

Some Notes on Carbon Taxes versus Cap-and-Trade Systems (dlc 3/9/2015)

Suppose citizens of a state, country, or group of countries seek to regulate future emissions of carbon dioxide (CO₂) and possibly other greenhouse gases (GHG). Regulatory options within the geographical region include mandating the use of specific technologies and/or establishing (and enforcing) emissions quotas at the firm- or plant-level. In contrast to such *direct* regulatory approaches, carbon taxes and cap-and-trade systems are *indirect* strategies; both are based upon *pricing* CO₂ (and GHG equivalent) emissions.

- **Carbon taxes** (or emissions fees) establish a *fixed price* per ton of CO₂ (or GHG equivalent). However, the total amount of emissions generated is uncertain.
- **Cap-and-trade approaches** establish a *fixed maximum quantity* of allowable CO₂ emissions for the region under regulation. However, the *price* of such allowances is uncertain: it is established dynamically through trading these allowances among parties that generate CO₂ emissions.

In sum, “a price policy provides a fixed incentive (dollars per ton of CO₂ emissions), regardless of the emission levels, and a quantity policy generates whatever incentive is necessary to strictly limit emissions to a specified level” (Pizer, 228).

A major advantage of emissions pricing over mandating technology or specifying emissions quotas at the plant- or firm-level is that only the cheapest reductions are undertaken (at least in theory).¹

Is there a clear preference between these two generic emissions pricing proposals?

The costs of meeting international GHG emissions targets depend upon several factors, including population, the level of economic growth, and the development of new technologies. (Recall Doug Muschett’s discussion of the I = PAT formula last year.) In view of such uncertainties, William Pizer² employed economic theory and numerical simulations to claim that the net economic benefits (expected benefits minus expected costs) are much greater for carbon tax approaches than cap-and-trade strategies.

In a lengthier and more recent paper³, two Standard economists have examined the strengths and weaknesses of carbon taxes vs. cap-and-trade approaches along several “dimensions,” including volatility of emissions prices, administrative costs, wealth transfers to oil-exporting countries, linkage across political jurisdictions, and political feasibility. They conclude that *neither approach dominates* and that the specific mechanisms by which each might be implemented can be as important as the generic type of the strategy itself.

Both papers favorably include **hybrid approaches**, in which CO₂ price and quantity control mechanisms are combined. Essentially, cap-and-trade activities operate, within a price floor and/or price ceiling.

¹ If the price of emitting a ton of CO₂ is established by the regulatory agency, then cost-minimizing firms will only take steps to reduce emissions that cost less than this fixed price. If the emissions price is established via trading allowances within an overall cap, profit-maximizing firms that can reduce emissions at a cost less than the trading price will do so and sell their surplus permits to firms that would find such emissions reductions more costly than the trading price.

² William Pizer, “Choosing Price or Quantity Controls for Greenhouse Gases,” in *The RFF Reader in Environmental and Resource Policy*, 2nd edition, Wallace C. Oates, editor (Washington, D.C.: Resources for the Future, 2006).

³ Lawrence Goulder and Andrew Schein, “Carbon Taxes versus Cap and Trade: A Critical Review,” in *Climate Change Economics*, Vol. 4, No. 3 (2013), 28 pp.