The Life-cycle of Concentrated Industries

Martin Beraja (MIT) Francisco Buera (WashU)

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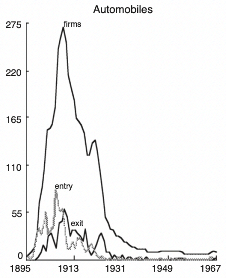
  Gort and Klepper, 1982; Klepper-Graddy, 1990; Klepper-Simons, 2005



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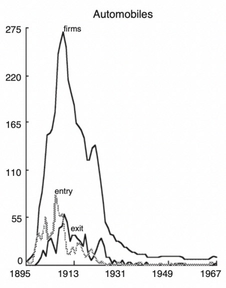

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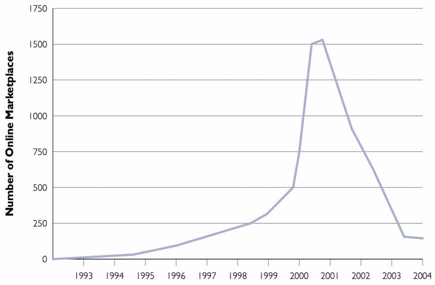

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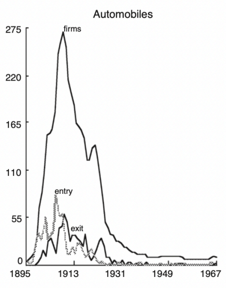

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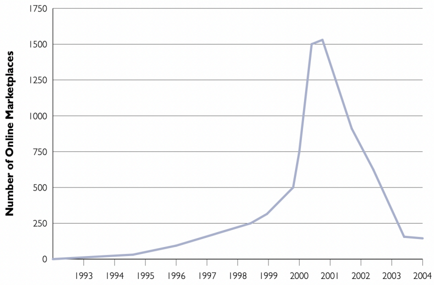

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- Also, OS or search engine industries. Windows or Google far ahead in a decade...

Motivation

Rekindled a **debate** about appropriate **policy interventions** to promote competition

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Ex-ante interventions

Act on nascent industries before they become too concentrated

- Subsidies to innovation or financing
- Data portability? Lax privacy regs?

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Ex-post interventions

Come into play only after an industry has sufficiently concentrated

- Essential infrastructure or IP access (AT&T, Intel)
- Data-sharing (EU Digital Markets Act)?

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2. When can they **wait** until the industry has sufficiently concentrated?
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Should entry be subsidized or taxed?

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Recent focus, measurement and quantification

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A version of Jovanovic-Macdonald (1994) with a finite # of firms

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1. Equilibrium and **(constrained) optimal policy** over the life-cycle
2. **Application:** Digital and AI industries in the US (dataset from VentureScanner)

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Special case:

- Cost function: $\Gamma(q; z) = \dfrac{1}{z} q + f$
- Inverse demand function:

$$p_i = \frac{\sigma - 1}{\sigma} \left[\sum_{j=1}^{\underline{N}_t + \bar{N}_t} \left(q_j\right)^{\frac{\epsilon - 1}{\epsilon}} \right]^{\frac{\epsilon}{\epsilon - 1} \frac{\sigma - 1}{\sigma} - 1} \left(q_i\right)^{-\frac{1}{\epsilon}}$$

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Households

$$V\left(\underline{N}_t, \bar{N}_t\right) = \mathbb{E}_t\left[\int_t^{\infty} e^{-r(s-t)} U\left(\underline{N}_s, \bar{N}_s\right) ds\right]$$

Equilibrium industry life-cycle

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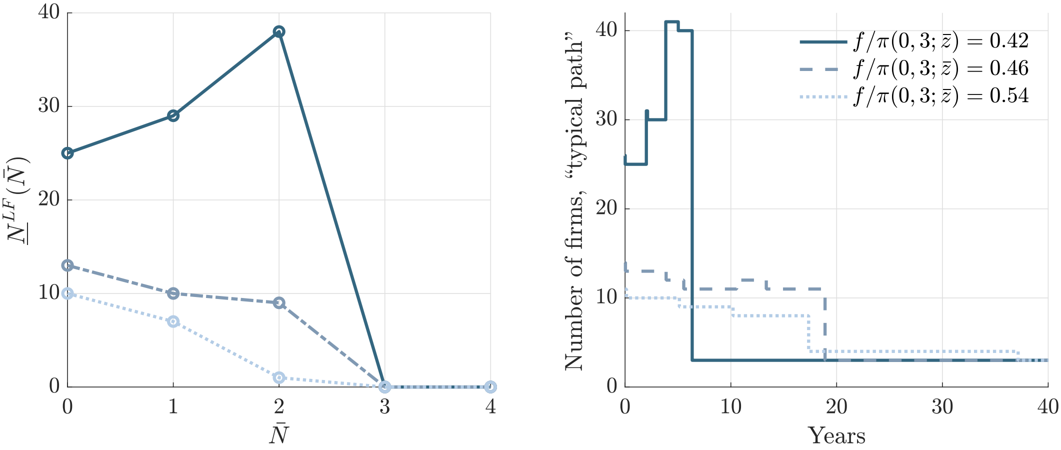
- Poisson mixed-strategy equilibrium exists and is unique



- Non-monotonicity?
  - Cost of delaying entry: more large firms present; e.g., $\pi\left(\underline{N}, 1; \underline{z}\right) - \pi\left(\underline{N}, 0; \underline{z}\right) < 0$
  - Benefit: Large gains right before the shakeout; e.g., $\pi\left(0, 3; \bar{z}\right) - \pi\left(\underline{N}, 3; \bar{z}\right) > 0$

Optimal policy

- **Primal approach**: choose # of firms that enter/exit. Second best policy.
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  - Infeasible/unrealistic. No widespread use. Information? Politics?

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- **Implementation**: subsidize (or tax) the fixed cost of small firms $s\left(\bar{N}\right)$
  - Mimic observe/proposed policies to promote competition over an industry's life-cycle
    - Large firms share infrastructure, IP, or data with small firms (ex-post)
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- Goal: characterize the **timing** of optimal policy over the life-cycle
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Optimal Policy and Economies of Scale

- **Scale** economies key driver of US concentration/markups (Autor et al, Philippon et al)
- Particularly important in **AI/digital** industries (Goldfarb-Tucker)

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Theoretical results in **two limit** cases:

1. $\bar{z}/\underline{z} \to \infty$, with $\underline{z} \to 0$. Strong economies of scale, competition <u>for</u> the market

2. $\bar{z}/\underline{z} = 1$. Static limit, competition <u>in</u> the market

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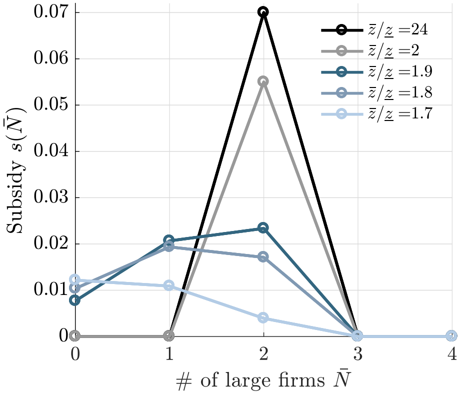
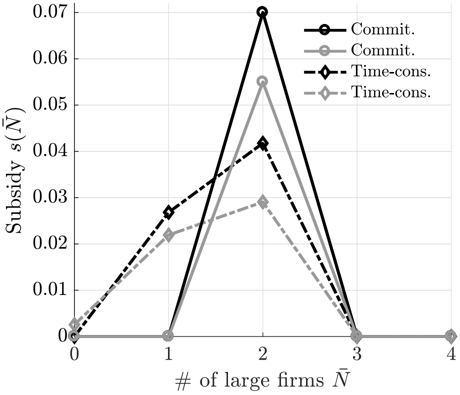
2. $\bar{z}/\underline{z} = 1$. Static limit, competition in the market
   - The government finds it optimal to intervene at all times.
   - Uniform **ex-ante** and **ex-post** interventions are needed.

Scale and optimal policy





- Firm entry/exit mostly driven by **option value** of taking over the market
  $\implies$ Governments can wait to intervene later in the life-cycle
- If the government cannot commit, the **time-consistent** policy must subsidize **earlier**

Application: Digital & AI Industries in the US

The **question** of how to regulate an industry **in practice** can be understood as:

Are firm choices mostly driven by competition <u>for</u> the market?
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- 17 categories of technologies/services: "AI," "Financial," "Real Estate," "Security," etc.
- Subcategories: "Deep and Machine Learning," "Consumer Payments," "Short Term Rentals and Vacation Search," "Threat Detection and Compliance," etc.
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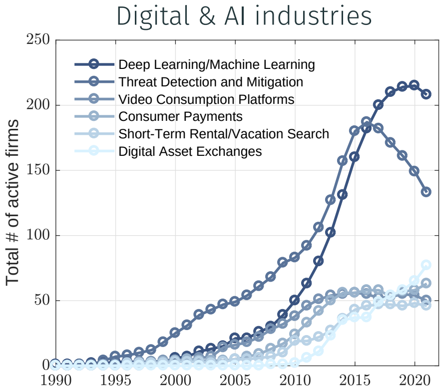
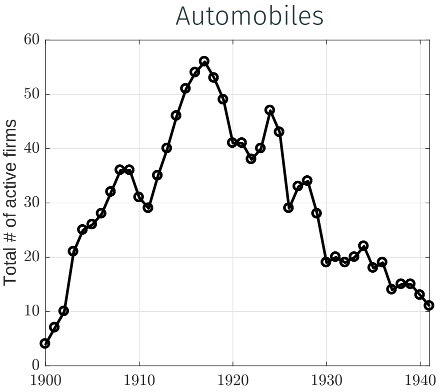
As a comparison, look at **Automobile** industry using *The 100 Year Almanac*

Life-cycle across industries





Relative scale across industries