

ECN 594: Mergers and Merger Policy

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Plan for today

1. Horizontal mergers: effects on prices
2. Merger simulation (connects Part 1 to Part 2!)
3. Worked example: simple merger simulation

4. Antitrust and merger review
5. Market definition and HHI
6. Efficiency defense

HW2 released

- **HW2:** Merger simulation exercise
- You will be given a demand system (estimated in Part 1 style)
- Your task: simulate price effects of a merger
- This lecture explains the methodology

Part 1: Merger Effects and Simulation

Horizontal mergers

- **Horizontal merger:** Competitors combine
- **Key concern:** Market power
 - Fewer firms → less competition
 - Higher prices for consumers
- **But also:** Potential efficiencies
 - Economies of scale
 - Elimination of duplicated costs
- Trade-off: market power vs efficiency

Why do prices increase after a merger?

- **Before merger:** Firm A and Firm B compete
 - If A raises price, loses customers to B
 - This constrains A's pricing
- **After merger:** Single firm owns both A and B
 - If A raises price, some customers go to B
 - But merged firm also owns B!
 - Lost customers are “recaptured”
- Merger **internalizes substitution** between products

Merger simulation: the idea

- **Goal:** Predict post-merger prices
- **Ingredients:**
 1. Demand estimates (from Part 1!)
 2. Pre-merger prices and market structure
 3. The merger (which firms combine)
- **Method:**
 1. Write down firms' pricing FOCs
 2. Change ownership structure
 3. Solve for new equilibrium prices

The ownership matrix

- Define ownership matrix \mathbf{H} where:

$$H_{jk} = \begin{cases} 1 & \text{if products } j \text{ and } k \text{ have same owner} \\ 0 & \text{otherwise} \end{cases}$$

- **Pre-merger** (products 1, 2 owned separately):

$$\mathbf{H}^{pre} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

- **Post-merger** (same owner):

$$\mathbf{H}^{post} = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$$

Pricing FOC with ownership

- Owner of products in set \mathcal{F} maximizes:

$$\sum_{j \in \mathcal{F}} (p_j - mc_j) q_j(p)$$

- FOC for product j :

$$q_j + \sum_{k \in \mathcal{F}} (p_k - mc_k) \frac{\partial q_k}{\partial p_j} = 0$$

- Using ownership matrix, in vector form:

$$\mathbf{q} + (\mathbf{H} \odot \boldsymbol{\Omega}^T)(\mathbf{p} - \mathbf{mc}) = 0$$

- where $\Omega_{jk} = \frac{\partial q_j}{\partial p_k}$ (demand derivatives)

How the merger changes things

- **Pre-merger:** Each firm only cares about own products
 - $H_{jk} = 0$ for $j \neq k$ (different owners)
 - Cross-price effects ignored
- **Post-merger:** Merged firm cares about both products
 - $H_{jk} = 1$ for merged products
 - Cross-price effects internalized
- When H_{jk} changes from 0 to 1:
 - Firm now “counts” sales diverted to product k
 - Less incentive to keep price low

Worked example: Simple merger simulation

- Two firms, each with one product
- Demand: $q_j = 100 - 3p_j + p_k$ (products are substitutes)
- $MC = 10$ for both products
- **Questions:**
 - (a) Find pre-merger equilibrium prices
 - (b) Find post-merger equilibrium prices
 - (c) Calculate price increase from merger

Take 7 minutes.

Worked example: Pre-merger (solution)

- **Pre-merger:** Each firm maximizes own profit
- Firm 1: $\max_{p_1} (p_1 - 10)(100 - 3p_1 + p_2)$
- FOC: $100 - 6p_1 + p_2 + 30 = 0$
- Symmetric: $p_1 = p_2 = p$, so:

$$100 - 6p + p + 30 = 0 \Rightarrow p = 26$$

- Pre-merger: $p_1^{pre} = p_2^{pre} = 26$
- Quantity: $q = 100 - 3(26) + 26 = 48$

Worked example: Post-merger (solution)

- **Post-merger:** Merged firm maximizes joint profit

- $\max_{p_1, p_2} (p_1 - 10)q_1 + (p_2 - 10)q_2$

- FOC for p_1 :

$$q_1 + (p_1 - 10)(-3) + (p_2 - 10)(1) = 0$$

- Note: now includes $\frac{\partial q_2}{\partial p_1} = 1$ term!

- Symmetric: $p_1 = p_2 = p$:

$$100 - 3p + p - 3(p - 10) + (p - 10) = 0$$

$$100 - 3p + p - 3p + 30 + p - 10 = 0$$

$$120 - 4p = 0 \Rightarrow p = 30$$

Worked example: Results

- **Pre-merger price:** $p = 26$
- **Post-merger price:** $p = 30$
- **Price increase:** $\frac{30-26}{26} = 15.4\%$
- **Why?**
 - Before: raising p_1 loses customers to product 2
 - After: those “lost” customers still buy from merged firm
 - Less competitive pressure → higher prices
- This is on HW2 (with more products)!

Merger simulation in practice

- **Step 1:** Estimate demand (logit, nested logit, etc.)
 - Get elasticities and demand derivatives
- **Step 2:** Recover marginal costs
 - Use pre-merger FOC: $mc_j = p_j - \frac{q_j}{\partial q_j / \partial p_j}$
- **Step 3:** Change ownership matrix
- **Step 4:** Solve for new equilibrium prices
 - Often requires numerical solution
- **Step 5:** Calculate welfare effects

Part 2: Merger Policy

Antitrust and merger review

- In the US:

- Department of Justice (DOJ) Antitrust Division
- Federal Trade Commission (FTC)
- Large mergers must be reported (Hart-Scott-Rodino Act)
- Agencies review and can challenge mergers
- **Horizontal Merger Guidelines:** Framework for analysis
- Similar agencies in EU, UK, and other jurisdictions

Market definition

- First step: define the relevant market
- **SSNIP test:** Small but Significant Non-transitory Increase in Price
 - Would a hypothetical monopolist raise price 5%?
 - If yes: products are in same market
 - If no (too much substitution): market is too narrow
- Market definition is often contentious
- Broader market → lower market shares → merger more likely approved

HHI: Herfindahl-Hirschman Index

- **Definition:**

$$HHI = \sum_{i=1}^N s_i^2 \times 10000$$

- where s_i is firm i 's market share (as decimal)
- Ranges from 0 to 10,000

- **Interpretation:**

- $HHI < 1500$: Unconcentrated
- $1500 \leq HHI < 2500$: Moderately concentrated
- $HHI \geq 2500$: Highly concentrated

HHI and merger guidelines

- Agencies look at ΔHHI from merger
- **Merger thresholds (approx):**
 - $\Delta HHI < 100$: Unlikely to raise concerns
 - Post-merger $HHI < 1500$: Unlikely to raise concerns
 - Post-merger $HHI > 2500$ AND $\Delta HHI > 200$: Likely scrutiny
- HHI is a screen, not definitive
- Real analysis uses merger simulation, efficiencies, etc.

Worked example: HHI calculation

- **Question:** Market has 4 firms with shares: 40%, 30%, 20%, 10%.
- Firm 1 (40%) merges with Firm 4 (10%).
- (a) Calculate pre-merger HHI
- (b) Calculate post-merger HHI and ΔHHI

Take 3 minutes.

Worked example: HHI (solution)

- **(a) Pre-merger:**

$$HHI = (0.40)^2 + (0.30)^2 + (0.20)^2 + (0.10)^2 = 0.30$$

- $HHI = 3000$ (highly concentrated)

- **(b) Post-merger:**

$$HHI = (0.50)^2 + (0.30)^2 + (0.20)^2 = 0.38$$

- $HHI = 3800$, $\Delta HHI = 800$

- **Shortcut:** $\Delta HHI = 2 \times s_1 \times s_4 \times 10000 = 2 \times 0.4 \times 0.1 \times 10000 = 800$

Efficiency defense

- Mergers can create efficiencies:
 - Economies of scale
 - Elimination of duplicated fixed costs
 - Better management
- **Williamson trade-off:**
 - Market power effect: prices rise, deadweight loss
 - Efficiency effect: costs fall, resource savings
- Merger approved if efficiency gains outweigh market power harms
- In practice: high bar for efficiency claims

Recent merger cases

- **Tech mergers:**
 - Google/Fitbit: wearables and data
 - Microsoft/Activision: gaming
- **Healthcare:**
 - Hospital mergers: quality vs price concerns
- **Key issues in modern cases:**
 - Data as competitive asset
 - Potential competition (would target have grown into competitor?)
 - Vertical concerns (platforms buying content)

Key Points

1. Mergers reduce competition by **internalizing substitution**
2. **Merger simulation:** Use demand + ownership change to predict prices
3. Key: ownership matrix **H** changes from 0 to 1 for merged products
4. FOC changes: merged firm counts cross-price effects
5. **SSNIP test:** Would hypothetical monopolist raise price 5%?
6. **HHI** = $\sum s_i^2 \times 10000$; ΔHHI screens mergers
7. **Efficiency defense:** Cost savings may offset price effects

Next time

- **Lecture 11:** Vertical Relationships
 - Double marginalization
 - Vertical integration
 - Vertical restraints (RPM, exclusive dealing)