The Use of Economic Tools in Merger Analysis

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*) The views expressed in this presentation are those of the author and do not necessarily reflect the views or opinions of the European Commission.
1. INTRODUCTION
2. DATA REQUIREMENTS
3. ECONOMIC TOOLS
4. CONCLUSION
Introduction

• This presentation gives an overview over economic tools used in merger control to assess the likely competitive effects of horizontal mergers
• These tools allow a more precise analysis of proposed transactions than merely looking at market shares, because:
  • they take into account the degree of closeness of competition of different suppliers
  • they do not require delineating markets
  • they take account of the degree of pre-merger pricing power
• Nonetheless, these tools can be applied with relatively simple data that can often readily be measured in merger proceedings (in particular: margins, diversion ratios, prices and volumes)
• Thus, they are less complex to apply than merger simulations based on full-fledged demand estimations (which is typically difficult)
Introduction

• Even where the quantitative data may not be available in a given case, these methodologies provide useful insight into what qualitative factors to look for (since they drive merger effects)
• Many of these methods are built on the notion of measuring "upward pricing pressure"
• Specifically, this presentation will discuss:
  • UPP (Farrell & Shapiro, 2010)
  • GUPPI (Salop & Moresi, 2009)
  • CMCR (Werden, 1996)
  • IPR (Hausman, Moresi & Rainey, 2011)
  • Calibrated merger simulations (linear demand)
• These methods are particularly useful for industries with differentiated products and price competition (e.g., FMCG)
Introduction

• It should be kept in mind that these tools aim to assess short-run price effects resulting from a merger.

• It is therefore important to complement these quantitative tools with other relevant evidence (e.g., on dynamic competition, capacity constraints, barriers to entry etc.).

• In recent Commission cases, these tools have been employed particularly frequently in mobile communication mergers (among other because of good data availability in this industry).

• Relevant recent cases include H3G UK/Telefónica, H3G/WIND, TeliaSonera/Telenor, H3G UK/Telefónica Ireland and others.

• However, the principles discussed here are applicable to price competition in differentiated products markets more generally, and are not specific to this sector in any way.
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Data requirements

- In principle, the tools discussed in this presentation require the following **data inputs**:
  - *Profit margins* (in particular, of the merging firms)
  - *Diversion ratios* (in particular, to and from the merging firms)
  - *Prices* of the products in question
  - *Volumes of sales* of the products in question
- The latter two ingredients are available in virtually every significant merger, as they are **needed for market shares** (volume and value)
- *Diversion ratios and margins* are the additional inputs needed, which can be more difficult to come by
- However, at least **rough estimates** can be obtained in many (if not most) transactions
- We will now **discuss how**
Diversion ratios

- Diversion ratios are a **measure of closeness of competition** between competing firms or products.
- Concretely, the **diversion ratio** from product 1 to product 2 asks: "Suppose product 1 increases its price and some customers stop purchasing the product as a result. Which proportion of the departing customers will switch to product 2?"
- If many departing customers switch from product 1 to product 2, then 1 and 2 can be said to be **close competitors**.
- **Formally**, the diversion ratio from good $i$ to good $j$ is given by $D_{ij} = -\left(\frac{\partial x_j}{\partial p_i}\right)/\left(\frac{\partial x_i}{\partial p_i}\right)$
- There are different ways in which diversion ratios **can be obtained** in concrete cases:
Diversion ratios

- **Approximation via market shares** (IIA assumption: $D_{ij} = s_j/(1 - s_i)$)
- **Switching data** (observation of past diversion)
- **Surveys** ("what would be your second best choice?")
- **Demand estimation** (from elasticities)

**In earlier mobile cases, the Commission used past switching from mobile number portability (MNP) data**

- This is a reasonable starting point, but switching is not necessarily based on (unilateral) **price changes**
- In later cases: use of **surveys** (online/phone) to provide better measure of second preference in case of price changes

**Surveys need to be conducted carefully:**
- **Focus on "informed" customers** (through screening questions)
- Put interviewee in **mindset of past purchase** decision
- Focus on **second choice** (diversion), not own-price elasticity (likely overstated)
Margins

- Firms will generally have **at least some margin data** available.
- For the tools discussed in this presentation, **incremental margins** are arguably often the most appropriate measure, as they...
  - ...use **incremental cost** (i.e., costs that are truly variable with output expansion).
  - ...ignore costs that are **genuinely fixed** (i.e., independent of output).
  - ...do take into account **capital expenditures** to the extent that increasing output requires expanding them (at least in the medium term).
- Practical **alternatives**, when such data cannot be constructed include:
  - **Contribution margins** (may somewhat overstate incremental margins as they do not account for incremental capex needed for output expansion).
  - **EBITDA margins** (similar).
  - **EBIT margins** (likely understates incremental margins as all CAPEX/depreciation is included).
Price pressure analyses

• Post-merger, **upward price pressure** is caused by the fact that the merging firms will now take into account the impact of their price setting on their respective merging partner.

• E.g., if firm 1 considers lowering its price, this will attract some customers also from firm 2, and thus **impose a cost** on firm 2.

• Since, post-merger, firm 1 takes into account this opportunity cost on firm 2, the merger acts like a "**tax on competing**".

• Price pressure tools essentially **measure the size** of this tax on competing (and some build on that to assess equilibrium effects).

• The "**tax on competing**" is higher if:
  • **Diversion ratios are high**: the firms are close substitutes, so firm 1's price cuts would attract many customers from firm 2 (and conversely).
  • **Margins are high**: the lost customers attracted by firm 1 are costly for firm 2.

• Hence, diversion ratios and margins are **essential** for those tools.
The simplest tool to measure the tax on competing is "upward pricing pressure" (UPP) (Farrell & Shapiro, 2010). It measures the opportunity cost ("tax") of competing by producing one more unit of output:

\[ UPP_i = D_{ij}(p_j - c_j) \]

It is typically applied as the "gross upward price pressure index" (GUPPI) (Salop & Moresi, 2009), which expresses it relative to price:

\[ GUPPI_i = D_{ij}m_j \frac{p_j}{p_i} \]

Interpretation: "tax" (in % of price) of merger on merging products
CMCR

- Werden (1996): Measures price pressure in terms of "compensating marginal cost reduction" (CMCR) needed to overturn it.
- Compared to GUPPI, CMCR also incorporates feedback effects between parties and hence is more comprehensive (with the same data requirements).
- CMCR as defined relative to price:

\[ CMCR_i = \frac{\Delta c_i}{p_i} = \frac{m_i D_{ij} D_{ji} + m_j D_{ij} \frac{p_j}{p_i}}{1 - D_{ij} D_{ji}} \]

- Interpretation: How large would a cost-reducing merger efficiency have to be (in % of price) to compensate anticompetitive effect?
The eventual price effect of price pressure will depend on the pass-on of the "tax on competition" (which is a perceived increase in cost).

Hausman et al. (2011): Indicative price rise (IPR) resulting from price pressure, computed by taking outsiders' prices as given.

Pass-on depends on demand curvatures, so functional form-assumption is needed.

With linear demand and Slutsky symmetry:

\[
IPR_i = \Delta p_i \div p_i = \frac{1}{2} \Delta c_i \div p_i = \frac{1}{2} CMCR_i
\]

Interpretation: How much (in %) will the merging parties' prices increase post-merger if (i) demand is linear and (ii) competitors' prices don't change?

Note: both assumptions tend to underestimate price increases.
Example: A hypothetical merger

- Consider a **hypothetical merger** of firm 1 and firm 2, with the following basic information:

<table>
<thead>
<tr>
<th>Company</th>
<th>Market shares</th>
<th>Margins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm 1</td>
<td>30%</td>
<td>35%</td>
</tr>
<tr>
<td>Firm 2</td>
<td>15%</td>
<td>25%</td>
</tr>
<tr>
<td>Firm 3</td>
<td>30%</td>
<td>40%</td>
</tr>
<tr>
<td>Firm 4</td>
<td>25%</td>
<td>20%</td>
</tr>
</tbody>
</table>

- For simplicity, let prices of the four companies **be identical** (i.e., revenue shares are equal to volume shares)
Example: A hypothetical merger

- Let **diversion ratios** be given by:

<table>
<thead>
<tr>
<th>Diversion</th>
<th>Firm 1</th>
<th>Firm 2</th>
<th>Firm 3</th>
<th>Firm 4</th>
<th>Outside</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm 1</td>
<td>./</td>
<td>21.4%</td>
<td>35.0%</td>
<td>29.2%</td>
<td>14.5%</td>
</tr>
<tr>
<td>Firm 2</td>
<td>34.2%</td>
<td>./</td>
<td>28.0%</td>
<td>23.3%</td>
<td>14.5%</td>
</tr>
<tr>
<td>Firm 3</td>
<td>34.2%</td>
<td>17.1%</td>
<td>./</td>
<td>34.2%</td>
<td>14.5%</td>
</tr>
<tr>
<td>Firm 4</td>
<td>31.4%</td>
<td>23.3%</td>
<td>38.5%</td>
<td>./</td>
<td>14.5%</td>
</tr>
</tbody>
</table>

- For instance, these could be given by switching data or by a **survey**
Example: price pressure tools

• **GUPPIs** are easy to calculate with available data:

\[
GUPPI_1 = D_{12} m_2 \frac{p_2}{p_1} = .214 \cdot .25 \cdot \frac{1}{1} = 5.4\%
\]

\[
GUPPI_2 = D_{21} m_1 \frac{p_1}{p_2} = .342 \cdot .35 \cdot \frac{1}{1} = 12.0\%
\]

• Likewise, price-based **CMCRs** are easy to derive:

\[
CMCR_1 = \frac{m_1 D_{12} D_{21} + m_2 D_{12} \frac{p_2}{p_1}}{1 - D_{12} D_{21}} = \frac{.35 \cdot .214 \cdot .342 + .25 \cdot .214 \cdot \frac{1}{1}}{1 - .214 \cdot .342} = 8.5\%
\]

\[
CMCR_2 = \frac{m_2 D_{21} D_{12} + m_1 D_{21} \frac{p_1}{p_2}}{1 - D_{12} D_{21}} = \frac{.25 \cdot .342 \cdot .214 + .35 \cdot .342 \cdot \frac{1}{1}}{1 - .214 \cdot .342} = 14.9\%
\]

• This results in the following **IPRs** (assuming Slutsky symmetry):

\[
IPR_1 = .5 \cdot CMCR_1 = .5 \cdot .085 = 4.3\%
\]

\[
IPR_2 = .5 \cdot CMCR_2 = .5 \cdot .149 = 7.5\%
\]
Example: merger simulation

- **Comparison** of results with a linear calibrated merger simulation:

<table>
<thead>
<tr>
<th>Company</th>
<th>GUPPI</th>
<th>CMCR</th>
<th>IPR</th>
<th>Simulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm 1</td>
<td>5.4%</td>
<td>8.5%</td>
<td>4.3%</td>
<td>5.2%</td>
</tr>
<tr>
<td>Firm 2</td>
<td>12.0%</td>
<td>14.9%</td>
<td>7.5%</td>
<td>8.2%</td>
</tr>
<tr>
<td>Firm 3</td>
<td></td>
<td></td>
<td></td>
<td>2.3%</td>
</tr>
<tr>
<td>Firm 4</td>
<td></td>
<td></td>
<td></td>
<td>1.2%</td>
</tr>
<tr>
<td>Average</td>
<td>3.4%</td>
<td>4.8%</td>
<td>2.4%</td>
<td>3.8%</td>
</tr>
</tbody>
</table>

- Note that (weighted) **average price changes** are constructed here also for tools that consider only merging parties' prices
- E.g., $CMCR = s_1 CMCR_1 + s_2 CMCR_2$
- Averages are constructed using **pre-merger** market shares
Overview of economic tools

• "Pecking order" of competitive effects measures:
  • **UPP**: Only one-company, gross first round "tax" on competition
  • **GUPPI**: Improves by permitting comparisons (UPP relative to price)
  • **CMCR**: Improves by accounting for feedback effects between parties
  • **IPR**: Improves by deriving price effect (but: assumes demand form)
  • **Simple merger simulations**: Improve by accounting for feedback effects with non-merging goods (but: also assume demand form)

• Relatively **simple merger simulations** comprise:
  • **Linear calibration**: imposes linear demand, but permits heterogeneous substitution patterns and requires only data on margins and diversion ratios (same as price pressure analysis)
  • **ALM/PCAIDS**: Also impose functional form, but do not permit heterogeneous substitution patterns absent nests

• **Mobile cases**: used a wide variety of tools from UPP to linear merger simulation for robustness
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Conclusion

- Upward pricing pressure tools help quantifying the **likely effect of mergers**
- **Data requirements** are moderate (margins and diversion ratios)
- Even where the necessary data is not available, tools show which elements to look for in qualitative analysis (**closeness of competition and pre-merger market power**)
- In EU **mobile merger cases**, usually a wide combination of tools was used for robustness
- Arguably, among tools requiring no demand form assumptions, **CMCR is most complete and intuitive**
- Similarly, among tools requiring a demand form assumption, **calibrated (linear) merger simulations are versatile yet simple**
References and further reading


Moresi, S. (2010), "The Use of Upward Price Pressure Indices in Merger Analysis", *Antitrust Source* 02/2010, 1-12


