Platform Competition with Net Fees

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TSE Digital Economics Conference
January 10, 2025 • Toulouse

Motivation

Public debate about "big tech" grew significantly over the last decade

Common pattern of debate:

- "Break up Facebook" (Hughes 2019 NYT op ed – now US v. Google)
  - "Do we really want two Facebooks?"
- "Instead, foster potential competitors"
  - "Can they actually gain traction?"
- "Instead, regulate Facebook"
  - "Do we really think regulation will improve things?"

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Questions for the economics of platforms to help address:

- What level of market concentration is optimal?
- Can competition policy interventions help?
- What are the likely effects of regulation?

This paper

- Can competition or regulation alleviate dominance of a single platform?
  - Offer a tractable model of platform competition, allowing for
    - Asymmetries
    - Outside option

- Preview of results
  - More competition may increase a single platform's dominance
  - Interoperability regulation can reduce its dominance

The model with one side

There are J platforms and an outside option.

Each user joins one platforms or choose the outside option

$$j \in \mathcal{J} \cup \{0\} = \{0,1, \dots, J\}$$

Users

Each user has a vector of *membership values* θ

$$\theta \in (\theta^0, \theta^1, \dots, \theta^J) \in \mathbb{R}^{J+1}$$

Joining platform *j* gives user θ utility

$$u^j := \theta^j + \gamma^j n^j - p^j$$

γ^j *interaction value* on platform *j* with n^j users

p^j total price paid to platform *j*

Net Fees

Platforms compete by posting *net fees,* $t^j \in \mathbb{R}$

$$p^j := t^j + \gamma^j n^j$$

Net fee t^j guarantees user θ a payoff from joining j of $u^j = \theta^j - t^j$

Timing

1. Platforms simultaneously post net fees

2. Demand is realized based on users' discrete choice problem

Demand and Profits

Demand for platform j

$$n^j(t) = \int 1_{\left\{u^j \geq u^k, \forall k \in \mathcal{J} \cup \{0\}\right\}} f(\theta) \mathrm{d}\theta$$

Profits earned by platform j

$$\pi^j(t) = \left(t^j + \gamma^j n^j(t) - c^j\right) n^j(t)$$

Best-responses and pricing

FOC: $\frac{\partial \pi^j(t)}{\partial t^j} = 0$ implies the following pricing formula.

$$t^j = c^j + \frac{n^j(t)}{-\frac{\partial n^j(t)}{\partial t^j}} - 2\gamma^j n^j$$

Pure strategy Nash equilibrium: net fee profile where each firm maximizes their profits given others' net fees.

Analysis

1) Competition and dominance
2) Interoperabillity and dominance

Why focus on dominance?

- Public debate around dominance
- Unmodeled implications of dominance

Analysis

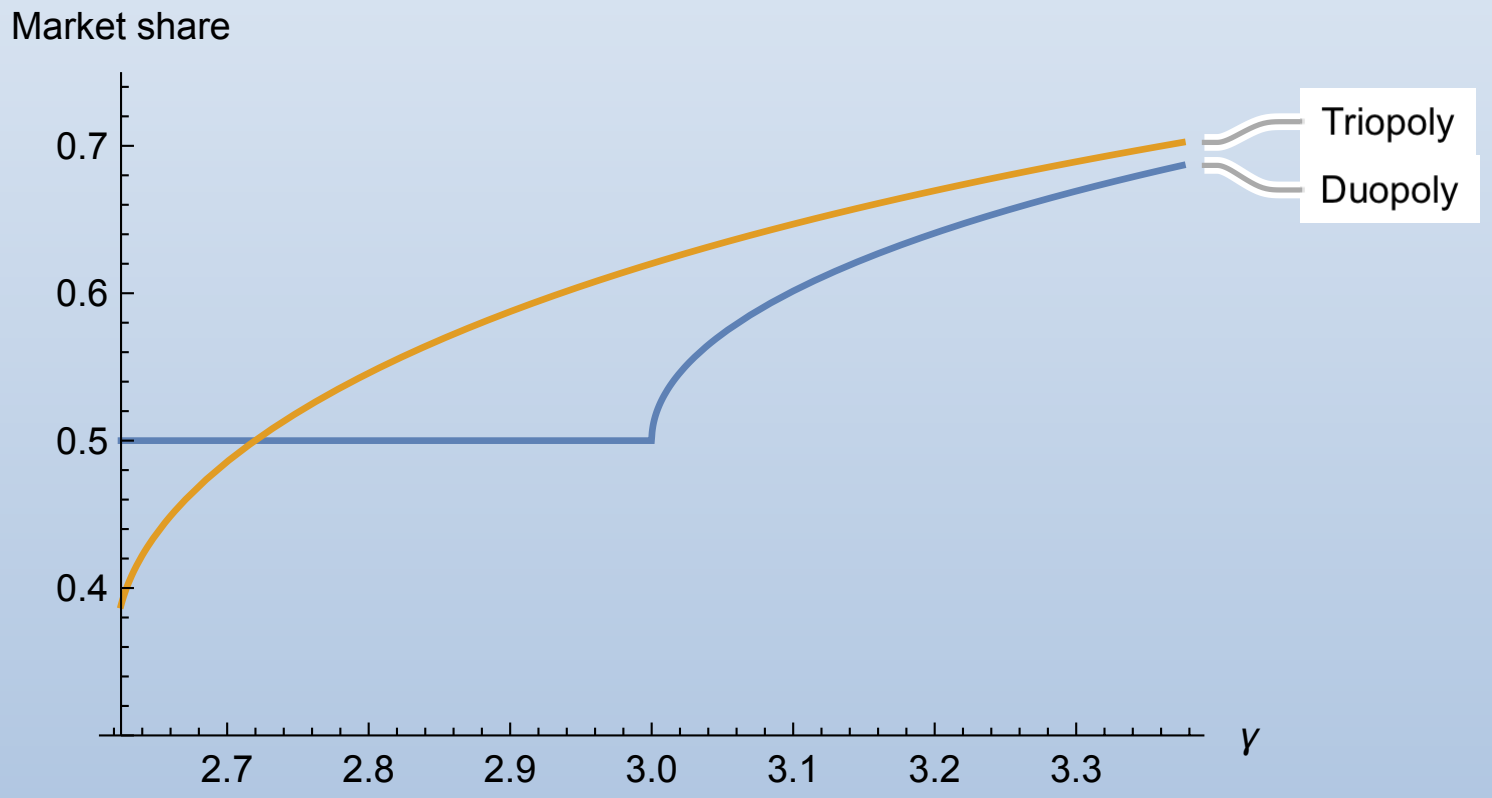
Assumptions:

- Demand is logit: $n^j(t) = {e^{-t^j}} \Big/ {e^z + \sum_{k \in J} e^{-t^k}}$
- Platforms are ex ante identical
- Normalize marginal cost, $c = 0$

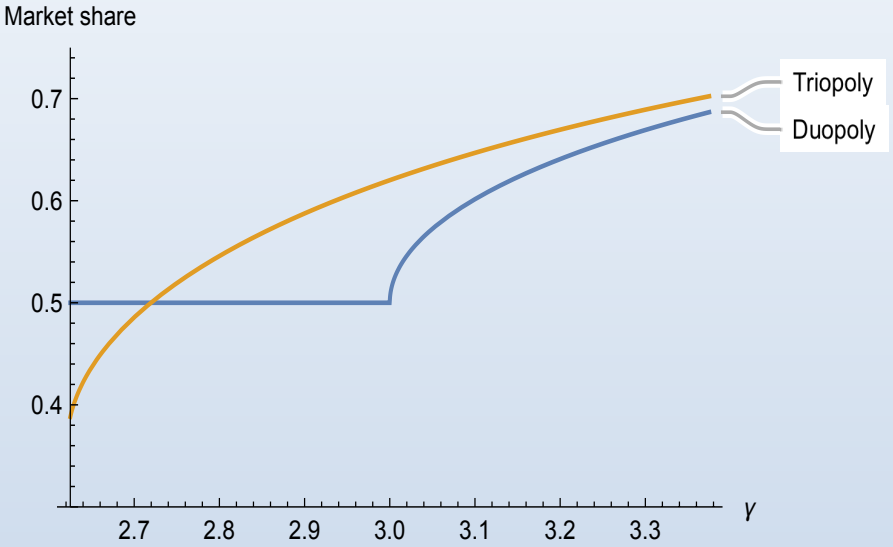
Competition may increase dominance

Proposition

Assume no outside option and $\gamma \in (2.71, 3.375]$. There exists an equilibrium under triopoly in which a dominant platform's market share is greater than the market share of any platform in any duopoly equilibrium.



Heuristic Intuition



- Iterative process with market shares (0.5,0.25,0.25)
- The smaller firms have lower externality discounts.
  - Net fees go up, market shares go down.
- Dominant firm has a higher market share.
  - Externality discount increases, net fee goes down, market share further goes up…

Merger Analysis

- Assume weak enough network effects => equilibrium unique
- *Status quo* has 3 platforms
- Pre-merger:
  - Dominant platform has zero cost, demand > ½
  - Both non-dominant platforms have $c > 0$, split remaining demand
- Potential merger between small platforms would bring cost synergy $\Delta c \in (0, c)$ for the combined firm

Proposition

Assume $\gamma < 2.61$. In a merger between the two non-dominant platforms, the minimum cost synergy needed to reduce the market share of the dominant platform decreases with the strength of network effects.

Interoperability

- Adding competition may backfire.

- Some argue that regulation is a better alternative.
  - ✓ A particularly popular idea is mandated “interoperability”.
  - ✓ Allow users across platforms to interact.

Interoperability

New parameter $\lambda \in [0,1]$: Degree of interoperability across platforms

Utility derived by a user who joins platform j is:

$$u^j := \theta^j + \gamma n^j + \lambda \sum_{k \in J \setminus \{j\}} \gamma n^k - p^j$$

Each platform chooses net fee t^j :

$$t^j := p^j - \gamma n^j - \lambda \sum_{k \in J \setminus \{j\}} \gamma n^k$$

Best-responses and pricing

FOC: $\frac{\partial \pi^j(t)}{\partial t^j} = 0$ implies the following pricing formula.

$$t^j = c^j + \frac{n^j(t)}{-\frac{\partial n^j(t)}{\partial t^j}} - \left(2 + \lambda \xi^j\right)\gamma^j n^j$$

where $\xi^j = \frac{\sum_{k \in J \setminus \{j\}} n^k}{n^j} - \phi^j$

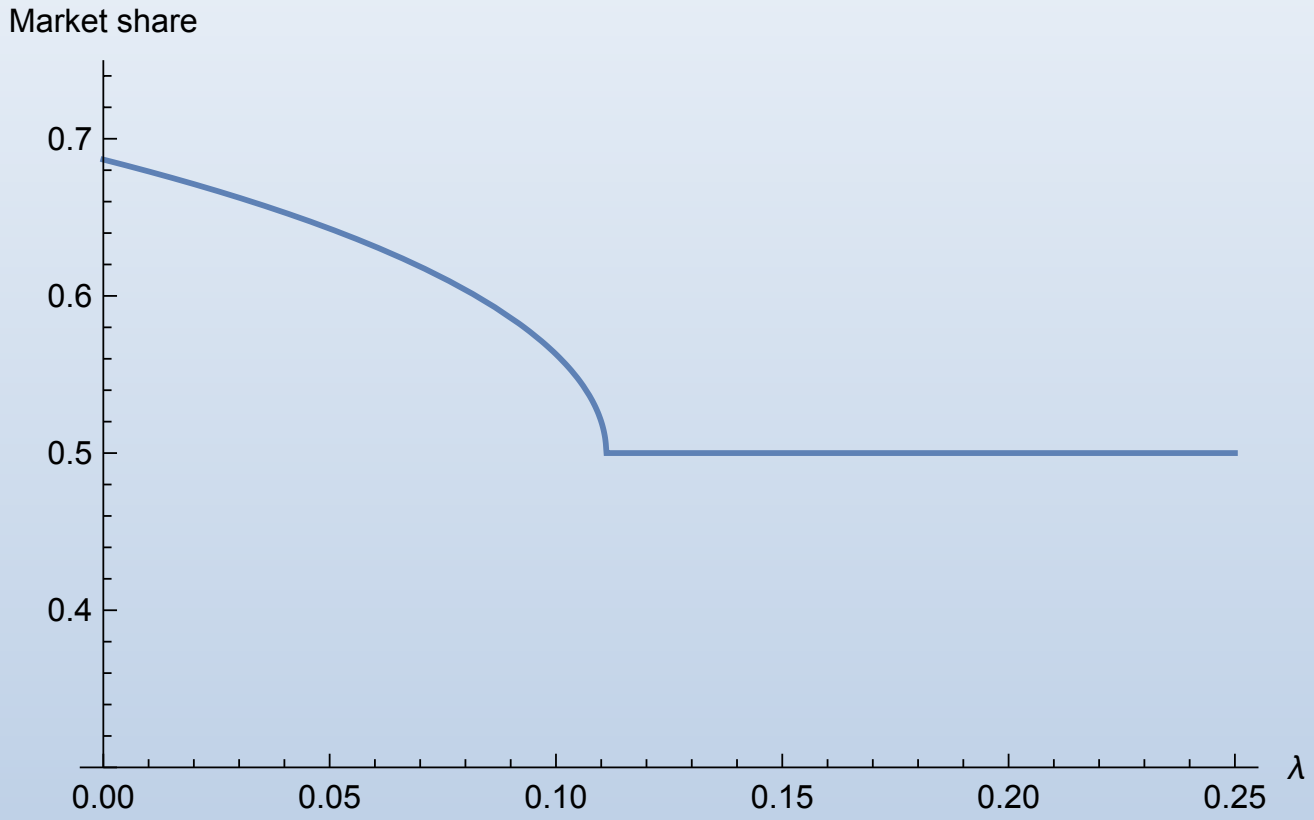
- Externality discount can increase or decrease with higher interoperability.
- Depends on the market share.
  - For large firms $\xi^j < 0$. Higher λ leads to smaller externality discount.
  - For small firms $\xi^j > 0$. Higher λ leads to bigger externality discount.

Interoperability decreases dominance

Proposition

Assume no outside option. Consider any two levels of interoperability $\underline{\lambda} < \overline{\lambda}$. For any duopoly equilibrium under $\overline{\lambda}$ in which the dominant platform has market share $\overline{n}^1 > 1/2$, when $\lambda = \underline{\lambda}$, there is an equilibrium in which $\underline{n}^1 > \overline{n}^1$.

Interoperability decreases dominance



Additional Results

- General existence of equilibrium
- Multiple sides
- General demand
- Multihoming in Competitive Bottlenecks model

Literature and benchmarks

- Much literature on single-sided networks and multi-sided platforms
  - ✓ Rohlfs (1974), Katz-Shapiro (1985), Farrell-Saloner (1985)
  - ✓ Rochet-Tirole (2003), Caillaud-Jullien (2003), Rysman (2004), Anderson-Coate (2004), Parker-Van Alstyne (2005), Hagiu (2006), White and Weyl (2016)…

- Workhorse model of platform competition:

  Armstrong (*RAND* 2006)

- Recent contribution extending this approach:

  Tan-Zhou (*REStud* 2020)

Final remarks

- This talk has presented a model of platform competition in *net fees*
- Advantages of this model include tractability and flexibility, particularly in:
  - Allowing for platforms asymmetries
  - Accommodating demand form that includes an outside option
- Two results from the model:
  - Increasing competition may increase dominance
  - Increasing interoperability may alleviate dominance