Tutorial 2 – Instrument choice for climate policies

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1 Multiple choice questions

1. Why is a carbon tax and dividend progressive in developed countries?
   (a) Poor households spend more in energy goods, and more as a share of their income.
   (b) Poor households spend less in energy goods, but more as a share of their income.
   (c) Poor households spend less in energy goods, and less as a share of their income.
   (d) Poor households spend more in energy goods, but less as a share of their income.
2. According to Dell et al (2012)'s findings, higher temperatures:
   (a) negatively affect the growth rate of both poor and rich countries, with larger effect in rich countries;
   (b) negatively affect the growth rate of both poor and rich countries, with larger effect in poor countries;
   (c) negatively affect the growth rate of rich countries and have no to little effect in poor countries;
   (d) negatively affect the growth rate of poor countries and have no to little effect in rich countries.
3. In a simple economy where many polluters have heterogeneous abatement costs, which of the following statements is correct?
   (a) Taxes and subsidies have the same efficiency and the same equity effects.
   (b) Taxes and tradable permits have the same efficiency, but not the same equity effects.
   (c) Tradable and non-tradable permits have the same efficiency, but not the same equity effects.
   (d) Subsidies and non-tradable permits have the same efficiency, but not the same equity effects.
4. Which of the following statements is true?
   (a) To be optimal, an allocation must also be efficient.
   (b) To be efficient, an allocation must also be optimal.
   (c) To be sustainable, an allocation must also be optimal.
   (d) To be sustainable, an allocation must also be efficient.

2 Document analysis

1. Explain the idea behind the "Synthetic Control Method", used for example by Andersson (2019) and Leroutier (2022).

2. In 1990, Sweden reformed the taxation of transport fuels: the VAT was increased, and a carbon tax was introduced. Figure 2.1 below comes from Andersson (2019). The author compares the emissions per capita from transport in Sweden, to what it would have been absent the reform. This counterfactual is represented by the "Synthetic Sweden". Describe the graph and comment on the effect of the reform.

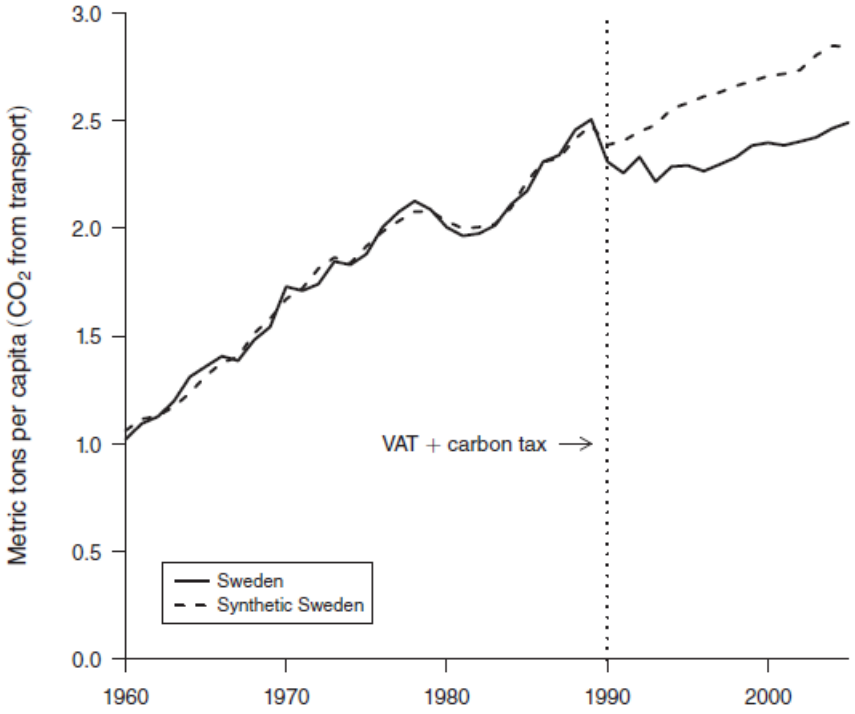


Figure 2.1: Per capita CO_2 emissions from transport during 1960-2005: Sweden versus Synthetic-Sweden (from Andersson, 2019).

3. In 2013, a carbon tax was introduced in the U.K. power sector. Figure 2.2 below comes from Leroutier (2022). It follows the same methodology as Andersson (2019) to compare emissions per capita from the power sector in the U.K., to what it would have been absent the policy. This counterfactual is represented by the "Synthetic UK". Describe the graph and comment on the effect of the policy. (Note: you can ignore the third curve representing the "Naive counterfactual").

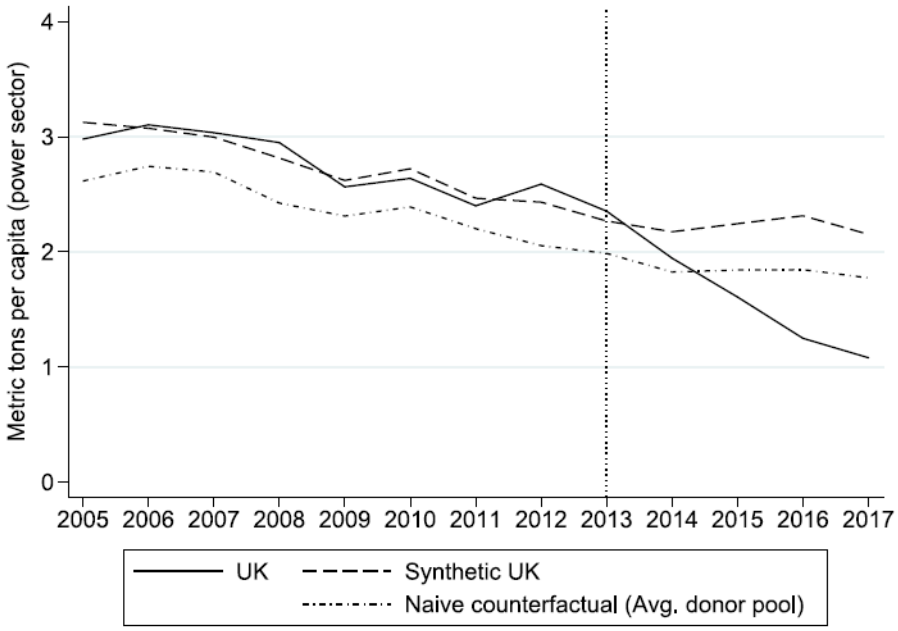


Figure 2.2: U.K. and synthetic U.K. per capita emissions (from Leroutier, 2022).

4. Explain what the EU-ETS is (what it stands for, what its goal is, and how it works).

5. Not all installations (factories, power plants, etc.) in the EU are subject to the EU-ETS. The ETS applies only to installations bigger than a certain threshold. If one wants to measure the effectiveness of the EU-ETS at changing firms' environmental outcome, what could be the problem of comparing the EU-ETS firms (whose installations are subject to the ETS) and the non-EU-ETS firms (whose installations are not subject to the ETS)?

6. In order to assess the impact of the EU-ETS on firms' green innovation, Calel and Dechezlepretre (2016) select only a sub-sample of EU-ETS and non-EU-ETS firms. They describe their method as follows: "*In order to control administrative costs, the EU ETS was designed to cover only large installations. Firms operating smaller installations are not covered by EU ETS regulations, although the firms themselves might be just as large as those affected by the regulations. Because innovation takes place at the firm level, we can exploit these installation-level inclusion criteria to compare firms with similar resources available for research and similar patenting histories, but which have fallen under different regulatory regimes since 2005.*" Explain how their method can address the issue raised in question 5.

7. Figure 2.3 below comes from Calel and Dechezlepretre (2016). From this figure, what do you conclude about the effect of the EU-ETS on low-carbon innovations?

8. Figure 2.4 below comes from Pizer and Sexton (2019). Based on this figure, do you expect a carbon tax levied on electricity to be progressive in these three countries? What about a carbon tax levied on motor fuels? Explain your answer.

9. Figure 2.5 below comes from Pizer and Sexton (2019). From this figure, should we expect that a carbon tax and dividend levied on electricity and gasoline be beneficial for all poor households

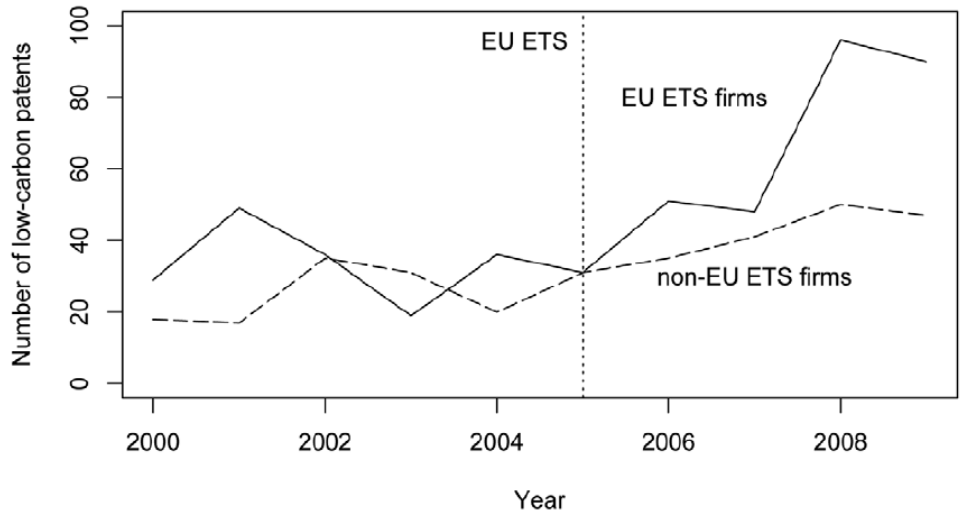
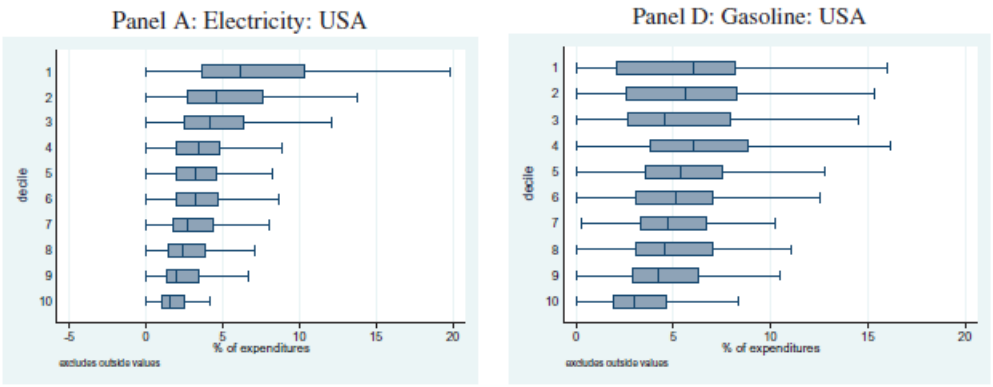


Figure 2.3: Low-Carbon Patents by EU-ETS and Non–EU-ETS Firms (from Calel and Dechezlepretre, 2016).

in the U.S.? Explain your answer.

10. Figure 2.6 below comes from Williams et al (2015). It shows the expected welfare gains (expressed in percentage of income) from a carbon tax whose revenue would be redistributed through a lower tax on capital (left), a lower tax on labor income (middle), or an equal lump-sum transfer for all households (right). The figure depicts the effect for each income quintile, and for the average household. Why can we talk of an efficiency-equity trade-off for the choice of the revenue recycling?

Figure 2.4: Average household electricity and motor fuels expenditures as percentage of total spending for the U.S., the U.K., and Mexico, by decile from poorest (decile 1) to richest (decile 10) (From Pizer and Sexton, 2019).



Notes: For each decile (1 = poorest, 10 = richest), the shaded box shows the interquartile range (IQR) with the median indicated by a line; the whiskers show the range of values within 1.5 times the IQR on either side of the box.

Figure 2.5: Within-decile variation in electricity and gasoline expenditures, by decile from poorest (decile 1) to richest (decile 10) (From Pizer and Sexton, 2019).

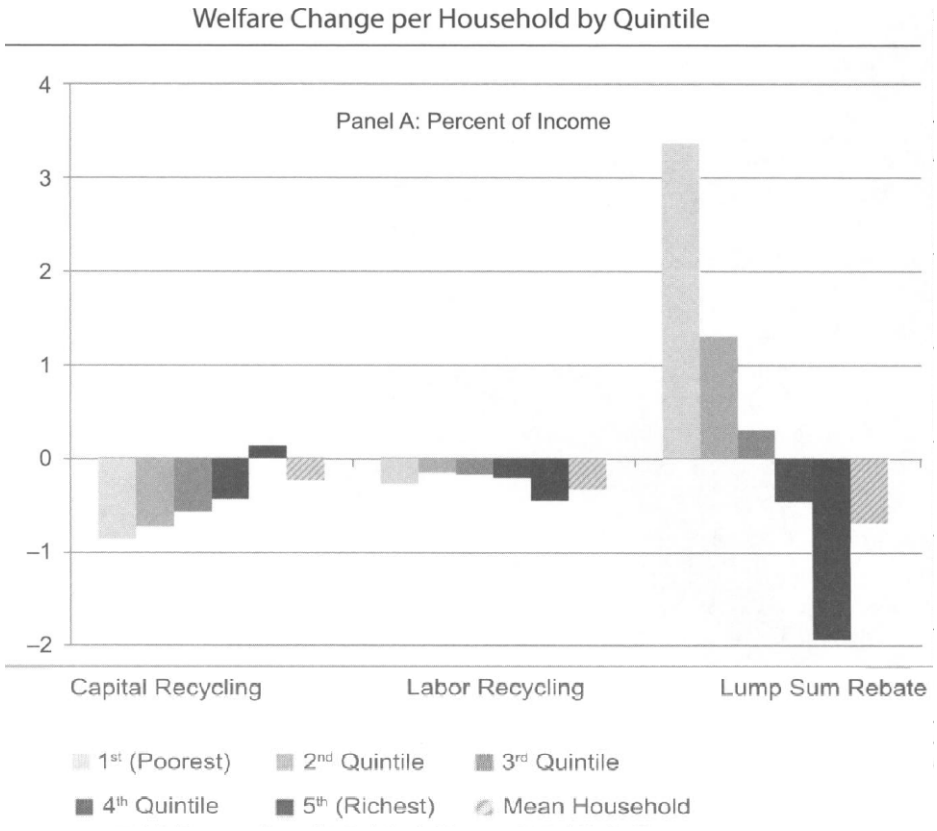


Figure 2.6: Distributional effects of a carbon tax with alternative revenue-recycling in the U.S.