains a number of Stata 13 data sets and several do files, as described below.

Stata 13 do files

1. create DamEVeh.do. Creates damages from electric vehicles (baseline, own state, own county) and stores the results in intermediate Stata data sets for subsequent calculations.

2. create DamGVeh.do. Creates damages from gasoline vehicles (baseline, own state, own county) and stores the results in intermediate Stata data sets for subsequent calculations.

3. analysis10.do. Creates all Tables except Table 6 and 7. Also creates data that is used as input for programs that create Table 6.

4. sensitivity.do. Creates Table 7.

Inputs: Stata data sets

1. Marginal damages by local pollutant and county from AP2

   (a) Area_Source_MD_2011_2MVSL.dat. 2 million VSL.

   (b) Area_Source_MD_2011_6MVSL_5th_95th.dta. 5th and 95th percentile.

   (c) Area_Source_MD_2011_6MVSL_Roman.dta. Roman et al dose response for PM_2.5.

   (d) Area_Source_MD_2011_6MVSL.dta. Baseline.

2. cbsatocountycrosswalk.dta. Maps counties to MSAs.

3. ChargPct.dta. Charging profiles.

4. electriccar.dta. Electricity consumption for electric cars (from EPA data).

5. fips2NERC.dta. Mapping from county identifiers (fips codes) to NERC regions.

6. fipscodes.dta. State and county names with fips codes.

7. Marginal damages by NERC region and hour from AP2 and econometric model.

   (a) MDelectric_carbon_2011_2MVSL.dta. Damages from carbon, 2 million VSL.

   (b) MDelectric_carbon_2011_Future.dta. Damages from carbon, future grid.

   (c) MDelectric_carbon_2011_Reg2.dta. Damages from carbon, binding caps on carbon.

   (d) MDelectric_carbon_2011_roman.dta. Damages from carbon, Roman et al dose response.

   (e) MDelectric_carbon_2011.dta. Damages from carbon, baseline.

   (f) MDelectric_local_2011_2MVSL.dta. Damages from local pollution, 2 million VSL.

   (g) MDelectric_local_2011_5th.dta. Damages from local pollution, 5th percentile.

   (h) MDelectric_local_2011_95th.dta. Damages from local pollution, 95th percentile.

   (i) MDelectric_local_2011_Cnty.dta. Damages from local pollution, at county level.

   (j) MDelectric_local_2011_Future.dta. Damages from local pollution, future grid.

   (k) MDelectric_local_2011_Reg1.dta. Damages from local pollution, binding caps on NO_x.

   (l) MDelectric_local_2011_Reg2.dta. Damages from local pollution, binding caps SO_2 and NO_x.

   (m) MDelectric_local_2011_Roman.dta. Damages from local pollution, Roman et al dose response.

   (n) MDelectric_local_2011_State.dta. Damages from local pollution, at state level.

   (o) MDelectric_local_2011.dta. Damages from local pollution, baseline.

8. ShareCnty.dta. Native damage data from AP2 (percent of pollution that stays in county.)

9. ShareState.dta. Native damage data from AP2 (percent of pollution that stays in state.)

10. Temperature Month.dta. Average daily temperature by county and month (from CDC data).

11. vehicles.dta. Emissions of gasoline vehicles (from EPA data).

12. VMT_NEI_v1_2011_21aug2013_v5.dta. VMT by county (from EPA MOVES).

Stata data sets: Intermediate calculations

1. DamEVeh_2011.dta.

2. DamEVeh_2011Cnty.dta.

3. DamEVeh_2011State.dta.

4. DamGVeh_2011.dta.

5. DamGVeh_2011Cnty.dta

6. DamGVeh_2011State.dta.

Execution instructions

Set the "cd" command at the top of each do file to reflect the directory on the local machine. Run "create DamEVeh.do" and "create DamGVeh.do" three times, setting the global variable "flag" equal to 1 for baseline results, 2 for own state damages, and 3 for own county damages. This generates the six intermediate Stata data sets ("DamEVeh_2011.dta", "DamEVeh_2011Cnty.dta, etc.). Then run "analysis10.do" and "sensitivity.do".

Table 6 and Figures 1-3

Data and Programs

Data and programs for Tables 6 are included in the "Welfare_posted" folder. This folder contains several Excel workbooks, and a number of Mathematica 10 notebooks.

Inputs: Excel Workbooks (data created by "analysis10.do")

1. B-states_full. Marginal damages (cents/mile) by state for gas and electric Ford Focus.
2. C-county_full. Marginal damages (cents/mile) by county for gas and electric Ford Focus.
3. D-states_native. Native marginal damages (cents/mile) by state for gas and electric Ford Focus.
4. E-county_native. Native marginal damages (cents/mile) by county for gas and electric Ford Focus.

This input can be used in conjunction with standard GIS software to generate Figures 1-3. To create Table 6, the following Mathematica notebooks must be run.

Mathematica 10 notebooks.

1. calibrate. Determines values for μ and H, places result in parms.xlxs file. This file is used as input by some of the other notebooks.
2. welfare_big. Determines welfare values for purchase subsidies.
3. welfare_big_tax. Determines welfare values for taxes (i.e. tax on both gas and electric miles).
4. welfare_electric_only A-B. Welfare values for tax on electricity only at federal and state level.
5. welfare_electric_only A-C. Welfare values for tax on electricity only, federal and county level.

6. welfare_gas_only_A-B . Welfare values for tax on gas only, federal and state level.

7. welfare_gas_only_A-C. Welfare values for tax on gas only, federal and county level.

8. welfare_A-B_current_subsidy. Determines welfare values for current federal subsidy of 7500.

9. welfare_A-B_zero_subsidy. Determines welfare values for BAU subsidy of 0.

10. welfare_A-B_federal native. Determines welfare for federal subsidy policy with native damages.

11. welfare_A-B_federal native tax. Determines welfare for federal tax policy with native damages.

Execution instructions

Go into each program and change the "SetDirectory" command to reflect the directory on the local machine. First run calibrate, and then run the rest of the programs in any order.