China-Australia Carbon Market Design Expert Workshop on Allocation

Beijing October 12th 2013

Key interdisciplinary perspectives & tools required to address challenges – CEEM’s unique strength

Science & Engineering

Technological innovation

Drivers: Energy security Climate Change Societal Welfare

Economic transformation

Requirements

Social sciences

Behavioral Change

Economies

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CEEM’s core tasks

**RESEARCH**

Drivers:
- Energy security
- Technology innovation
- Economic transformation
- Behavioral change

**POLICY IMPACT**

Requirements

**EDUCATION**

Climate Change
- Societal Welfare

Allocation and distributional effects

Price

Marginal Abatement Costs

Cap=Target=Supply (government)

Net cost (damage) to the economy of abating emissions down to capped level

Value of permits

Uncontrolled emissions

Emissions

Permit price

Q_S
### Allocation effects

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<tr>
<th>Allowance allocation method</th>
<th>Discourage plant closure</th>
<th>Discourage closure of higher emitting plants</th>
<th>Incentive operation of (higher) existing plants</th>
<th>Less efficiency improvements</th>
<th>Reduce incentives for efficiency improvements</th>
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<td>Auction</td>
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<td>Installed capacity</td>
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<td>Output projection</td>
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*To avoid distortions between generation technologies, new coal-fuel stations would also have to receive free allowances. This would avoid internalisation of CO₂ costs in the electricity price, and thus distort choices of input factors and consumption for electricity consumers.*

Source: Neuhoff et al. 2006

### Australian Carbon Pricing Mechanism Auction Design

Dr. Regina Betz  
Beijing October 12th 2013
Auction Classification (I)

- Sell auctions vs. purchase auctions
- Single sided auctions vs. double auctions
  - Single sided: e.g., auction for primary allocation of CO₂ permits
  - Double auction: e.g., secondary market for permits
- Single unit vs. multi unit vs. multi item auctions
  - Single unit: one indivisible item
  - Multi unit: several homogeneous items
  - Multi item: several heterogeneous items

Emissions Permits characteristics

- Mixture of multi unit and multi item
  - Become perfect substitutes over time (after validation date)
- Decreasing marginal value
- Existence of secondary markets
  - No exposure problem
  - No need for package bidding / combinatorial auctions
Auction classification (II)

- Static or dynamic auctions
  - Static: one round
  - Dynamic: more than one round (e.g. ascending clock)

- Sealed bid or open bid auctions
  - Sealed bid: no information is available on price and quantities
  - Open bid: Different options on transparency
    - Price
    - Total (excess) demand
    - Individual demand
    - Who is bidding

- Uniform- or pay-your-bid (discriminatory)
  - Uniform pricing: each winner pays the clearing price
  - Pay-your-bid prices: winners pays price of its bids
Australian Government Auction Objectives

- Promote an efficient allocation of permits... with a minimum of risk and transaction costs = allocate permits to those who value them the most
  - Simple auction rules will attract more (smaller) bidders
- Promote efficient price discovery
  - Reveal market prices of permits particularly at early stages (advance auctions)
- Raise auction revenue (consistent with other objectives)
  - Not a primary goal


Recommendations for Auction Design

- Clock auction with intra-round bidding with aggregate demand revealed in each round,
- Simultaneous auctions of different vintages whenever applicable
- Allowing trade-exposed industries and other recipients of free permits to sell these permits in the auction (double auction extension)
- Proxy bids to accommodate small participants

To tested experimentally:
- Sealed bid vs. Clock auction (no intra-round bidding)
- Sequential vs. Simultaneous
- Clock with information of aggregate demand vs. without info
Results

- **Hypotheses**
  - Higher social surplus with simultaneous clock auctions (allocative efficiency).
  - Better price discovery with open clock (information efficiency). Prices are closer to the Walrasian equilibrium and less volatile.
  - Lower prices with open clock (public revenue).

Conclusions

- **No significant differences in multi-unit auction formats**
  - Sealed bid and clock formats perform equally well
  - No evidence for increased collusion under clock
- **But sequential auctioning of multiple (multi-unit) items yields higher efficiency and higher revenues than simultaneous auction**
  - Bidders bid more aggressively on first item of sequential auction
- **Recommendations for Australian ETS Auction**
  - Use open clock auctions with proxy-bidding (reveal aggregate demand after each round)
  - Auction multiple vintages sequentially (with earliest vintage first)
Thank you.

Many of our publications are available at: www.ceem.unsw.edu.au

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