



# 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.

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# 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 
$$D_{ij} = - (\partial x_j / \partial p_i) / (\partial x_i / \partial p_i)$$
- 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)

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# 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

# UPP/GUPPI

- 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?

# IPR

- 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:

$$IPR_i = \frac{\Delta p_i}{p_i} = \frac{1}{2} \frac{\Delta c_i}{p_i} = \frac{1}{2} CMCR_i$$

- **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:

Company	Market shares	Margins
Firm 1	30%	35%
Firm 2	15%	25%
Firm 3	30%	40%
Firm 4	25%	20%

- 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:

Diversion	Firm 1	Firm 2	Firm 3	Firm 4	Outside
Firm 1	./.	21.4%	35.0%	29.2%	14.5%
Firm 2	34.2%	./.	28.0%	23.3%	14.5%
Firm 3	34.2%	17.1%	./.	34.2%	14.5%
Firm 4	31.4%	23.3%	38.5%	./.	14.5%

- 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:

Company	GUPPI	CMCR	IPR	Simulation
Firm 1	5.4%	8.5%	4.3%	5.2%
Firm 2	12.0%	14.9%	7.5%	8.2%
Firm 3				2.3%
Firm 4				1.2%
Average	3.4%	4.8%	2.4%	3.8%

- Note that (weighted) **average price changes** are constructed here also for tools that consider only merging parties' prices
- E.g.,  $\overline{CMCR} = s_1 CMCR_1 + s_2 CMCR_2$
- 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

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