Killer Acquisitions and Beyond:
Policy Effects on Innovation Strategies

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Introduction: Background

- Current practice: start-up acquisitions are waved through.
  - Acquisitions by Google, Amazon, Apple, Facebook and Microsoft (31.6 billion USD in 2017).
  - Google acquired about one firm per month between 2001 and 2018.
- Recent concern about eliminating Potential Competition
- Anti-competitive motive particularly salient in the case of Killer Acquisitions (Cunningham, Ederer and Ma 2021).

INVESTIGATION OF COMPETITION IN DIGITAL MARKETS

MAJORITY STAFF REPORT AND RECOMMENDATIONS

SUBCOMMITTEE ON ANTITRUST, COMMERCIAL AND ADMINISTRATIVE LAW OF THE COMMITTEE ON THE JUDICIARY

Jerrold Nadler, Chairman, Committee on the Judiciary

David N. Cicilline, Chairman, Subcommittee of the Judiciary on Antitrust, Commercial and Administrative Law

UNITED STATES
2020

Intention to act against acquisition of start-ups

- Subcommittee report (p.395):

Since startups can be an important source of potential and nascent competition, the antitrust laws should also look unfavorably upon incumbents purchasing innovative startups. One way that Congress could do so is by codifying a presumption against acquisitions of startups by dominant firms, particularly those that serve as direct competitors, as well as those operating in adjacent or related markets.[2485]

- NY Times, December 9, 2020:

U.S. and States Say Facebook Illegally Crushed Competition

Regulators are accusing the company of buying up rising rivals to cement its dominance over social media.

Intention to act against acquisition of start-ups

- Chief Executive of the CMA, Andrea Coscelli, lecture on Febrary 9, 2021:

> Many of us are now familiar with the statistic that – between 2008 and 2018 of the 400 acquisitions made globally by the 5 largest digital firms – none has been blocked by competition authorities. But it remains a powerful one. It is very hard to look at those numbers, to look at the state of the relevant markets today, and conclude with hindsight that the balance has been struck correctly.

What is the right balance?

- Ex post effect:
  - (Potential) competition is preserved.
  - (Potential) loss of acquisition synergies.
- Ex ante effect:
  - Selling the firm can foster innovation by entrants (Rasmussen 1988).
  - But prohibiting acquisitions could increase innovation by incumbents.
  - Is there a difference between the "killer acquisitions" and the "genuine acquisitions"?
- This paper:
  - Focuses on the ex ante (innovation) effect.
  - Analyze how innovation strategies of start-ups and incumbents react to policy intervention.
  - Analyzes both kinds of start-up acquisitions in one framework.

Our paper

- Most innovation models only focus on the amount of resources that firms invest in innovation.
- This does not necessarily reflect the market-wide probability of an innovation! Why?
  - Firms also choose in which research projects to invest.
  - Duplicate projects don't increase the probability of innovation!
- We develop a framework where firms can choose in which projects to invest
- Strategic project choice allows firms to affect the correlation between their innovation outcomes and those of their competitor.
- This allows us to uncover an important channel: a ban on acquisitions affects the incentives to invest in new projects differently from incentives to invest in duplicate projects.

Main Results

- Prohibiting killer acquisitions has a strictly negative innovation effect.
- Prohibiting genuine acquisitions has a weakly negative innovation effect.
  - We provide conditions under which the effect is zero.
- Innovation effect is likely to be small (and prohibition of acquisitions justified) when:
  - entrant has low bargaining power,
  - incumbent's profits after entry are large.

Literature

- Cunningham et al. (2021) provide empirical evidence + explain rationale behind discontinuing development, but not initial innovation decisions.
- Innovation effects of mergers between incumbents:
  - negative effects: Federico, Langus and Valletti (2017, 2018), Motta and Tarantino (2021), Gilbert (2019);
  - positive effects: Denicolò and Polo (2018);
  - mixed effects: Bourreau, Jullien and Lefouili (2021), Marshall and Parra (2019);
  - distortion of direction: Moraga-Gonzalez, Motchenkova and Nevrekar (2022), Cabral (2018).
- Innovation effects of start-up acquisitions:
  Rasmussen (1988), Mason and Weeds (2013), Gans (2000, 2002), Phillips and Zhdanov (2013), Bryan and Hovenkamp (2020), Fumagalli, Motta and Tarantino (2020), Hollenbeck (2020), Kamepalli, Rajan and Zingales (2020), Katz (2021).

Model

Model: Overview

- Two firms: incumbent and entrant.
- Incumbent faces entry challenge.
- Contrary to incumbent, entrant has to innovate to produce.

Laissez-faire model:

1. Firms choose investments in different R&D projects.
2. Incumbent can acquire the entrant.
3. Commercialization decision.
4. Product market competition.

Alternative: No-acquisition policy (without Stage 2).

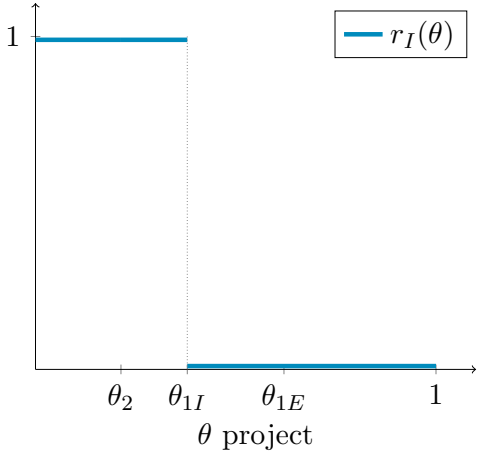
Model: Investment Stage

- Incumbent I and entrant E simultaneously choose in which project θ from $\Theta = [0, 1)$ to invest.
- Depending on the firms' investment decision, $r_i(\theta) \in \{0, 1\}$.
- Marginal cost of investing in project θ is $C(\theta)$, where $C : \Theta \to \mathbb{R}_+$ is well-behaved and strictly increasing.
- Total investment cost: $\int_0^1 r_i(\theta) C(\theta) d\theta$.

Model: Investment Stage

- Only one project, $\hat{\theta} \in \Theta$ is correct (leads to an innovation).
- Each project is equally likely to be the correct project.
- The correct project yields high technology H (drastic innovation) with probability p, otherwise non-drastic innovation L.
- Patent for innovator (probability 1/2 if both innovate).
- Firms learn technology state from $(\ell, 0)$, (ℓ, L), (ℓ, H), $(L, 0)$, $(H, 0)$, where ℓ is incumbent's default technology.

Model: Investment Stage



Model: Stages of the Game

Acquisition stage 2:

- The incumbent can acquire the entrant by paying the foregone profits plus a share β of the bargaining surplus.
- Acquisition iff bargaining surplus is strictly positive.
- Patents are transferred to the acquiring firm.

Commercialization stage 3:

- Patent holder can commercialize at cost κ.
- Firms' final technology states t_I^{fin} and t_E^{fin} are realized.

Market stage 4:

- Incumbent profits $\pi(t_I^{fin}, t_E^{fin})$; entrant profits $\pi(t_E^{fin}, t_I^{fin})$.

Model: Further assumptions

Assumption 1 (Market profits)

(i) *Profits are non-negative.*

(ii) *Without an innovation, the entrant earns zero profits.*

(iii) *Technology H corresponds to a drastic innovation.*

(iv) *Competition decreases total profits:*

$$\max\{\pi(L,0), \pi(\ell,0)\} > \pi(\ell,L) + \pi(L,\ell).$$

Assumption 2 *(Commercialization costs)*

(i) $\pi(L,\ell) \geq \kappa$;

(ii) $\pi(H) - \pi(\ell,0) \geq \kappa$.

Condition 1 *(Existence of Pure-Strategy Nash Equilibrium)*

Investments under the Laissez-Faire Policy

Subgames

Lemma 1 (Acquisitions)

Acquisition stage 2:

- The incumbent acquires the entrant iff the entrant holds the patent to L.

Commercialization stage 3:

- Entrant commercializes both technologies.
- Incumbent commercializes H always and L iff $\pi(L,0) - \pi(\ell,0) \geq \kappa$.

Market stage 4:

- Incumbent profits $\pi(t_I^{fin}, t_E^{fin})$; entrant profits $\pi(t_E^{fin}, t_I^{fin})$.

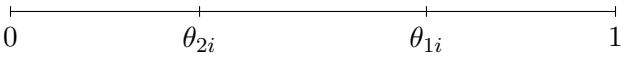
Critical Projects

- Characterization of equilibrium investments will rely on critical projects: θ_{1I}, θ_{1E}, θ_{2I} and θ_{2E}.

$$
\begin{aligned}
C(\theta_{1E}) &= pv_E(H) + (1-p)v_E(L,\ell) \\
C(\theta_{2E}) &= \frac{1}{2}\left(pv_E(H) + (1-p)v_E(L,\ell)\right) \\
C(\theta_{1I}) &= pv_I(H) + (1-p)v_I(L,0) - v_I(\ell,0) \\
C(\theta_{2I}) &= \frac{p}{2}v_I(H) + (1-p)\left(\frac{1}{2}v_I(L,0) + \frac{1}{2}v_I(\ell,L)\right) \\
&\quad - (1-p)v_I(\ell,L).
\end{aligned}
$$

Critical Projects

- $C(\theta_{1i})$ equals expected value increase to firm i if it invests in the project when the other firm does not.
- $C(\theta_{2i})$ analogous for the case that both firms invest.



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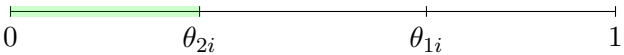

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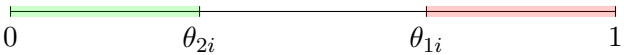

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- $C(\theta_{2i})$ analogous for the case that both firms invest.

Critical Projects

Lemma 3

Under laissez-faire, the critical projects must satisfy (i) or (ii):

(i) $\theta^A_{2I} = \theta^A_{2E} \leq \theta^A_{1I} < \theta^A_{1E}$;

(ii) $\theta^A_{2I} = \theta^A_{2E} < \theta^A_{1E} \leq \theta^A_{1I}$.

Relation (ii) cannot arise in the killer-acquisition case.

Equilibrium Investments

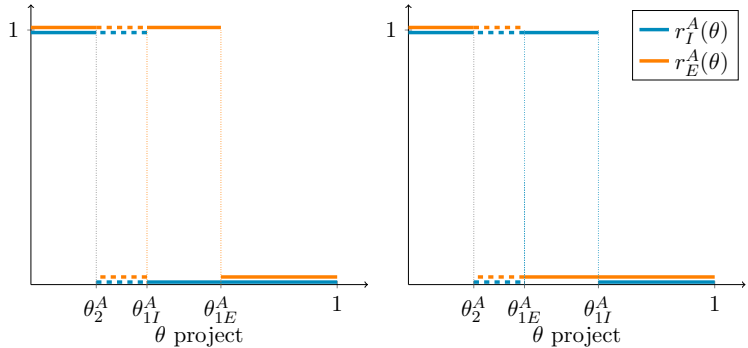

Figure: Proposition 1 – Equilibrium portfolios.

- In the killer acquisitions case, only $\theta_{1I}^A < \theta_{1E}^A$ can arise.
- In the genuine acquisitions case, also $\theta_{1I}^A \geq \theta_{1E}^A$ can arise.

Prohibiting Acquisitions

The Effects on the Probability of Innovation

Note: $\theta_{1E}^N < \theta_{1E}^A$ and $\theta_{1I}^A = \theta_{1I}^N =: \theta_{1I}$.

Proposition 3

(i) In any equilibrium under the no-acquisition policy, the innovation probability is weakly smaller than in any equilibrium under laissez-faire.

(i) The policy has no effect on the innovation probability in the genuine acquisitions case if $\theta_{1E}^A \leq \theta_{1I}$. Otherwise, the effect is strictly negative.

The Effects on the Probability of Innovation

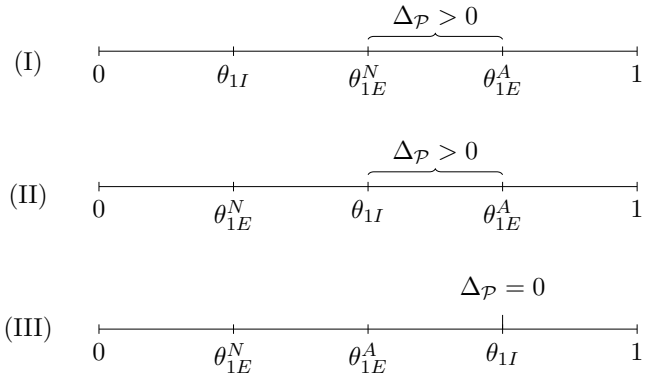

Figure: The effect of prohibiting acquisitions on innovation probability.

The Size of the Effect on Variety

Proposition 4

Suppose that $\theta_{1I} < \theta_{1E}^{A}$. The size of the policy effect is:

(i) strictly increasing in entrant bargaining power β;

(ii) strictly decreasing in incumbent duopoly profits $\pi(\ell, L)$.

(iii) strictly decreasing in the entrant's profits under competition $\pi_E(L, \ell)$ if $\theta_{1I} < \theta_{1E}^{N}$, but strictly increasing if $\theta_{1E}^{N} < \theta_{1I}$.

The Effects on Duplication

Proposition 5 (Duplication effect)

In any equilibrium under the no-acquisition policy, the duplication of innovation is strictly smaller than in any equilibrium under laissez-faire.

- A prohibition increases the incumbent's incentive to duplicate, but decreases it for the entrant.
- But: equilibrium duplication is determined solely by the entrant's incentive.

Discussion and Further Results

Policy Discussion

What about the trade-off between ex-post competition and ex-ante innovation effects?

- No trade-off if there is no innovation effect ($\theta_{1I} \geq \theta_{1E}^{A}$), i.e., if
  - the increase in the incumbent's profit due to non-drastic innovation is large,
  - and the entrant's profit under duopoly competition is small.
- If there is a trade-off, examples suggest that small innovation effects translate into large net gains from prohibiting acquisitions.

Alternative policies

- So far, we have only focused on prohibitions of start-ups.
- However, there are other policy tools that could be used (e.g as proposed by Lemley and McCreary, 2020).
- We also consider alternative policies
  1. Restrictions on technology usage.
  2. Prohibition of "killing".
  3. Taxing Acquisitions and Prohibiting High-Price Acquisitions.
  4. Increasing Profitability of IPOs.
- Common features: All policies prevent acquisitions of entrants with high stand-alone profits.

Results robust to

- Probability of drastic innovation increasing in θ.
- Innovation uncertainty at the time of acquisition.
- Asymmetric chances of receiving patents.
- Heterogeneous commercialization costs.
- Licensing of innovation.
- Multiple entrants.
- Continuum of technological states.

Conclusion

- We analyze the innovation effects of a prohibition on acquiring start-ups.
- We show that there is no innovation effect when:
  - the increase in the incumbent's profit due to non-drastic innovation is large,
  - and the entrant's profit under duopoly competition is small.
- We show that, if it exists, the (negative) innovation effect is likely to be small when:
  - entrant has low bargaining power,
  - incumbent's profits after entry are large.
- Genuine acquisitions may be just as problematic as killer acquisitions.

Appendix

Condition 1

For simpler exposition, we impose condition 1 in the main part of the paper:

Condition 2 *(Condition for simpler exposition)*

$$p(\pi(H) - \kappa) + (1-p)(\max\{\pi(L,0) - \kappa, \pi(\ell,0)\} + \pi(\ell, L)) \geq 2\pi(\ell, 0)$$

- This condition ensure that a pure strategy Nash equilibrium exists
- Dropping it requires a more involved analysis, but does not affect results on the probability of innovation

Back