Antitrust and (Foreign) Innovation: Evidence from the Xerox Case

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Recent Concerns About Antitrust Policy

THE WALL STREET JOURNAL.

The Misguided Antitrust Attack on Big Tech

"Antitrust action against leading U.S. tech companies would shrink American dominance of the world's fastest-growing industry [...]."

14 September 2020

Antitrust Can Hurt U.S. Competitiveness

"[A]ggressive antitrust actions against U.S. leaders run the risk of giving a new generation of foreign rivals the boost they need to dominate global markets [...]."

5 July 2021

This Paper

How does antitrust enforcement against IP-based monopolies affect innovation by domestic and foreign firms?

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How does antitrust enforcement against IP-based monopolies affect innovation by domestic and foreign firms?

- Little empirical evidence about which antitrust measures are effective
- (Abuse of) IP is one important source of market power
  - Inherent conflict between patent protection and antitrust laws
  - Grey zone between legal use of IP and illegal exclusionary conduct
- Setting: study antitrust case against Xerox Corporation in the 1970s

  $\Rightarrow$ **How did compulsory licensing affect subsequent innovation by others?**

Historical Background

The Origins of Xerox

XEROX

- 1946: Xerox started to develop novel photocopying technology (= xerography)
- 1959: breakthrough with release of the Xerox 914

Xerox 914

"The most successful product ever marketed in America measured by return on investment"

Fortune Magazine, in the 1980s

Xerox's Patent-Based Monopoly in the 1960s

- "Plain-paper copiers" required no special paper and made copying cheaper
- Technology protected by more than 2000 patents but Xerox refused to grant licenses
- Xerox became the only seller of plain-paper copiers throughout the 1960s

FTC Complaint and 1975 Consent Decree

- 1972: FTC charged Xerox with illegal monopolization of plain-paper copier market
- Strategic (ab)use of patent system viewed as main barrier to entry
- 1975: consent decree obliged Xerox to license all copier-technology patents

Empirical Strategy

Class-Level Analysis of Cumulative Innovation

Idea: Compare patenting across technology classes with differential exposure to compulsory licensing *within* the same higher-order class

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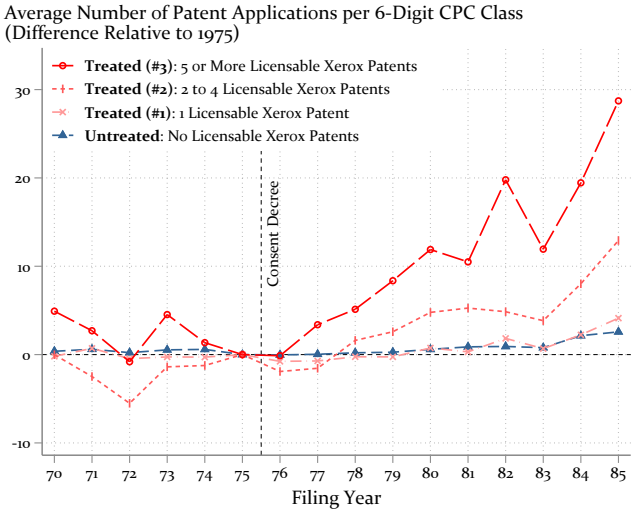
Sample:

- Panel of 2210 (6-digit CPC) subclasses within 141 (4-digit CPC) classes
- 313 subclasses with at least one compulsorily licensed Xerox patent

Patenting in Subclasses With Different Number of Licensable Patents



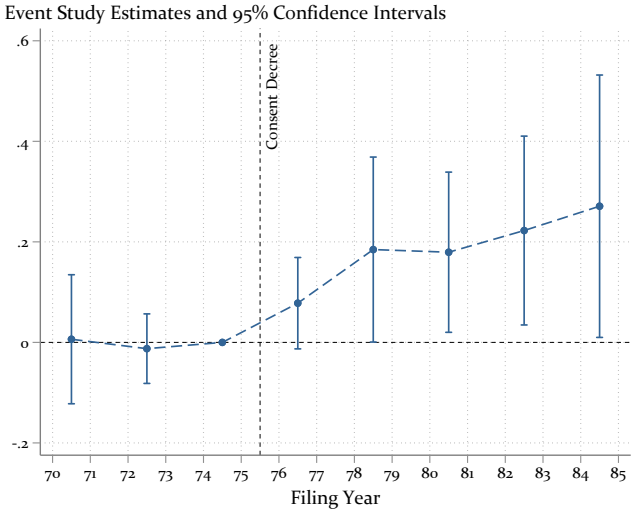
Difference-in-Differences Model

$$\text{Patents}_{c,s,t} = \beta \cdot \text{Share}_s \cdot \text{Post}_t + \alpha_s + \lambda_{c,t} + \epsilon_{c,s,t}$$

- $\text{Patents}_{c,s,t}$ — number of patent applications in subclass s of class c in year t
- Share_s — share of unexpired patents in subclass that were compulsorily licensed
- Post_t — indicator for years after 1975

Main Results

Key Result #1: Antitrust Case Led to Increased Patenting



Key Result #1: Antitrust Case Led to Increased Patenting

	Baseline				
	(1)	(2)	(3)	(4)	(5)
$\text{Share}_s \cdot \text{Post}_t$	0.189**				
	(0.094)				
Mean of Outcome	15.13				
4-Digit CPC Classes	141				
Observations	35360				

Notes: The outcome variable is the number of patent applications. All regressions include subclass and year × class fixed effects. Standard errors clustered at the 4-digit CPC technology class level are in parentheses. Significance levels: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Key Result #2: Positive Effect Driven by Japanese Patent Applicants

	Baseline	Applicant Country			
		USA	Non-USA	Among Non-USA	
				Japan	Others
	(1)	(2)	(3)	(4)	(5)
$\text{Share}_s \cdot \text{Post}_t$	0.189**	0.029	0.162**	0.143**	0.020
	(0.094)	(0.038)	(0.073)	(0.064)	(0.013)
Mean of Outcome	15.13	8.93	5.74	2.25	3.49
4-Digit CPC Classes	141	141	141	141	141
Observations	35360	35360	35360	35360	35360

Notes: The outcome variable is the number of patent applications. All regressions include subclass and year $\times$ class fixed effects. Standard errors clustered at the 4-digit CPC technology class level are in parentheses. Significance levels: $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Robustness Checks

- Increase in innovation is driven by patents that (indirectly) cited Xerox
- Complementary approach: increase in citations to licensed Xerox patents
- Additional checks: alternative model specifications, treatment definitions, etc.

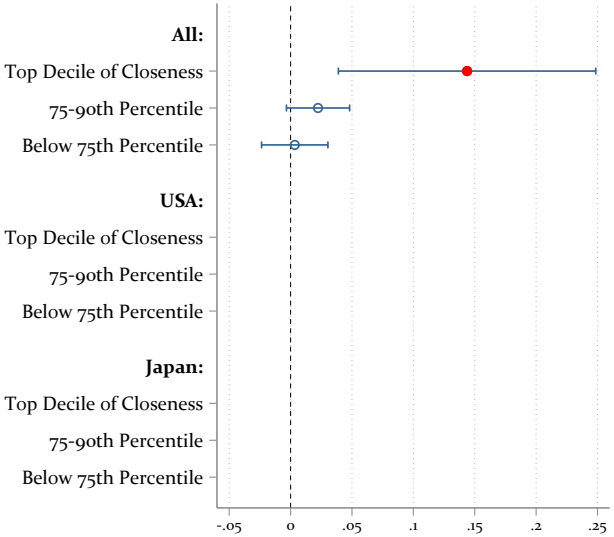
Which Firms Benefited?

Closeness to Xerox

Firm-level measure: $\text{Closeness}_i = \sum_s w_{is} \cdot \text{Share}_s$

- w_{is} — share of firm i's unexpired patents (as of 1975) that are in subclass s
- Share_s — share of patents in subclass that were compulsorily licensed

Increase in Patenting Driven by Firms Experienced in Copier Technologies



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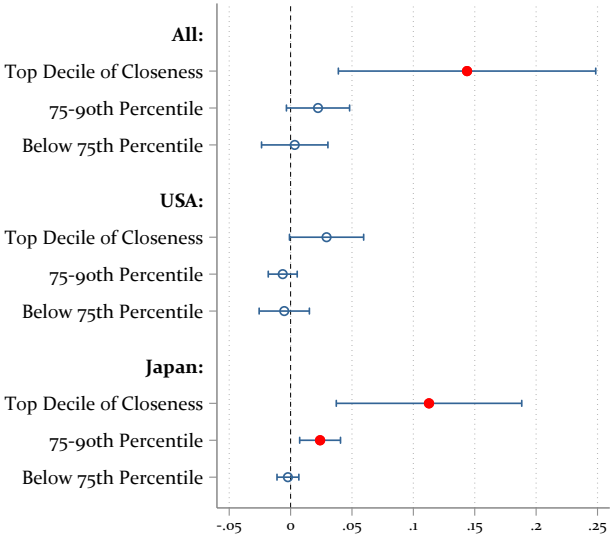
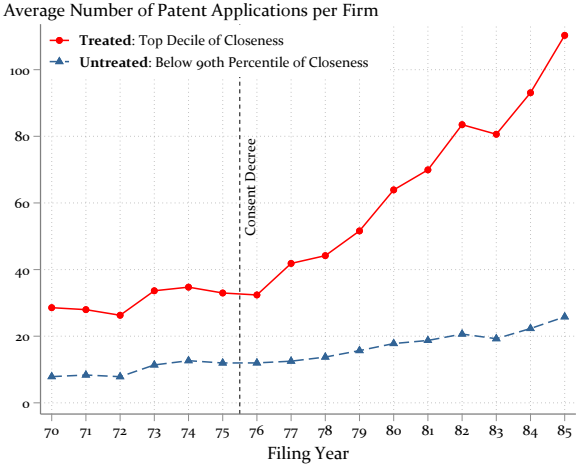
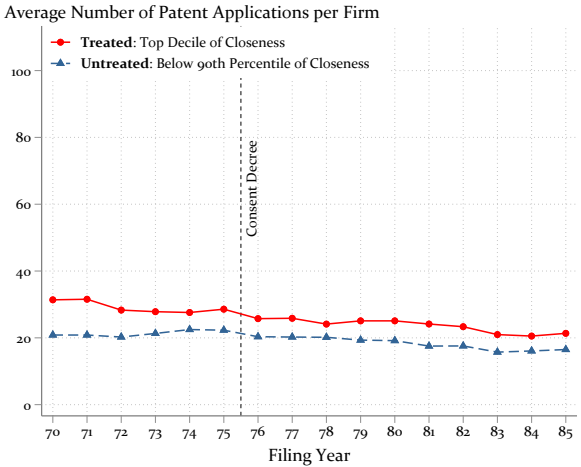


Firm-Level Patenting Trends by Country and Closeness to Xerox



(A) Japan



(B) US and Other Countries

Narrative Evidence on Japanese Entrants

"Within a few years after the consent decree, Japanese firms such as Canon, Toshiba, Sharp, Panasonic, Konica, and Minolta had achieved significant inroads into the U.S. market with copying machines that were more reliable and lower-priced than those of Xerox."

Scherer (2007)

Mechanism

What Did Japanese Entrants Do Differently?

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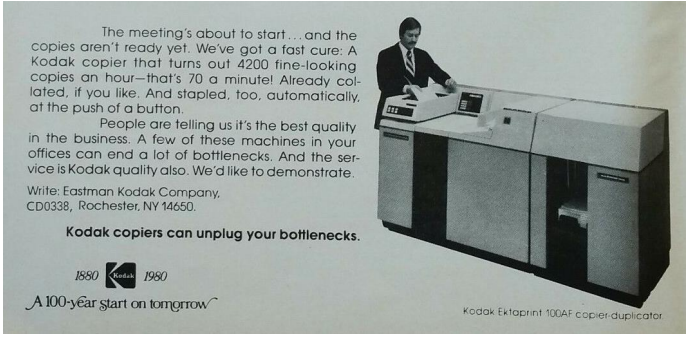
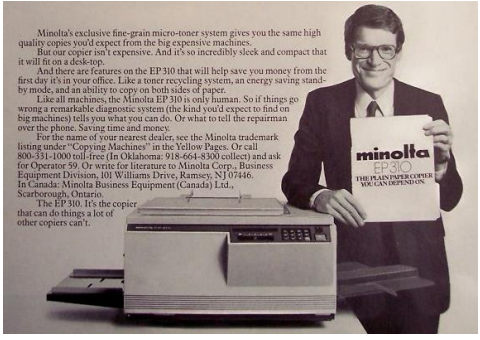




(A) Kodak (US)

(B) Minolta (Japan)

The Japanese Business Model

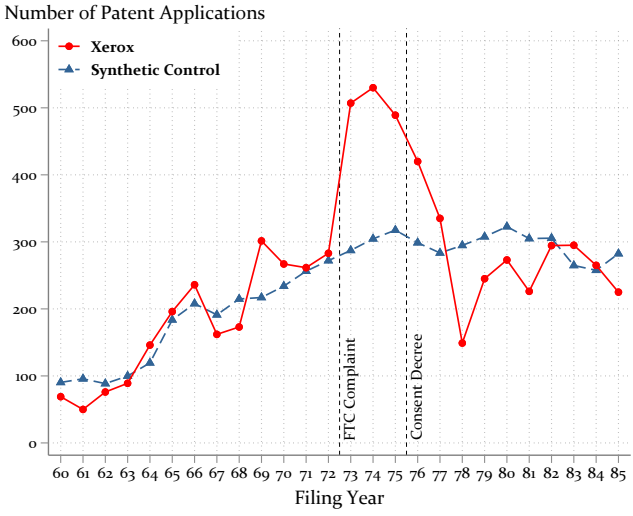
- Japanese entrants focused on lower end of copier market (Jacobson & Hillkirk, 1986)
- Successful “indirect attack” on segment ignored by Xerox (Paley, 1999; Porter, 1985)
- Possible mechanism: higher rate of innovation due to greater product differentiation

Descriptive Evidence Consistent With This Narrative

- Japanese patents more frequently contained words related to smaller copiers
- Increase in the diversity of (Japanese) innovation

The Effect on Xerox

Xerox Reduced Its Patenting, but Overall Effect Still Positive



Conclusion

Innovation Effects of the Antitrust Case Against Xerox

- Antitrust case against Xerox promoted innovation in copier industry
  - $\Rightarrow$ **Compulsory licensing was effective in target sector as it removed entry barrier**
- Positive innovation effect primarily driven by Japanese competitors
  - $\Rightarrow$ **Antitrust allowed Japanese competitors to build on Xerox's technology**
  - $\Rightarrow$ **Consumers benefited from lower prices, greater variety, higher quality**

Thank you for your attention!

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