Mergers and Demand-Enhancing Innovation

M. Bourreau, B. Jullien, Y. Lefouili

Iván RENDO BARREIRO

TSE - Theoretical IO (I) - Feb. 2023

I. Economic Issue

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Important remark: **demand-enhancing innovation:**

E.g. in a duopoly, demand for good 1: $D_1(p_1, p_2, \gamma_1, \gamma_2)$, where γ_i = level of innovation

$$\frac{\partial D_1(p_1, p_2, \gamma_1, \gamma_2)}{\partial \gamma_1} > 0$$

Moreover, it is assumed $\frac{\partial D_1(p_1, p_2, \gamma_1, \gamma_2)}{\partial \gamma_2} < 0$, otherwise not interesting.

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Intuition already at US 2010 Guidelines §6.4:

«A problem is most likely to occur if at least one of the merging firms is engaging in efforts to introduce new products that would capture substantial revenues from the other merging firm.»

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20XX?: Case M.XXXX Microsoft / OpenAI. Market of AI developers very concentrated: Meta, Amazon, Google (DeepMind), OpenAI and Microsoft (Azure). Lately, large "investments" of Microsoft on OpenAI (~10B$). A merge or "just" exclusive contracting? Revenue schema not clear yet. Potential spillovers large enough? Potential remedies: data sharing or open source?

II. Model and Results

(Simplified) Model

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Framework:

- 2 firms, differentiated goods, compete in prices and innovation levels
- Common marginal cost of production c and convex cost of innovation $C(\cdot)$.
- **Simplification**: linear demand $D_i(p_i, p_j, \gamma_i, \gamma_j) = M - \alpha p_i + \beta p_j + A\gamma_i - B\gamma_j$

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Problem of the **independent firm** i: $\Pi_i(p_i, p_j, \gamma_i, \gamma_j) = (p_i - c)\Big(M - \alpha p_i + \beta p_j + A\gamma_i - B\gamma_j\Big) - C(\gamma_i)$

From FOCs, the symmetric equilibrium satisfies:

$$h^*(\gamma^*) = C'(\gamma^*)$$

$$\boxed{h(p, \gamma) \triangleq D_i(p, p, \gamma, \gamma)\frac{A}{\alpha}}$$

$h^*(\gamma) \equiv$ **firm's marginal gain from an increase in its innovation level** when its price is set optimally holding constant the innovation and price levels of firm j at γ and $p(\gamma) \equiv$ optimal pricing decision for innovation each level

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Profit of the **merged entity**: $\Pi_M(p_1, p_2, \gamma_1, \gamma_2) = \sum_{i=1}^{2} (p_i - c - \sigma)D_i(p_i, p_j, \gamma_i, \gamma_j) - C(\gamma_i)$

FOC of the merged entity's problem: $l^M(\gamma^M) = C'(\gamma^M)$

$$\boxed{l^M(\gamma) \triangleq D_i(p, p, \gamma, \gamma)\frac{A - B}{\alpha - \beta}}$$

$l^M(\gamma) \equiv$ **slope of the merged entity's profit with respect to** γ_i when all prices are set optimally, holding the innovation level of the other unit

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- More: oligopolies, observable (strategical) investments, asymmetry…

In general, low or complex tractability and results very dependent on demand functional forms.

III. Further Discussion

Other literature

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Motta & Tarantino (2021)

- Revisit the problem, allowing for investments on cost reduction and quality (demand) enhancing.
- **Main result:** absent of efficiency gains, the merger always reduces total investments and consumer surplus if investing in cost reduction. Ambiguous in the quality enhancing case -> **conclusions more limited but very similar to Bourreau et al. (2021).**

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Federico, Langus & Valleti (2017)

- Model where innovation does not lead to cost reductions or demand enhancing, but to **new products**. (Dow/DuPont case)
- n>2 firms compete on R&D, they invest ω_i at cost $C(\omega_i)$, convex, to obtain P(discover new product) = ω_i.
  - If one and only one firm discovers a new product, obtains a prize = 1
  - If two or more firms discover the new product, obtain a prize $\delta << 1$

Main results:

- The merged firm decreases effort ω_i compared to the situation pre-merger for any $\delta > 0$.
- Total industry effort decreases after the merger **iff n is low enough**.

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Nothing said about welfare!

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  - It is possible that a merger is incentivized partly by the willingness to obtain better data for the parties. This would be killed with strong data sharing policies, which can be imposed as a condition to a merger. However, what would happen to innovation in that case?