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THE ROLE OF CALIBRATED MODELS OF COMPETITION IN MERGER CONTROL

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Introduction

- **The purpose of unilateral merger effect control**

  – To prevent substantial lessening of competition (*SLC*)

  – Finding the sign and the magnitude of ΔCS

  – We need some economic tools…

- **The role of calibrated models for merger simulations**

  – It is complementary to the traditional tools

  – It can reduce regulatory mistakes without excess regulatory costs

  – Calibration *vs* estimation of used model's parameters (with enough time and resources we can use both)

- **The outcome of simulations**

  – Deducing the sign and the magnitude of ΔCS by incorporating lessening of competition and expected efficiencies in the same model

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Literature

- **Farrell, Joseph & Carl Shapiro** (1990), "Horizontal Mergers: An Equilibrium Analysis", *The American Economic Review*, Vol. 80, No. 1, March, 107-126.

- **Werden, J. Gregory & Luke M. Froeb** (2002), "Calibrated Economic Models Add Focus, Accuracy, and Persuasiveness to Merger Analysis", Vanderbilt University Law School, Law & Economics Working Paper No 02-22.

- **Budzinski, Oliver & Isabel Ruhmer** (2009), "Merger Simulation in Competition Policy: A Survey", *Journal of Competition Law & Economics*, Vol. 6, No. 2, 277-319.

- **Kreps, M. David & Jose A. Scheinkman** (1983), "Quantity Precommitment and Bertrand Competition Yield Cournot Outcomes", *The Bell Journal of Economics*, Vol. 14, No. 2, (Autumn, 1983), 326-337.

- **Schulz, Norbert** (1999), "Capacity Constrained Price Competition and Entry Deterrence in Heterogeneous Product Markets", Working paper, Würzburg economic papers,3 No. 99-7, Universität Würzburg.

- **Taleb, Nassim Nicholas** (2010), *The Black Swan: The Impact of the Highly Improbable*, Second Edition, Random House Trade Paperbacks, New York.

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Rationale for simulation (I)

- **Standard reasoning behind traditional tools**

  - Creating or straightening of dominant position by merger, measured by market shares, can indicate future incentives to increase market power → **positive correlation between market power and shares**

  - Merger can improve market position of its participants in relation with the demand side of the market → **negative correlation between own price elasticities and market power**

  - Logic of safe harbours based upon *HHI*, which is based upon shares, and shares based upon relevant market definition → so, **positive correlation between HHI and SLC**

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Rationale for simulation (II)

- Let's start from the fundamental model of quantity competition

  - Standard assumptions:

  $$p = D(X), D'(X) < 0$$
  $$X = x_1 + x_2 + \cdots + x_n$$
  $$C_i(x_i), C_i'(x_i) \geq 0$$

  - Equilibrium by solving the system of FOC's:

  $$\frac{\partial \pi_i(x_i, X_{-i})}{\partial x_i} = p + x_i D'(X) - C_i'(x_i) = 0$$

  $$\text{for } i = 1, 2, \ldots, n$$

Rationale for simulation (III)

- **From firm i's FOC:**

  - $p + x_i D'(X) - C_i'(x_i) = 0$

- **If:**

  - ε market elasticity of demand
  - $L_i = \dfrac{p - C_i'(x_i)}{p}$ (Lerner index)
  - $s_i = \dfrac{x_i}{X}$ (market share)
  - $HHI = \sum_{i=1}^{n} s_i^2$, (Herfindahl-Hirschman Index)

- **Finally, we obtain:**

$$L_i = \frac{p - C_i'(x_i)}{p} = \frac{s_i}{|\varepsilon|}$$ and $$L = \frac{s_1^2}{|\varepsilon|} + \frac{s_2^2}{|\varepsilon|} + \cdots + \frac{s_n^2}{|\varepsilon|} = \frac{\sum_{i=1}^{n} s_i^2}{|\varepsilon|} = \frac{HHI}{|\varepsilon|}$$

Basic steps of simulations

1. Model selection

2. Calibration of the chosen model

3. Calculation of the hypothetical after merger equilibrium

4. Comparative static analysis

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The naive example (I)

- **Inspiring sugar industry case**

- **Model selection (appropriate for the given example)**
  - Dominant strategic variable (price, quantities, advertising, innovations, or something else)
  - Cournot's simultaneous model of quantity competition as the shortened form of the two-staged models of capacity then price competition
  - Selection of the appropriate forms of demand and cost functions
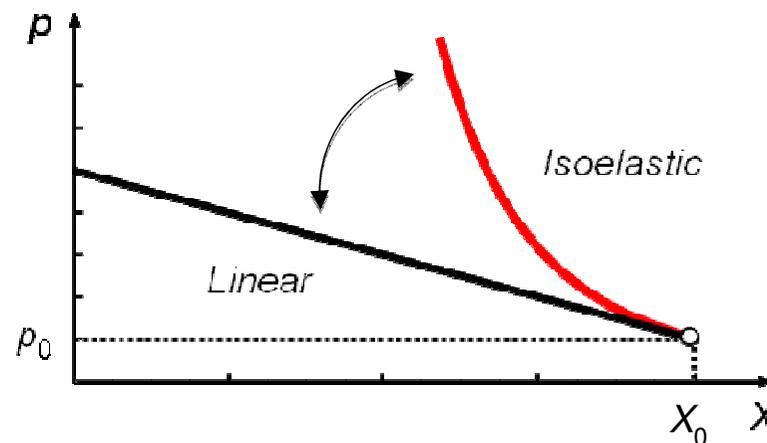
The naive example (II)

- **Calibration of the chosen model**

  - Demand and costs calibration

- **Demand calibration:**

  - $p = a - bX$ (for $a, b > 0$)

  - If p_0, X_0, ε_0 is known (and it should be known if the relevant market is properly defined)

  - By definition of price elasticity and for values of p_0, X_0, ε_0, we obtain:

$$b = \frac{p_0}{X_0 |\varepsilon_0|}$$

$$a = \frac{p_0(|\varepsilon_0|+1)}{|\varepsilon_0|}$$

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The naive example (III)

- **Marginal cost calibration** (if they are unknown):
  - Starting again from i's firm FOC:
  - $p + x_i D'(X) - C_i'(x_i) = 0$, and by assuming constant returns to scale:
  - $p_0 + x_i \, b - c_i = 0$, we obtain:

$$c_i = \frac{p_0(|\varepsilon_0| + s_i)}{|\varepsilon_0|} \quad \text{for } i = 1, 2, \dots, n$$

- **Therefore, model is finally equipped for short-run predictions**

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Conclusions

- The application of simulation as a **complementary analytical tool** for the control of concentrations decreases the space for regulatory mistakes

- It does not require significant **additional time, data nor other resources** (probably all ingredients are already available if the relevant market was properly defined)

- It enables **significant influence of economic theory** in merger control, which is in accordance with the so-called "More economic approach" (it incorporates lessening of the competition and merger efficiencies in one model)

- It does not exclude the **possibility of econometric approach** in equipping the chosen economic model (by estimating demand and cost functions)

- It can **complicate the day-to-day life** of judges and lawyers accustomed to the use of *per se* rules (models may look like the black box generating evidence)

Thank you for your attention!

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