Carbon Markets, Electricity Prices and “Windfall Profits”

Emerging Information on the European Union Emissions Trading Scheme

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Agenda

- Concern for “windfall profits”
- “Real world” factors affecting cost pass-through
- Empirical information
- Policy proposals
- Conclusions and implications
Concern for “Windfall Profits” and “Real World” Complications
Why has EU ETS given rise to concerns about “windfall profits”?

1. Electricity prices have risen steeply in 2005, coinciding with rise in CO$_2$ prices in EU ETS

2. Price increase not matched by CO$_2$ cost increase for all generators (e.g., nuclear, other low emitters)

3. “Opportunity costs” account for substantial part of the added generator costs, due to free allocations

Note, not clear that concern is with profits, since focus seems to be on electricity prices
Prices and “profits” affected by many factors

Example: higher gas prices with gas on the margin

- Affects participants differently
  - Higher electricity price
  - Gains to non-gas facilities (e.g., coal, nuclear, renewables)
  - Gains also to more efficient gas plants if not on the margin (costs increase less than revenue)

- “Windfall” reflects normal functioning of liberalized market
  - Pass-through to end-users reflects costs of marginal generating unit
  - Low users of scarce / expensive resource benefit
  - Efficient units benefit
  - New investment steered by likely profitability, helping preserve efficiency of supply
  - Long-term adjustments may moderate effects (e.g., adjustment to demand)

- “Windfall profits” not necessarily helpful concept
  - Price signals help promote efficiency in consumption, production, and investment.
Will electricity prices rise by full cost of CO₂ in “real world”?

- **“Standard factors”** affecting electricity price impact and generator impacts
  - Price of CO₂ allowances
  - Marginal vs. non-marginal generation
  - Shift in electricity market merit order
  - Diversity in carbon intensity of marginal generation
  - Long-run electricity market effects

- **Additional “Complicating factors”**
  - Allowance allocation methodology (new entrant set-aside)
  - Regulation in electricity markets
  - Competitive conditions in electricity markets
  - International trade in electricity
  - Other climate policy (e.g., green/white certificates)
  - Government constraints on electricity prices and/or windfall profits

- **Bottom line:** Electricity price may not reflect all of the added CO₂ costs, particularly in the long-term
Recent Empirical Information regarding CO₂ and Electricity Prices
There was a steep rise in 2005 in CO$_2$ allowance price.

Source: PointCarbon, with annotations by NERA
UK electric, gas, CO₂ prices all have risen since March

Price movements reflect complex interactions among CO₂, fuel (oil, gas, coal) and electricity markets

UK electricity and gas prices (forward Q4 2005), CO₂ prices

Source: Platts, PointCarbon and NERA calculations
Recent UK electricity market seems to reflect CO₂ costs for gas

Correlation between UK “spark spread” (electricity price minus gas cost) in Q4 2005 forward prices and CO₂ costs for combined cycle gas turbine

Note that coal units also relevant for some periods, complicating relationship

**UK base spark spread (Q4 2005), CO₂ cost of CCGT**

Source: Platts, PointCarbon, and NERA calculations
Recent German electric market also linked to CO₂, with complications

Correlation between German “dark spread” (electric price minus coal cost) in forward prices (one quarter ahead) and CO₂ costs for coal unit

Costs for gas units also relevant for this market, complicating relationship

**Germany base dark spread, CO₂ cost of coal**

Source: Platts, PointCarbon, and NERA calculations
Forecasts of CO₂ price vary near-term but converge long-term

- Uncertainty about future CO₂ prices
  - Large variations in forecasts for Phase I
  - Fewer forecasts (and less variation) for Phase II and beyond
  - Bottom line: CO₂ price consensus is elusive, even in near term

Equity Analyst 2005 Forecasts of CO₂ Allowance Price
Forecasts of electricity price impacts of given CO₂ price vary widely

- Variation in CO₂ price forecasts is compounded by variation in electricity price impacts
- Some differences due to year and markets analyzed
- But forecasts also differ in sophistication and accounting for complicating factors

**Forecast Price Increase of Wholesale Electricity**

- The graph shows the relationship between CO₂ Allowance Price (€/t) and the forecast price increase of wholesale electricity (%).
- The x-axis represents the CO₂ Allowance Price (€/t) ranging from €0 to €40.
- The y-axis represents the forecast price increase of wholesale electricity (%) ranging from 0% to 70%.
- The data points indicate a trend where as the CO₂ price increases, the forecast price increase of wholesale electricity also increases.
Studies suggest future electricity price-CO$_2$ price link complicated

Complications Considered in Various Studies and Reports

<table>
<thead>
<tr>
<th></th>
<th>Analyst reports</th>
<th>Modeling studies</th>
<th>Theoretical studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number reviewed</td>
<td>22</td>
<td>8</td>
<td>5</td>
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<tr>
<td>Marginal fuels?</td>
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<td>8</td>
<td>5</td>
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<tr>
<td>Allocation / New entrant?</td>
<td>0</td>
<td>8</td>
<td>3</td>
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<tr>
<td>Electricity regulation?</td>
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<tr>
<td>Electricity market structure?</td>
<td>22</td>
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<tr>
<td>Possible government intervention?</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Other policies (e.g., renewable energy programs)?</td>
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<td>0</td>
<td>1</td>
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</table>
Summary of recent empirical observations

- Large variations in forecasts of CO₂ and electricity price effects going forward
- CO₂ costs appear to affect recent electricity prices, but not in the “simple” way of one-to-one pass-through
  - No simple one-to-one relationship for marginal units in recent data
  - Non-marginal units affected differently (e.g., coal, nuclear, hydro)
  - Correlations recent and in immature CO₂ market
  - Long-term impacts may differ from current snapshot
- Complicating factors likely to intervene in the future
  - “Updating” allowance allocation (new entrants, closure rules)
  - Future oil/gas prices
  - Electricity market structure and strategy
  - Bilateral deals between generators and large customers
  - Government policy (or threat thereof)
Government Policy and “Windfall Profits”
## Many Policies Proposed by Government/Private Groups

<table>
<thead>
<tr>
<th>Country / Entity</th>
<th>Type of intervention</th>
<th>Details</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alliance of Power-Intensive Industries</td>
<td>Wholesale price regulation</td>
<td>Opportunity costs of CO₂ to be excluded from bids</td>
<td>Proposed in several position papers</td>
</tr>
<tr>
<td>Ireland (1)</td>
<td>Wholesale price regulation</td>
<td>Regulation of allowable revenue of dominant generator</td>
<td>In force</td>
</tr>
<tr>
<td>Ireland (2)</td>
<td>Revenue “recycling”</td>
<td>Additional levy on generators used to subsidize transmission charge</td>
<td>Shelved for the time being</td>
</tr>
<tr>
<td>Spain (1) (Various others)</td>
<td>Regulation of retail prices</td>
<td>Electricity rate increase limited to &lt; 2 percent</td>
<td>In force</td>
</tr>
<tr>
<td>Spain (2)</td>
<td>Allocation / transfer reduction</td>
<td>CTC (stranded cost) payments or allocations to be reduced</td>
<td>Proposed in recent White Paper</td>
</tr>
<tr>
<td>France</td>
<td>Special “industry tariffs”</td>
<td>Long-term discounted electricity contracts facilitated by government</td>
<td>Announced, not implemented</td>
</tr>
<tr>
<td>Germany</td>
<td>“Industry tariffs”? Regulation of pricing?</td>
<td>Competition authority investigating pass-through of opportunity costs</td>
<td>No action taken yet</td>
</tr>
<tr>
<td>Sweden, Finland, etc.</td>
<td>Potential “windfall profit “ taxes</td>
<td>-</td>
<td>Potential policies currently being investigated</td>
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</table>
Recent policy proposals can be put in four categories

1. Change allocations/ taxes on generators
   - Provide fewer allowances to generators
   - Tax “windfall profits”

2. Revenue “recycling”
   - E.g., allowance auction to generator combined with subsidy of transmission charges

3. Wholesale price regulation
   - (re-)regulation of markets, using residual regulatory power to limit increases

4. Retail price regulation
   - Limited rate increases with rising wholesale price
   - Special “industry” tariffs
Two apparent objectives: (1) Profits and (2) Electricity Prices

1. Profits:
   - Some generators perceived to receive “unearned” profits
   - Applies to sites receiving free allocation
   - But also to sites not covered by scheme (nuclear, large hydro, renewables)

2. Electricity prices:
   - Customers perceived to be transferring money directly to generators
   - Concern for industry competitiveness with high electricity prices

- Which is the primary motivation for policy?
  - Important because a given policy does not necessarily “solve” both concerns

- Also need to consider “unintended effects” of policies on electricity and allowance markets
Policies may impede efficiency of electricity markets

- Policies to alter electricity prices can lead to “unintended effects” by causing distortions
  - Wholesale price regulation incompatible with liberalized markets
  - Retail price regulation risks viability of retail providers
    - Potential for “California style” imbalances with potential bankruptcies

- “Windfall profits” could be addressed without intervention in electricity market
  - E.g., through allowance market, auctioning of allowances
  - These policies would not distort electricity markets

- But, most policies appear to be concerned about high electricity prices, not generator profits
Policies may impede cost-efficiency of trading scheme

- Limiting wholesale prices
  - New entrant composition changed, less incentive for low-CO$_2$ generation

- Limiting retail prices
  - Less incentive for abatement through energy efficiency improvement, decreases in output, and reduced use of energy services

Restricting electricity prices would lead to higher CO$_2$ allowance price and higher overall cost of meeting the EU ETS emissions cap
None of the policies achieve both objectives without adverse effects

<table>
<thead>
<tr>
<th>Policy</th>
<th>Intended effects?</th>
<th>Unintended effects?</th>
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<tbody>
<tr>
<td></td>
<td>Electricity price</td>
<td>Generator profits</td>
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<td>Allowance market</td>
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<td>Likeley feasibility</td>
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<tr>
<td>Adjust allocation / tax “profits”</td>
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<td>Yes</td>
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<tr>
<td>Revenue “recycling”</td>
<td>Possibly</td>
<td>Possibly</td>
</tr>
<tr>
<td>Restrict wholesale prices</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Restrict retail prices</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Conclusions
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- “Windfall profits” (and “losses”) result from many market conditions in liberalised markets and thus is not a particularly helpful concept.

- Many “real world” factors complicate the size of the likely electricity price increase and thus extent of any “windfall profits”.

- Existing empirical information suggests current CO₂ costs are being included in electricity prices, but the relationship is complex.

- Future linkages remain uncertain, more so in light of “updating” of allocations and market uncertainties (e.g., oil price).

- None of the proposed policies appear likely to reduce both “windfall profits” and electricity price increases without compromising efficient operation of the CO₂ allowance market and/or the electricity market.
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