Auctions in RGGI and in the US Electricity Sector

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*Resources for the Future*

EU ETS Auction Workshop  
Cambridge, January 12, 2007
- RGGI public benefit allocation
- NY, NJ
- End-use investments
- July 06 Workshop
- Road Map

- Note intended use of revenues
Auctions and Auctioneering: Public Policy Applications

Charles Holt, University of Virginia

- Auctions can bypass wasteful rent-seeking
- Auctions create real economic value by finding the high-value users
- Auctions promote price discovery by bringing together all buyers and releasing significant quantities
- Auctions are fast, fair, and generate high revenue when properly designed
- Emissions allowances are relatively homogeneous, so auctions should be simpler to design. Holt would suggest looking at clock auctions as strong candidates for generating fast, efficient, and high-revenue outcomes, i.e. maximum public benefit.
Road Map

- Articulate the goals of the allowance auction.
- Identify basic auction designs that are consistent with goals.
- Identify a range of relevant auction parameters.
- Solicit input from stakeholders and independent experts.
- Develop a short list of potentially appropriate designs.
- Test auction designs with laboratory experiments.
- Develop proposed auction rules.
- Take care with set-asides and preferential allocation.
Annual Asset Value of Emission Allowances

- **Venus**: NOx $1.7 Billion
- **Earth**: SO2 $2.7 Billion
- **Jupiter**: Carbon 34% Reduction (Kyoto) Economy Wide $450 Billion
- **Neptune**: Carbon 6% Reduction in Electricity $15-$24 Billion
Compensation

Key assumption: Long-run costs to shareholders accrue only in competitive regions.

- Consumers realize greatest loss, but harm is diffuse.
- Measure of “deserved” compensation for producers depends on the yard-stick.
  - Industry-level cost is 1/8\textsuperscript{th} of allowance value in competitive regions (1/16\textsuperscript{th} nationally).
  - At firm-level, a revelation strategy invoking complete information/precise policy could achieve full compensation for 22\% of allowance value, creating $8 billion for winners.
NPV of CO₂ Emission Allowances = $141 billion

Losses at Industry Level (-$9b)

Losing Facilities (-$50b)  Winning Facilities (+$41b)

Losing Firms (-$14b)  Winning Firms (+$5b)

Change in Market Value of Individual Assets (billion dollars)

Firm A  Firm B

Firm C  Firm D

(-)  0  (+)
Compensation has a significant opportunity cost.

- Free allocation (100%) provides over-compensation of $65 billion (1999$).
- With information about fuel & technology characteristics a (smart) blunt policy can achieve the goal for 39% of allowance value, with overcompensation of $19.5 billion.
- With information about firm-level emission rates a (smart) blunt policy can achieve the goal for 32% of allowance value, with overcompensation of $15 billion.
- The incremental opportunity cost of compensating for the last $2.6 billion is $26 billion at the federal level.
Electricity Price Effects of Allowance Allocation Depends on Electricity Regulation

Panel A: Upstream Allocation

- Regulated Regions
- Competitive Regions

Panel B: Free Allocation to Electricity Generators

- Regulated Regions
- Competitive Regions
Distribution of Costs to Firms in Competitive Regions
Under NCEP/Bingaman National Proposal

Change in Value of Firms ($/kW)

- Upstream Allocation
- Free Allocation to Generators

Break Even (Change = 0)
Safety Valve Policies

- Fixed targets (quantities or prices) cannot respond to new information.
- An inherent attribute of market based policy is instantaneous feedback on marginal cost (allowance price).
- Safety valve instruments embody decision rules to respond to market information about costs.
Volatility in Emission Markets

SO\textsubscript{2} Allowance Prices (real 2005\$/ton)

NO\textsubscript{x} Prices (real 2005\$/ton)

EU ETS

Source: South Coast Air Quality Management District (2002a).
Economic Impact of Price Volatility
Based on Experience To Date

- Unexpected price rise – RECLAIM.
- Unexpected price fall has been much more important in economic terms - SO$_2$
  - Benefits of the Title IV SO$_2$ program appear to be 30-50 greater than costs.
  - Imagine safety valve 33% below mean of EPA (1990) cost forecasts.
  - In 2010 (absent CAIR) emission reductions of over 2 million tons (Banzhaf et al.).
  - Imposing a floor on SO$_2$ allowance prices under Title IV would have improved economic welfare by $1.5 billion to $8.25 billion per year.
Why the **Symmetric** Safety Valve is Important

A **one-sided safety** valve has unintended consequences
- One-sided safety valve reduces risk of unexpected impacts on the economy. But…
- It breaks the emission cap
- Reduces incentive for innovation.
  - The upside profit potential for investors in clean technology is lower.
  - Thus, the one-sided safety valve lowers the investor’s expected future profits.

A **symmetric safety valve**
- Adding a floor on allowance prices offsets these unintended consequences and improve welfare, efficiency.
Taylor Series Approximations of Equilibrium Measures

Expected Values of Key Variables Compared to No Safety Valve Policy in 2020

- **CO2 Emissions**
- **Welfare**
- **Electricity Price**
- **Allowance Price**
- **Renewable Generation (subset)**

Legend:
- No Safety Valve
- High-Side Safety Valve
- Symmetric Safety Valve