Collusion and Misallocation

- Collusion raises price allowing a high cost fringe to produce
- What can we learn about the costs of collusion?
  1. We might be understating the costs of collusion when considering only DWL
  2. There is another triangle (or rectangle)
Collusion and Misallocation

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  1. We might be understating the costs of collusion when considering only DWL
  2. There is another triangle (or rectangle)

- What is the benchmark?
- Does the presence or expansion of high cost fringe make it worse?
Table 6: Dynamic counterfactual results
(NPV of costs in billions of 2014 dollars)

<table>
<thead>
<tr>
<th></th>
<th>Timespan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual (A)</td>
<td>2184 (125)</td>
</tr>
<tr>
<td>Counterfactual (C)</td>
<td>1268 (76)</td>
</tr>
<tr>
<td>Total distortion (A - C)</td>
<td>916 (124)</td>
</tr>
<tr>
<td>Decomposition of total distortion</td>
<td></td>
</tr>
<tr>
<td>Within country (non-OPEC)</td>
<td>329 (80)</td>
</tr>
<tr>
<td>Within country (OPEC)</td>
<td>192 (46)</td>
</tr>
<tr>
<td>Across country (within non-OPEC)</td>
<td>163 (18)</td>
</tr>
<tr>
<td>Across country (within OPEC) (X)</td>
<td>85 (22)</td>
</tr>
<tr>
<td>Between OPEC and non-OPEC (Y)</td>
<td>148 (29)</td>
</tr>
<tr>
<td>Production distortion due to OPEC market power</td>
<td></td>
</tr>
<tr>
<td>Upper bound (X+Y)</td>
<td>233 (42)</td>
</tr>
<tr>
<td>Lower bound (Y only)</td>
<td>148 (29)</td>
</tr>
</tbody>
</table>
The Benchmark

- Efficient allocation vs non-collusive outcome
- Cournot equilibrium also has misallocation
  \[
  \frac{p - c_i}{p} = \frac{s_i}{\eta}
  \]
- Would misallocation within cartel decrease?
- How much of fringe output replaced?
## Cartel Distribution

<table>
<thead>
<tr>
<th>Country</th>
<th>Actual Share</th>
<th>Counterfactual</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Persian Gulf</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iran</td>
<td>13.0%</td>
<td>11.1%</td>
</tr>
<tr>
<td>Iraq</td>
<td>6.6%</td>
<td>8.4%</td>
</tr>
<tr>
<td>Kuwait</td>
<td>6.9%</td>
<td>18.9%</td>
</tr>
<tr>
<td>Qatar</td>
<td>2.1%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>30.4%</td>
<td>50.5%</td>
</tr>
<tr>
<td>UAE</td>
<td>10.1%</td>
<td>3.8%</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algeria</td>
<td>4.8%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>4.6%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Libya</td>
<td>5.7%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Nigeria</td>
<td>6.4%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Venezuela</td>
<td>9.4%</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

100% 100%
Counterfactual

- Cartel output increases to Cournot equilibrium
- Price decreases, but higher than marginal cost!
- Output of fringe decreases
- Magnitudes?
From Cartel to Cournot
From Cartel to Cournot
From Cartel to Cournot
From Cartel to Cournot
From Cartel to Cournot
Fringe: Misallocation and Welfare

- Existence of fringe leads to more misallocation with cartel
- But does it hurt welfare?
Fringe: Misallocation and Welfare

• Existence of fringe leads to more misallocation with cartel
• But does it hurt welfare?

• Fringe expanded considerably during this period
• Can hurt welfare if prevented cartel from expanding
Expansion of Fringe can Decrease Welfare

\[ q_0 \]

\[ p \]

\[ c_0 \]

\[ DWL \]
Expansion of Fringe can Decrease Welfare
Expansion of Fringe can Decrease Welfare
Expansion of Fringe can Decrease Welfare
Expansion of Fringe can Decrease Welfare
Expansion of Fringe can Decrease Welfare

Change in CL proportional to $c_0 - c$
Expansion of Fringe can Decrease Welfare

- Change in CL proportional to $c_0 - c$
- Change in DWL proportional to $(p - c)/2$
Expansion of Fringe can Decrease Welfare

Change in CL proportional to $c_0 - c$

Change in DWL proportional to $(p - c)/2$

Total Change in $(p - c)/2 - (c_0 - c)$
Expansion of Fringe can Decrease Welfare

Change in CL proportional to $c_0 - c$
Change in DWL proportional to $(p - c)/2$
Total Change in $(p - c)/2 - (c_0 - c)$
Negative iff $c_0 > (p + c)/2$
Conclusions

- Great paper
  - points to a missed component of welfare losses
  - careful empirical analysis
  - careful modeling of dynamic allocation
- What is the correct benchmark?
- For misallocation: efficient allocation
- For antitrust: Non-collusive equilibrium
  - Losses from misallocation could be considerably smaller
- How is ML compared to DWL?