

Tutorial 4 – Environmental policies: instruments

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This exercise is based on Metcalf and Stock paper titled “Measuring the Macroeconomic Impact of Carbon Taxes” (2020, *AEA: PP*). The paper is available [here](#).

The answers (.pdf or hand-written) and Stata do-file should be submitted before Tutorial 4 (November 24).

1. What is the research question of this paper?
2. What is the novelty in their approach compared to previous papers that investigated the same research question?
3. Download the dataset `ctax_gdp_AERPP.dta` (posted on Canvas), open it on Stata, and briefly describe it. (The description should include the origin of the data, the main variables the dataset contains, the number of observations, and any other relevant information).
4. Using Stata, reproduce Table I of the paper, i.e. a list of all countries in the sample that have a carbon tax in 2018, with the year of implementation, the 2018 tax rate, and the share of emissions covered in 2019. Discuss the table.
5. Pick 3 countries of your choice. For each of them, plot the growth rate of GDP and growth rate of employment over time.
6. Create a new variable called *weighted_carbon_rate* that represents the carbon tax rate of each country weighted by the share of emissions covered in 2019. Create a label for this variable.
7. Run a simple linear regression of the GDP growth rate on *weighted_carbon_rate*. Do the same for the employment growth rate instead of the GDP growth rate. Why can't we interpret the results as reliable estimates of the effect of carbon taxes on GDP and employment?
8. Regress GDP growth and employment growth on *weighted_carbon_rate* with country and year fixed effects and standard errors clustered at the country level. Comment on the results of these two regressions. (Hint: first create a categorical variable for countries. Then use the command `xtset` to tell Stata which variable you use for country and for time. This will be important when you will create lag variables in Question 10.)
9. Create a dummy variable called *CT20* equal to 1 if the country has a carbon tax of at least \$20 for at least one year over the whole period. Then, re-run the two fixed-effects regressions of the previous question on the subsample of countries with *CT20*=1, and compare the results.

10. Create three lag variables (of degrees 1 to 3) for the variable *weighted_carbon_rate*. Run the fixed effects regressions on the full sample, including these three lags. What do you conclude about the medium-run effects of carbon taxes on GDP and employment?
11. Create three lag variables (of degrees 1 to 3) for GDP growth and employment growth. Run fixed effect regressions of the variable *weighted_carbon_rate* on these lag terms (run two separate regressions, one with GDP lags, one with employment lags). What do the results suggest with respect to the endogeneity of *weighted_carbon_rate* in the previous regressions?
12. What is the main takeaway of this paper? What do you think about the robustness of the results?