Optimal Merger Remedies

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Introduction

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  - The European Commission cleared 60% of mergers that reached Phase 2 between 1990 and 2024 subject to remedies
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  - Merger partners divest assets, e.g., manufacturing facilities, personnel, intellectual property, ... More
- Goal of these remedies is to prevent a merger harming consumers—by strengthening existing competitors, or by facilitating entry of new firms

Introduction

- Literature on merger policy largely ignores possibility of remedies
- Allowing for remedies raises several natural questions:
  - When are remedies required and when are they effective?
  - Which assets should be divested, and to whom? And how does this depend on market characteristics?
  - To what extent can remedies substitute for a lack of efficiencies?
  - Mergers often affect multiple markets. If the authority can balance (consumer) surplus gains and losses across markets, is it better to divest few assets in many markets, or many assets in few markets?
- This paper: tractable framework to study optimal merger remedies
  - Focus on unilateral effects (Williamson, 1968; Farrell and Shapiro, 1990)

Related Literature

- *Unilateral price effects in single-product mergers.* Williamson (1968), Farrell and Shapiro (1990), Nocke and Whinston (2010, 2013, 2022)
- *Single-product mergers with remedies.* Vergé (2010), Vasconcelos (2010), Cosnita-Langlais and Tropeano (2012), Dertwinkel-Kalt and Wey (2016)
- *Multiproduct mergers.* Johnson and Rhodes (2021), Nocke and Schutz (2025)
- *Empirical analysis of remedies.* Tenn and Yun (2011), Lagos (2018), Argentesi, Buccirossi, Cervone, Duso, and Marrazzo (2021), Friberg and Romahn (2015), Alviarez, Head, and Mayer (2025)

1. Single-Market Mergers

2. Multimarket Mergers

Single-Market Setting

- Set of firms $\mathcal{N}$ producing a homogeneous good and competing a la Cournot
- Constant marginal cost of firm j given by c_j
- Inverse market demand $P(Q)$, with curvature $\sigma(Q)$
- Standard assumptions (ensuring existence and uniqueness of equilibrium):
  - $P(0) > 0$ and $\lim_{Q \to \infty} P(Q) = 0$
  - For any Q such that $P(Q) > 0$: $P'(Q) < 0$ and $\sigma(Q) < 1$

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  - For any Q such that $P(Q) > 0$: $P'(Q) < 0$ and $\sigma(Q) < 1$
- Consider a potential merger among two active firms, denoted by $\mathcal{M} \subset \mathcal{N}$
- The set of outsiders is $\mathcal{O} \equiv \mathcal{N} \setminus \mathcal{M}$ (not all necessarily active pre merger)
- An antitrust authority wishes to maximize consumer surplus

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  - Marginal costs $\overline{c}_M(-k)$ for the merged firm and $\overline{c}_i(k)$ for outsider i
    - ⋆ Both continuous and weakly decreasing in asset holdings, with $\overline{c}_i(0) \equiv c_i$
  - Marginal cost for all other firms is unchanged
  - This talk: the merged firm does not receive revenue from divesting assets

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- Three-stage game:
  1. Merger partners decide whether to propose their merger and a remedy (k, i)
  2. The antitrust authority decides whether to clear or block the proposed (k, i)
  3. Given the resulting market structure, firms compete à la Cournot
- (Tie-break rule: merger partners propose only if it is strictly profitable)

Single-Market Setting

In the paper we also extend our results to allow for:

- Price competition with differentiated products $\rightsquigarrow$ multi-nomial logit
- Asset revenues $\rightsquigarrow$ Nash bargaining between merged firm and outsider i
- Bargaining over remedies between the authority and merger partners

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- Williamson trade-off between market power and efficiency effects
- Absent divestitures, synergies required for a merger not to harm consumers

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- Focusing on the case $\overline{c}_M(-K) < P(Q^*)$, where $P(Q^*)$ is the pre-merger price, $\mathcal{A}$ is non-empty if and only if there exists (k, i) satisfying

$$\underbrace{P\left(Q^*\right) - \max_{j \in \mathcal{M}} c_j}_{\text{Market power effect}} \leq \underbrace{\min_{j \in \mathcal{M}} c_j - \overline{c}_M\left(-k\right)}_{\text{Synergy effect for } M} + \underbrace{\min\left\{P\left(Q^*\right), c_i\right\} - \overline{c}_i\left(k\right)}_{\text{Synergy effect for } i}$$

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  - Market power effect: less efficient merger partner's output is lost
  - M's synergy: more efficient merger partner may get a lower cost
  - i's synergy: asset-receiving outsider gets a lower cost

Antitrust Authority's Problem

- What about comparative statics of the acceptance/blocking sets?
- We say that a market becomes less competitive if the pre-merger price $P(Q^*)$ increases due to
  - a change in demand, or
  - a vertical translation in $\overline{c}_j(.)$ for any active firm $j \in \mathcal{O}$

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Proposition

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- The blocking set is larger in less competitive markets
- Intuition: market power effect of the merger becomes larger
- Can also show that conditional on $\mathcal{A}$ being non-empty, more likely to have to divest to a previously-inactive firm, i.e., divestitures create a "new" firm

Merger Partners' Problem

- Now consider the first stage and the merger partners' problem
  - They choose the most profitable merger (if any) in the acceptance set
- (To make problem interesting, assume some feasible mergers are in $\mathcal{A}$)

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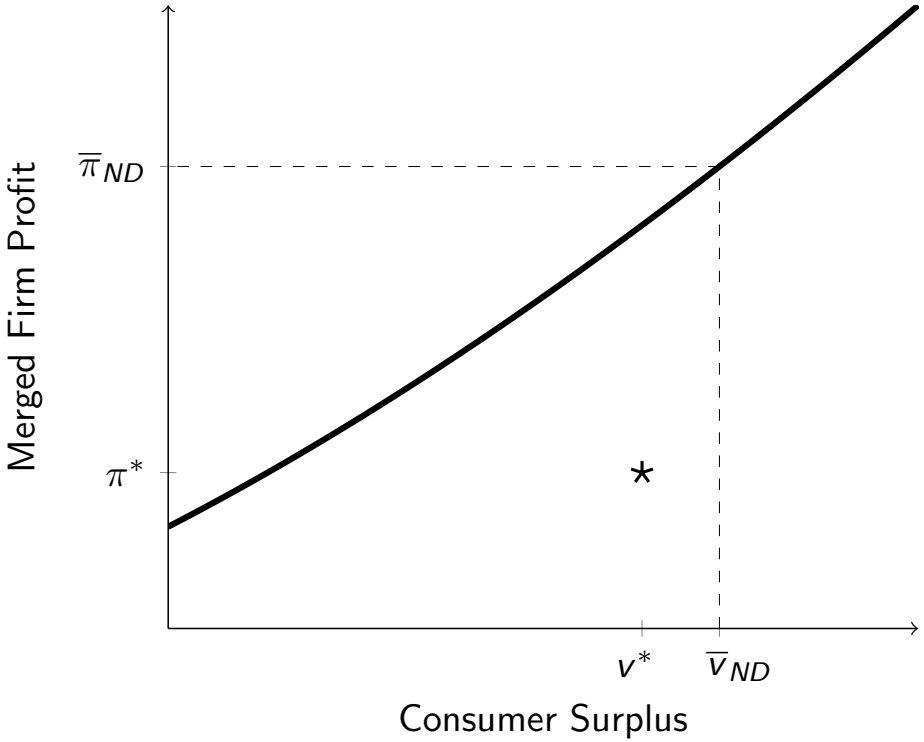
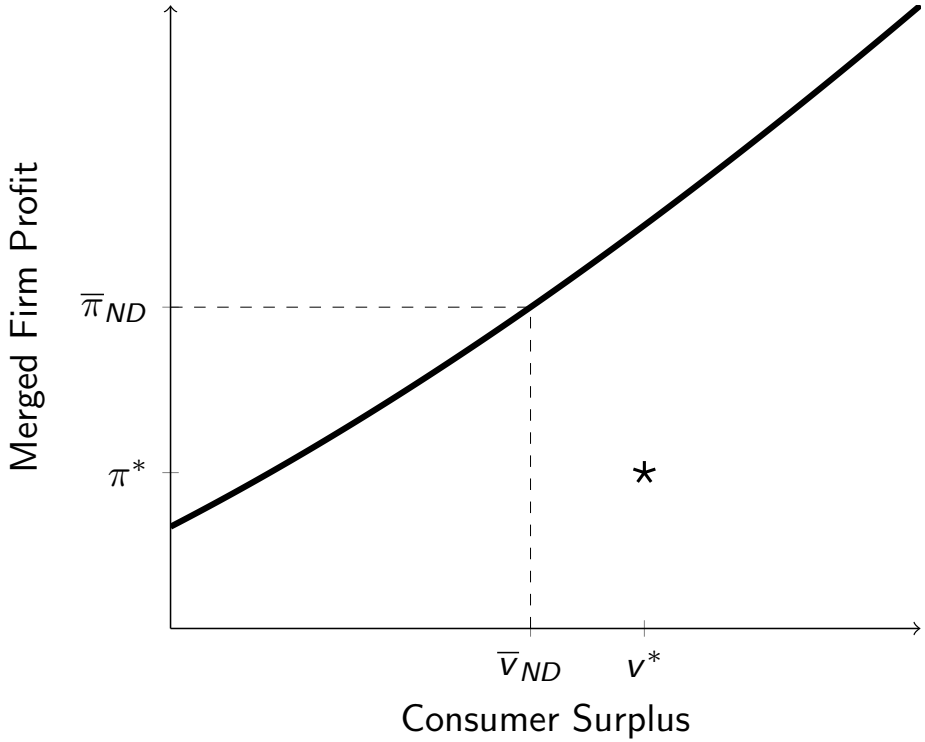
- (To make problem interesting, assume some feasible mergers are in $\mathcal{A}$)
- To characterize the solution, it is useful to introduce the synergies curve and the divestitures curve

Merger Partners' Problem





- Synergies curve: combinations of consumer surplus and merged firm profit induced by synergies
- Distinguish between whether no-divestitures consumer surplus $\overline{v}_{ND}$ is above or below its pre-merger level v^*

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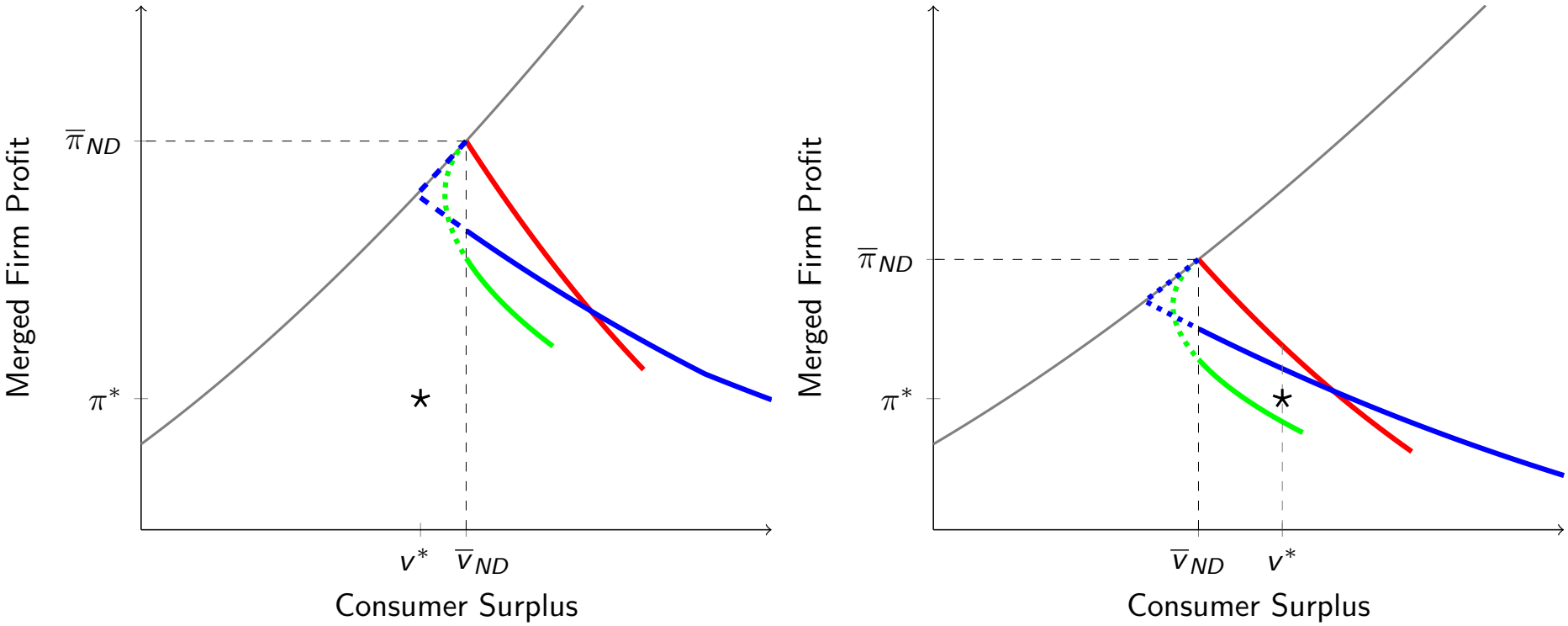

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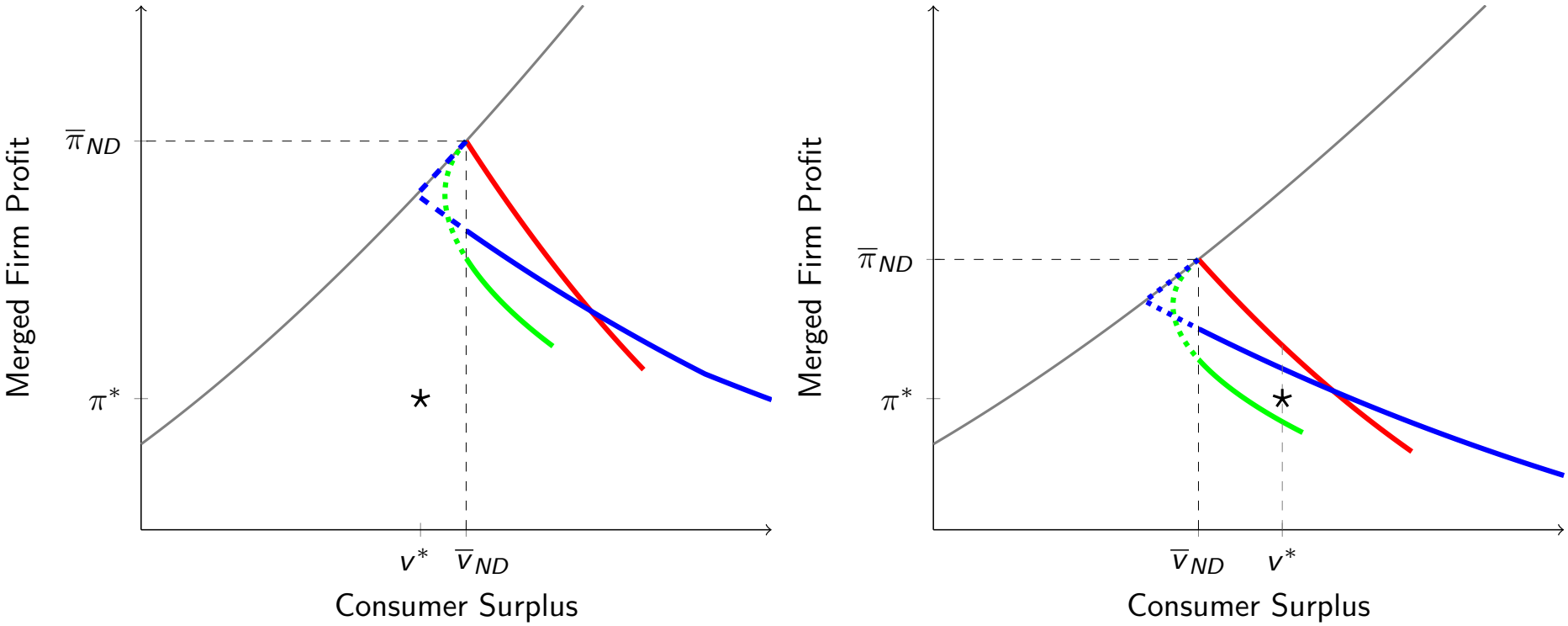

- Conditional divestitures curves: combinations of consumer surplus and (maximized) merged firm profit induced by divestitures to a given outsider
- Upper envelope is a divestitures curve $d_M(v; i)$, which is decreasing

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- Intuition:
  - A merger without divestitures that does not harm consumers is profitable
  - Divesting assets reduces the profitability of the merger

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- If a merger is proposed, it will be one that leaves consumer surplus unchanged
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Suppose that $\overline{c}_M(0) > \widehat{c}_M$. Then:

- *If $\underline{c}_M < \tilde{c}_M$, a CS-neutral merger is proposed and approved in equilibrium.*
- *Otherwise, no merger is proposed.*

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The following result is then immediate:

Proposition

A necessary condition for a merger and remedy $(k, i) \in \mathcal{A}$ *to be profitable is* $\overline{c}_M(-k) < \min_{j \in \mathcal{M}} c_j$*, i.e., there must be efficiencies even after divestitures.*

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- Remedies can partially but not fully compensate for a lack of efficiencies
- Intuition: need to make up for lost profit of the less efficient merger partner

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- Intuition: authority becomes (weakly) more demanding due to stronger market power effect, which reduces merger profitability

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2 Multimarket Mergers

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- Many (if not most) mergers affect multiple (geographic or product) markets
- In principle authorities should follow a "market-by-market" approach, and approve a merger if and only if consumer surplus increases in each market
- In practice, good reasons for authorities to sometimes deviate from this and balance gains and losses across markets:
  - The same consumers may be present in many (or even all) of the affected markets (Crane, 2015)
  - "[I]f a merger with massive competitive benefits would be made unlawful by unfixable anticompetitive effect in a single tiny market" (Werden, 2017)
  - Also consistent with antitrust policy in some countries

Multimarket Setting

- Now consider a continuum of independent markets, $h \in [0, 1]$
- Within each market h, there is a set K^h of divestible assets
- Same assumptions on costs and demands in each market as earlier
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- Same assumptions on costs and demands in each market as earlier
- For simplicity: the two firms in $\mathcal{M}$ are active in all markets
- The antitrust authority clears a merger if and only if consumer surplus, aggregated across all markets, is not reduced

Multimarket Analysis

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- Interesting case: suppose that without remedies in any market, the authority would block the merger
- Merger partners therefore choose a (feasible) consumer surplus level in each market, s.t. aggregate consumer surplus reaching its pre-merger level V^*
- Hence can write their problem as the following Lagrangian:

$$\mathcal{L} = \max_{(v^h)^{h\in[0,1]}} \int_{[0,1]} \left[d_M^h(v^h) + \lambda(v^h - V^*) \right] dh$$

where $d_M^h(v^h)$ is the divestitures curve (i.e., maximum profit) in market h

Remedies Exchange Rate

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- The remedies exchange rate improves as induced consumer surplus increases
  - Consumer surplus is convex in output
  - With linear demand, price falls in Q by a constant amount
  - But any given drop in price hurts the merged firm less, when Q is higher
  - Our assumption ensures that with non-linear demand, demand does not become too concave as Q increases, so price does not fall too quickly
  - Merged firm's cost does not increase too fast as output increases

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- But in *which* markets should assets be divested?
- The average remedies exchange rate in market h is

$$a^h \equiv \frac{d_M^h(\overline{v}_{ND}^h) - d_M^h(\overline{v}_{\max}^h)}{\overline{v}_{\max}^h - \overline{v}_{ND}^h}$$

Proposition

The solution to the merger partner's maximization problem is "bang bang":

- *In market h, it is optimal to induce consumer surplus $v_{\max}^h$ if $a^h < \lambda$*
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- Unlike in the single-market analysis, now it can be optimal to do divestitures in more competitive markets

Conclusion

- Merger remedies common in practice, but largely ignored by literature
- Mergers also often cut across multiple (geographic or product) markets
- This paper: tractable framework to allow for both phenomena
- Single-market analysis
  - Remedies do not obviate the need for synergies
  - Sense in which more remedies needed in less competitive markets
  - Hence less likely that mergers are proposed and accepted in such markets
- Multi-market analysis (balance gains and losses across markets)
  - Introduced concept of a remedies exchange rate, and argued that it becomes more favorable as divestitures increase
  - "Bang-bang" solution then follows immediately
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Thank you!

Examples

- Stericycle-STG (healthcare risk waste disposal services): in some markets manufacturing plants like incinerators were divested
- American-US Airways: slots at key airports divested to low-cost carriers
- Orange-Masmovil: divestiture of spectrum
- Rentokil-Cannon Hygiene (waste supply services): some contracts divested including assets such as personnel required to service them
- Nufarm-AH Marks (herbicides): licensing of intellectual property to allow a rival firm to supply competing products
- Emap-ABI Building Data (supplying information to building companies): Emap proposed licensing certain project data to competitors

Back