Modelling Welfare loss in the Iranian Electricity Market

University of Economic Sciences of Tehran

Ali Nazemi
Mehdi Mashayekhi
• Iran’s electricity market was inaugurated in 2003.

• Economic production Efficiency equals to producing power by the least-costly producers.

• In short run, welfare loss in a market stems from production inefficiencies.

• Strategic firms with strategies distort production in a market.
Econometric Model

\[
\log(\text{Deadweight Loss}_i) = \alpha + \beta_1 \cdot \log(\text{Market Share}_i) + \beta_2 \cdot \log(\text{HHI}_i) + \beta_3 \cdot \log(\text{Capacity}_i) + \beta_4 \cdot \log(\text{Demand}_i) + U_i
\]
Welfare Loss

Supply Curve
10/8/2006

Total Demand

- competitive Mc
- strategic MC

Rial/KWh

Output (MWh)

0 5000 10000 15000 20000 25000 30000
1. Market share of the largest producers in a market.

2. Unlike market share index, HHI shows market shares of all producers in it.

\[
HHI = \sum_{i=1}^{N} S_i^2
\]
Capacity and Demand

**Uniform-Price Auction**

- MCP: 120
- Total Demand: 180

**Pay-as-Bid Auction**

- MCP: 100
- Total Demand: 140
## Welfare Loss Estimation

<table>
<thead>
<tr>
<th>Estimation Results</th>
<th>2006</th>
<th>2012</th>
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<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>Std. Error</td>
</tr>
<tr>
<td><strong>Intercept(α)</strong></td>
<td>252.49</td>
<td>25.87</td>
</tr>
<tr>
<td>Log(hhi)</td>
<td>-25.91</td>
<td>2.75</td>
</tr>
<tr>
<td>Log(Marketshare)</td>
<td>13.58</td>
<td>2.31</td>
</tr>
<tr>
<td>Log(capacity)</td>
<td>11.58</td>
<td>1.02</td>
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<tr>
<td>Log(demand)</td>
<td>-15.40</td>
<td>1.46</td>
</tr>
<tr>
<td>AR(1)</td>
<td>0.52</td>
<td>0.04</td>
</tr>
</tbody>
</table>
Significant Results

• Non-competitive behavior of oligopolists has distorted production in the market.

• Production inefficiencies impose at least 96 million dollars on the market.

• HHI is not reliable in monitoring Iran’s electricity market.
Possible Solutions to welfare loss problem

• Speeding up the process of privatization in the market.

• Changing to a uniform-price mechanism.

• Removing the price cap.
Thank You For Your Attention