Overview of CEEM Emissions Trading Design Research

CEEM China- Australia Carbon Market Design Expert Workshop
Dr. Regina Betz, CEEM
Centre for Energy and Environmental Markets facts

- Established in 2004
- Interdisciplinary Centre including researchers from faculty of Engineering, Business, Social Sciences, Environmental Sciences, Built environment, Law, etc.
- Staff: 2 Joint Directors, 7 Research coordinators for each faculty, 3-5 Post-docs and around 10 PhDs

Core tasks: Research, education and policy impact
Key interdisciplinary perspectives & tools required to address challenges – CEEM’s unique strength

Science & Engineering

Social sciences

Technological innovation

Challenges: Energy security  Climate Change  Societal Welfare

Behavioral Change

Economic transformation

Requirements

Economics
CEEM works in the areas of

- Energy markets
  - spot, ancillary services and derivative markets, retail markets
  - primary focus on the Australian National Electricity Market
- Energy related environmental markets
- Broader policy frameworks and instruments to achieve desired societal energy and environmental outcomes
- **Future:** Work with Chinese University Partners on Climate and Energy policy in China
CEEM ETS Research: Main Methods

Methods to test design before ETS introduction
- Theoretical Analysis
- Simulations
- Experiments

Methods to evaluate design after ETS implementation
- Data Analysis based on European Union CITL Data

排放交易计划实施前，机制设计的测试方法
- 理论分析
- 模拟仿真
- 实验

排放交易计划执行后，机制设计的评价方法
- 数据分析
  （基于欧盟 CITL数据）
CEEM ETS Research

Experiments
- Compliance mechanism
- Auction design
- Market design
- Monitoring, reporting, and verification

Data Analysis (EU ETS)
- Coverage
- Winners and losers
- Role of banks

实验
- 规则遵守的机制设计
- 拍卖机制设计
- 市场机制设计
- 监测，报告和审核设计

数据分析（欧洲排放交易机制）
- 政策的覆盖范围
- 政策的赢家和输家
- 银行的角色
Compliance mechanisms: Experiment

Theory:
- When the penalty is higher than market price of permits, firms will choose to be compliant.

Research question:
- Will penalty design have effect on compliance rates and market performance?

Sanction types
- Fixed penalty rate, make-good provision, mix of both
- Level: independent, or related to permit price

Results
- Contradicts theory
- Trade-off: make-good provision higher compliance but lower efficiency than fixed penalty

理论依据:
- 当罚金高于市场交易价格，企业会选择遵守规则。

研究问题:
- 处罚的机制设计会对遵守规则的比率和市场的业绩有影响吗？

奖惩类型
- 固定的处罚额度，履行职责的奖励，两者相结合
- 标准：独立设置，或者与市场价格关联

结论
- 与理论相矛盾
- 权衡：相对于固定处罚，履行职责的奖励有更高的遵守比率但是效率相对较更低

Restiani, Phillia and Betz, Regina 2010, The Effects of Penalty Design on Market Performance: Experimental Evidence from an Emissions Trading Scheme with Auctioned Permits, EERH Research Report No.87
Auctioning of allowances: Experiment

Research question:
- How to design an efficient auction for Australian carbon market, when more than one vintage is auctioned?

Method:
- Experimental testing of different auction formats:
  - simultaneous vs. sequential,
  - sealed bid vs. open clock

Results:
- Sequential auctions are not worse than simultaneous auctions and outperform simultaneous auction in a sealed bid setting. No difference in revenue or price discovery between auction type.
Coverage: Simulation and data analysis

Theory:
- Broader coverage will make emissions trading more efficient, because more variety in mitigation costs.

Research question:
- What are the costs and benefits of covering companies in an ETS compared to an alternative policy, taking transaction costs into account?

Transaction costs
- Trading costs, monitoring, reporting, and verification costs…

Results
- Efficient coverage depends on cap stringency, transaction costs, and distribution of mitigation costs
- Trading costs may prevent participation (Analysis of expired EUAs)
- Phase-in of sectors may be efficient

Overall Expired EU Allowances (EUAs)

Installations

German companies

Source: Own calculations based on CITL data
## Trading Costs per Installation/Firm

<table>
<thead>
<tr>
<th></th>
<th>Aggregate Trading Costs (M€)</th>
<th>Installations that did not trade</th>
<th>Per installation (€)</th>
<th>Aggregate Trading Costs (M€)</th>
<th>German firms that did not trade</th>
<th>Per German firm (€)</th>
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<tbody>
<tr>
<td><strong>upper bound</strong></td>
<td></td>
<td></td>
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<tr>
<td>(individual years, yearly prices)</td>
<td>6,589</td>
<td>7,912</td>
<td>832,828</td>
<td>226</td>
<td>702</td>
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<tr>
<td>(all years, yearly prices)</td>
<td>2,600</td>
<td>3,111</td>
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<td>264</td>
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<td>(all years, 2005-07 av. price)</td>
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<td><strong>lower bound</strong></td>
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<tr>
<td>(all years, 2007 av. price)</td>
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<td>32,877</td>
<td>3</td>
<td>264</td>
<td>12,151</td>
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</tbody>
</table>

- Very high as compared to bottom-up studies
- There might be additional factors that inhibit trade, e.g. uncertainty

Source: Own calculations based on CITL data
Transfer patterns using cluster analysis

<table>
<thead>
<tr>
<th>Transfer pattern</th>
<th>Passive</th>
<th>Medium Active</th>
<th>Acquiring</th>
<th>Partnering</th>
<th>Highly Active</th>
<th>Continuous</th>
<th>Future Clearing</th>
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<tr>
<td>Total transfer volume</td>
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<td>[Million EUAs]</td>
<td>290</td>
<td>14,742</td>
<td>18,526</td>
<td>37,776</td>
<td>97,480</td>
<td>78,368</td>
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<tr>
<td>Net transfer volume</td>
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<td>332</td>
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<tr>
<td>[Million EUAs]</td>
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<td>Transfers relative to</td>
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<td>14,384</td>
<td>12,448</td>
<td>37,776</td>
<td>97,480</td>
<td>78,368</td>
<td>221,464</td>
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<td>allocation</td>
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<td>Number of accounts</td>
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<td>34.82</td>
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<td>transferred from</td>
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<td>Discontinuity of transfers</td>
<td>2.40</td>
<td>1.36</td>
<td>1.74</td>
<td>1.03</td>
<td>1.36</td>
<td>1.06</td>
<td>1.74</td>
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|                  |     |               |           |            |               |            |                 |
| No. of accounts  | 7,212 | 78            | 41        | 11         | 7             | 5          | 1               |
| % of total accounts | 98.06% | 1.06%       | 0.56%     | 0.15%      | 0.10%         | 0.07%      | 0.01%           |
New CEEM Project: The Rise of Carbon Markets in China

Aim:
- Foster collaboration between CEEM and universities in China working on carbon market design

Process:
- Exchange of researchers and postgraduates
- Set up working groups on different design elements
- Host two symposia in China, one jointly with Fudan, and another in Beijing

Potential topics:
- Electricity production
- State-owned companies
- Allocation rules for new entrants
Carbon Pricing Future in Australia

Likely repeal of „Carbon Tax“ by Abbot and introduction of „emissions reductions fund“, but most likely more expensive.

Compromising line

- Mid June 2014 new elections of half of Senate
- Based on current projection Abbot government will need 6 crossbencher Senators to vote for the repeal

Uncompromising line

Double dissolution

- Possible if the same legislation passed by the lower house is twice rejected by the Senate.
- This may give Abbot majority in Senate since the whole Senate is reelected
Topics for joint collaboration

1. Target setting
2. Coverage
3. Traded Unit
4. Allocation
5. Compensation
6. Market functioning and oversight
7. Price containment
8. Including Offsets
9. Sanctioning
10. Monitoring, reporting and verification
11. Accounting
Many of our publications are available at:
www.ceem.unsw.edu.au