AAE 343 Discussion Section 11

April 19, 2019

I. Notes on climate change & carbon taxes

- Examples of places where economic logic can contribute to discussions about managing climate change:
  - How do we discount future costs/benefits? (Or is discounting even the appropriate framework? – recall comments in lecture about intergenerational equity)
  - How does the prospect of future innovation affect intergenerational tradeoffs we're willing to make?
  - How do we design policy to account for people's/countries' heterogeneous tolerance for climate-related risk? What about when climate tipping points exist?
  - How do we coordinate international climate policy to ensure that countries don't free ride on efforts of others?
- Preferred baseline climate policy of most economists: carbon tax. This is a tax imposed on universally on releases of carbon dioxide (CO2), which is emitted largely through the combustion of fossil fuels.
- A carbon tax could lead to overall economic growth, if the tax revenues are used in a way that promotes economic growth. For example, carbon tax revenues could be used to replace current income tax revenues (revenue neutrality).
- The double dividend associated with a carbon tax refers to the concept that a revenue-neutral carbon tax policy can generate an increase in social net benefits by reducing both CO2 emissions and a distortionary tax.
- Leakage occurs when reduced carbon emissions in one country result in increased emissions elsewhere. This can occur on at least 2 margins when we imagine a country unilaterally passing a carbon tax…
  - "Direct": Production of energy-intensive goods move to (carbon) pollution havens, where emissions are not taxed and production is therefore cheaper.
  - "Indirect": reduced demand for carbon-intensive fossil fuels (read: coal) in the country where the carbon tax is passed *could* lower global prices for that resource. Lower prices mean further use of the fossil fuel in pollution havens
- International climate policy:
  - Unilateral or coalition multilateral climate policy not very helpful (see above)
  - Despite what dark corners of the internet say, there is not some international enforcement body that can force countries to participate in climate treaties
  - Some ideas to play around with:
    - If you sign an international agreement, what happens when one country backs out? (Answer: everyone backs out). Need to design *self-enforcing* treaty where everyone has incentives to remain in coalition.
    - Countries have more/less developed economies and energy tech. How to balance countries' differing growth needs while getting full participation?
    - Short-term vs long-term climate commitments: more politically feasible but prospect of renegotiations can lead to hold-ups problems. Why improve tech today if you will be held to tougher standard tomorrow?
    - Cheeky "supply-side" argument (Harstad, 2012): what if a coalition of countries concerned about climate change decide to buy coal in ground and "retire" it? Indirect leakage mitigated, non-coalition countries incentivized to go green.

Problem 1 *Questions about carbon taxes*

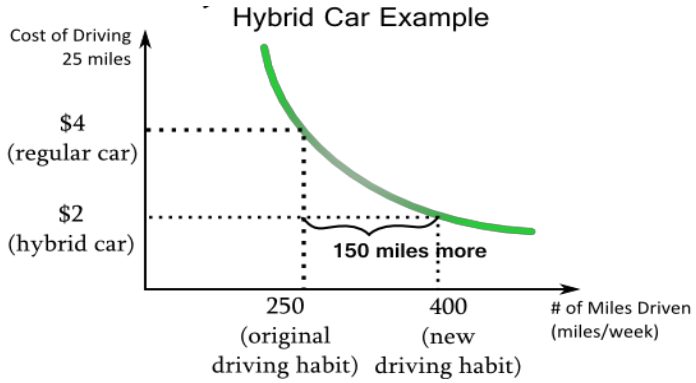
1. Explain why many economists strongly support carbon taxes to reduce carbon emissions.

2. Explain why a revenue neutral carbon tax is a source of a "double dividend"? Use figures to identify the two components of the double dividend in the case where the carbon tax allows the removal of taxes on private goods (i.e., sales tax).
3. Explain why a revenue neutral carbon tax does not ensure that every member of society is better off.

II. Energy Efficiency

- Energy efficiency refers to how little energy is used to achieve a particular level of output. The less energy is used to produce a given outcome, the more energy-efficient it is.
- The rebound effect is the result of higher efficiency leading to lower operating costs and greater demand for energy; efficiency improvements also generate an income effect. (Analogous to "indirect" effect of leakage mentioned in section I)
- Jevon's paradox is an extreme case: when price elasticity of demand is high, an increase in energy efficiency can result in an increase in total energy consumption.

Problem 2 *Jevon's Paradox* - Assume gas consumption is the only cost of a vehicle mile.



1. Suppose that a gas price is $2 per gallon. How many gallons of gas were used originally by a regular car and a hybrid car?
2. With the new driving habit, how many gallons of gas are used?
3. Describe (graphically) a new driving habit that exhibits Jevon paradox?

Top Hat Q1 Suppose the TAC is set by the government and ITQs are allocated to the two firms in the industry: firm A and firm B. The government allocates the permits based on firm size. The permit allocation is Q_A and Q_B. If the firms are allowed to trade:
Top Hat Q2 The maximum that a firm is willing to pay for a permit is equal to: