Market Power in the German Wholesale Electricity Market: What are the Political Options?

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Discussed Questions

- There is market power in the German electricity market

- Four political options are discussed
  1. Federal Ministry of Economics and Technology: price controlling
  2. European regulators: implementation of a day-ahead flow-based market coupling
  3. European Commission: expansion of cross border capacity
  4. Hessian Ministry of Economics: divestiture of dominant suppliers

- Are these options adequate measures to mitigate market power? What are the intended and non-intended effects on market efficiency? And how likely is the political implementation?
1 Indicators of market power

2 Political Options
2.1 Revised version of § 29GWB - Price controlling
2.2 Day-ahead flow-based market coupling
2.3 Expansion of cross border capacity
2.4 Divestiture of dominant suppliers

3 Conclusion
1 Indicators of market power

Possibilities of Measurement:

1. **Potential Market Power:** Suppliers are able to exercise market power because they are large or capacity is scarce.
   
   **Examples:** Herfindahl-Hirschman-Index, Concentration Ratios, Pivotal-Supplier-Index, Residual-Supply-Index, Residual-Demand-Analysis.

2. **Exercised Market Power:** Price-MC gap → Problem: shutdowns
   
   **Examples:** Competition-Benchmark-Analysis → Lerner-Index, Price-Cost-Margin-Index (PCMI).
1 Indicators of market power

Definition of Market Power:

The ability to alter prices away from competitive levels in a profitable way.

Possibilities to exercise market power:

1. Physical or quantity withholding, which involves deliberately reducing the output that is bid into the market. Withholding can be done by not bidding, de-rating or declaring unit outages.

2. Financial or economic withholding, which involves bidding in prices higher than the competitive bid for the particular unit.

3. Capacity shutdowns, which involve, just like physical or quantity withholding, deliberately reducing the output that is bid into the market.
# Potential market power indicators

<table>
<thead>
<tr>
<th>Concentration Ratios</th>
<th>Herfindahl-Hirschman-Index (HHI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assumed market dominance:</td>
<td>unconcentrated:</td>
</tr>
<tr>
<td>CR1 &gt; 33,3 %</td>
<td>HHI &lt; 1.000</td>
</tr>
<tr>
<td>CR3 &gt; 50,0 %</td>
<td>moderate concentration:</td>
</tr>
<tr>
<td>CR5 &gt; 66,7 %</td>
<td>1.000 &lt; HHI &lt; 1.800</td>
</tr>
<tr>
<td>high concentration:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HHI &gt; 1.800</td>
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</tbody>
</table>

\[
CR_n = \sum_{i=1}^{n} x_i \quad \text{HHI} = \sum_{i=1}^{n} x_i^2
\]
1 Indicators of market power

Potential market power indicators

What is the relevant market?

Hourly price differences between EEX and EXAA 2006 (no congestions!)
1 Indicators of market power

2 Potential market power indicators

Moving averages EEX and EXAA

→ Germany is in the short run the relevant market but not in the long run.
Potential market power indicators

Capacity and production shares in Germany, HHI 1840→highly concentrated
Potential market power indicators

Residual-Supply-Index

\[
RSI = \frac{\sum_{i=1}^{n} C_i - C_x}{Load}
\]

RSI < 1, if the capacity of supplier \(C_x\) is necessary and > 1, if the capacity is not necessary.

Details:
- must take Capacity → production
- net import capacity → net imports

Sheffrin: RSI should be >110% for 95% of hours
1 Indicators of market power

2.2 Potential market power indicators

RSI of RWE and E.ON for the national German market in 2006 → potential market power problems because Germany can be seen in the short run as relevant market.
# Indicators of market power

## Exercised market power

### State of research (exercised market power in Germany)

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Aim</strong></td>
<td>MC hourly</td>
<td>MC hourly</td>
<td>MC hourly</td>
</tr>
<tr>
<td><strong>Analysed period</strong></td>
<td>June 2000 - June 2003</td>
<td>January 2004-June 2006 every hour of each 3rd Wednesday of all months</td>
<td>June 2000 - December 2005 every hour of each 3rd Wednesday of all months; July 2003 - December 2005 every hours</td>
</tr>
<tr>
<td><strong>Demand</strong></td>
<td>Typical load values of a representative week (4,8 workdays, 1 Saturday and 1,2 Sundays)</td>
<td>UCTE load values of each 3rd Wednesday of all months</td>
<td>UCTE load values of each 3rd Wednesday of all months, other days fitted out of vertical load</td>
</tr>
<tr>
<td><strong>Foreign trade</strong></td>
<td>endogenous</td>
<td>no foreign trade</td>
<td>exogenous foreign trade, statistical fitted</td>
</tr>
</tbody>
</table>
## Exercised market power

### State of research (exercised market power in Germany)

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Start Up costs</strong></td>
<td>Exogenous Running times of plant</td>
<td>No start up cost</td>
<td>Endogenous with MIP</td>
</tr>
<tr>
<td><strong>Model type</strong></td>
<td>LP</td>
<td>LP</td>
<td>mixed MIP/LP</td>
</tr>
<tr>
<td><strong>Wind energy</strong></td>
<td>monthly</td>
<td>hourly, synthetic</td>
<td>real hourly data</td>
</tr>
<tr>
<td><strong>Reserve capacity</strong></td>
<td>Model endogenous</td>
<td>Not considered</td>
<td>Model exogenous</td>
</tr>
<tr>
<td><strong>Availability</strong></td>
<td>monthly</td>
<td>Year temporally</td>
<td>monthly power plant daily</td>
</tr>
<tr>
<td><strong>Net efficiency</strong></td>
<td>Not clear</td>
<td>Fitted according to year of construction</td>
<td>Internet/phone/E-Mail-inquiry, missing plants according to year of construction</td>
</tr>
<tr>
<td><strong>CO₂</strong></td>
<td>Not necessary</td>
<td>„normal“</td>
<td>„normal“ and “Option rule“ considered</td>
</tr>
</tbody>
</table>
1 Indicators of market power

2.1 Exercised market power

2.2 Reasons for rising prices on the German wholesale market

PCMI: 40%

PCMI: 17.5%

PCMI: 20%

MC with fuel prices 2000

€/MWh
Four political options are discussed

1. Federal Ministry of Economics and Technology: Price controlling
2. European regulators: implementation of a day-ahead flow-based market coupling
3. European Commission: expansion of cross border capacity
4. Hessian Ministry of Economics: divestiture of dominant suppliers
2.1 Revised version of § 29GWB - Price controlling

Federal Ministry of Economics and Technology: price controlling

1. Repay, payment components, or other demand conditions, which are more unfavourable than those from enterprises on comparable markets or other supply enterprises, or

2. Repay require fees, which exceed the costs in an inadequate way. There is no abuse, if the producer proves that the deviation is businesslike justified. Costs and cost elements, which would adjust themselves at perfect competition, may not be considered.

(Entwurf des Gesetzes gegen Wettbewerbsbeschränkung § 29)

Unclear: Is price controlling based on average costs or Marginal costs?

Consequence: end of liberalisation experiment

Consequence: capacity shut downs \( \rightarrow \) capacity scarcity
2.2 Day-ahead flow-based market coupling

Present and intended market organisation in Central Europe

- frequent congestion
- existing market coupling
- announced market coupling
- planned market coupling
- not (yet) deregulated
2.2 Day-ahead flow-based market coupling

Net capacity shares in the Central West Region (plus Austria and Switzerland)
2.2 Day-ahead flow-based market coupling

RSI of EDF, RWE and E.ON for the Central West Region (plus Austria and Switzerland) from 22/01/2007 to 18/02/2007
→ EDF dominant player
2.2 Day-ahead flow-based market coupling

RSI of EDF, RWE and E.ON for the Central West Region (plus Austria and Switzerland) on Wednesday 25/01/2006 → EDF dominant on workdays
2.2 Day-ahead flow-based market coupling

RSI of EDF, RWE and E.ON for the Central West Region (plus Austria and Switzerland) on Sunday 22/01/2006 → EDF partly dominant on Sundays
2.3 Expansion of cross border capacity

Net capacity shares in the EU27 (plus Norway and Switzerland)
Expansion of cross border capacity seems not to be very likely
### 2.3 Expansion of cross border capacity

Net capacity shares and RSI of EDF, E.ON and RWE in their national markets and the Central West Region (plus Austria and Switzerland)

<table>
<thead>
<tr>
<th></th>
<th>Net capacity share [in %]</th>
<th>RSI &lt; 110 % [in % of hours]</th>
<th>RSI &lt; 100 % [in % of hours]</th>
</tr>
</thead>
<tbody>
<tr>
<td>National markets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDF</td>
<td>85</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>E.ON</td>
<td>22</td>
<td>53</td>
<td>32</td>
</tr>
<tr>
<td>RWE</td>
<td>19</td>
<td>55</td>
<td>35</td>
</tr>
<tr>
<td>Central West Region (plus Austria and Switzerland)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDF</td>
<td>30</td>
<td>95</td>
<td>75</td>
</tr>
<tr>
<td>E.ON</td>
<td>9</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>RWE</td>
<td>8</td>
<td>12</td>
<td>0</td>
</tr>
</tbody>
</table>
2.3 Expansion of cross border capacity

According to the HHI screening:
EDF will still be too big if EU 27+Nor+CH is the relevant market.
2.4 Divestiture of dominant suppliers

The Proposal of the Hessian Minister of Economics Alois Rhiel (HMWVL 2007) aims at a divestiture of the four big German suppliers

Successful example for divestiture:
Electricity market England/Wales

Several studies come to the conclusion that the divestiture process has been responsible for decreasing exercise of market power (e.g. Bower 2002, Newbery 2005).

Dominant power producers do often not exercise the entire potential market power they possess (Wolfram 1999, Schwarz and Lang 2006). One reason could be their fear of the regulatory response of the state. If the state authorities use a divestiture strategy, the reaction of the suppliers could be to exercise their entire potential market power. Although potential market power is mitigated, the exercised market power could be higher than before.
2.4 Divestiture of dominant suppliers

• Therefore, it is important for a successful divestiture strategy to downsize the suppliers to appropriate size rapidly. The appropriate size of electricity producers depends on the size of the relevant market. If the relevant market is enlarged simultaneously, less capacity must be sold.

• But if a market coupling regime is established in Central West Europe, the size of E.ON and RWE will not be a problem anymore.

→ Main problem for competition in Europe is the size of EDF.
Evaluation of the four propositions

- **Federal Ministry of Economics and Technology**: price controlling leads to capacity shutdowns, inefficient production structure, insecurity of electricity supply, not to decreasing market power.

- **European regulators**: implementation of a day-ahead flow-based market coupling enlarging relevant market, German power producers lose their market power, but EDF does not.

- **European Commission**: expansion of cross border capacity EDF is still a problem.

- **Hessian Ministry of Economics**: divestiture of dominant suppliers
  If market coupling is introduced, divestiture of German suppliers will not be necessary but divestiture of EDF will still be necessary.