

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

---

Robin Mamrak (LMU Munich)

EEA-ESEM Congress

28 August 2023

# 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

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

### 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
  - ⇒ **How did compulsory licensing affect subsequent innovation by others?**

## Historical Background

---

# 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

## Class-Level Analysis of Cumulative Innovation

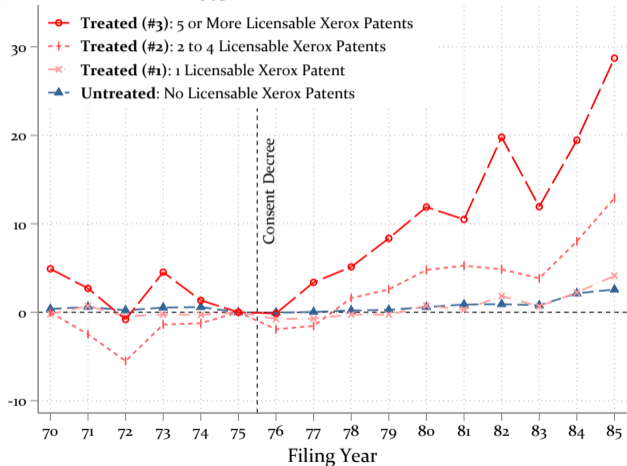
**Idea:** Compare patenting across technology classes with differential exposure to compulsory licensing *within* the same higher-order class

**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

Average Number of Patent Applications per 6-Digit CPC Class  
(Difference Relative to 1975)



## Difference-in-Differences Model

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

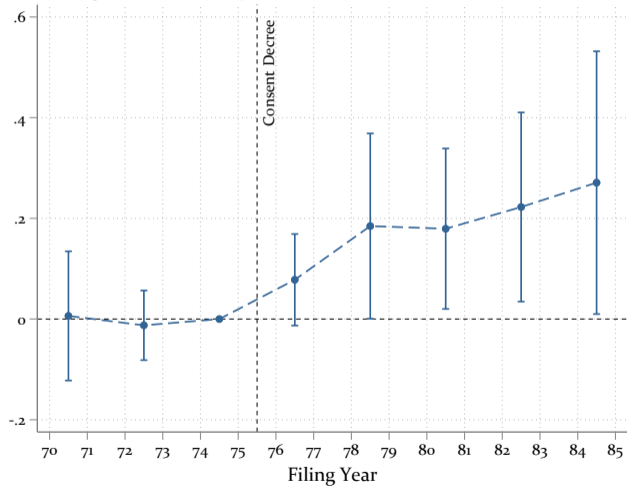
- ▶  $\text{Patents}_{c,s,t}$  — number of patent applications in subclass  $s$  of class  $c$  in year  $t$
- ▶  $\text{Share}_s$  — share of unexpired patents in subclass that were compulsorily licensed
- ▶  $\text{Post}_t$  — indicator for years after 1975

## Main Results

---

# Key Result #1: Antitrust Case Led to Increased Patenting

Event Study Estimates and 95% Confidence Intervals





## Key Result #1: Antitrust Case Led to Increased Patenting

	Baseline				
	(1)	(2)	(3)	(4)	(5)
Share <sub>s</sub> · Post <sub>t</sub>	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

	Applicant Country				
	Baseline	USA	Non-USA	Among Non-USA	
				Japan	Others
	(1)	(2)	(3)	(4)	(5)
Share <sub>s</sub> · Post <sub>t</sub>	0.189** (0.094)	0.029 (0.038)	0.162** (0.073)	0.143** (0.064)	0.020 (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 × class fixed effects. Standard errors clustered at the 4-digit CPC technology class level are in parentheses. Significance levels: \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

- ▶ 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.

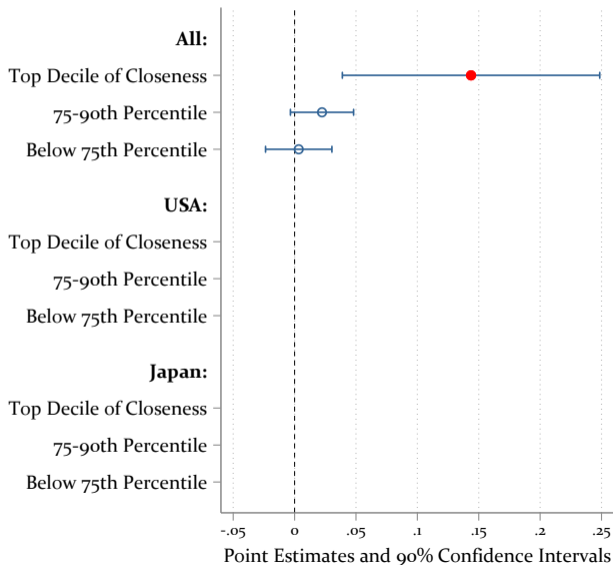
## Which Firms Benefited?

---

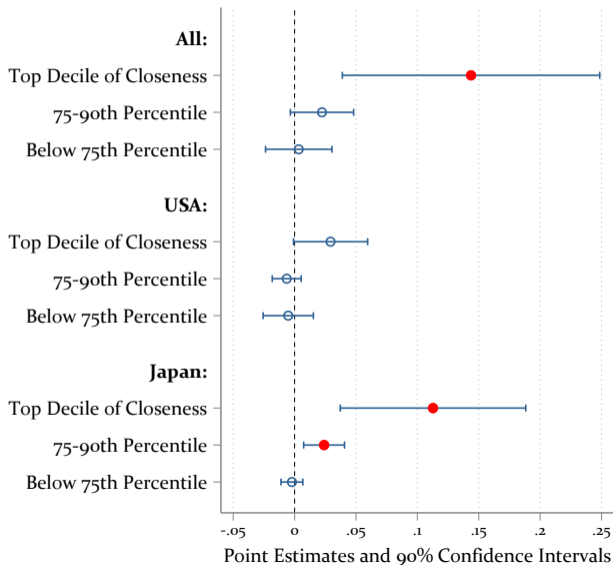
**Firm-level measure:**  $\text{Closeness}_i = \sum_s w_{is} \cdot \text{Share}_s$

- ▶  $w_{is}$  — share of firm  $i$ 's unexpired patents (as of 1975) that are in subclass  $s$
- ▶  $\text{Share}_s$  — share of patents in subclass that were compulsorily licensed

# Increase in Patenting Driven by Firms Experienced in Copier Technologies

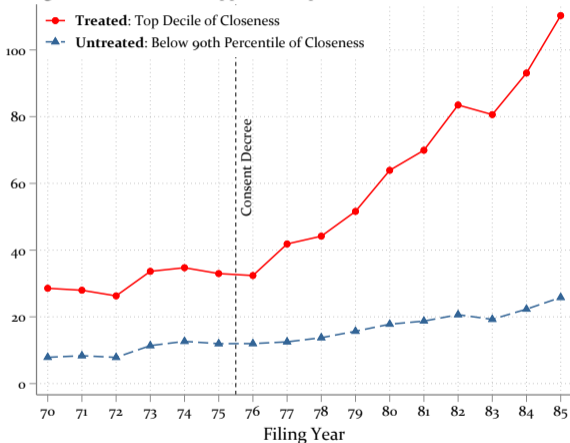


# Increase in Patenting Driven by Firms Experienced in Copier Technologies



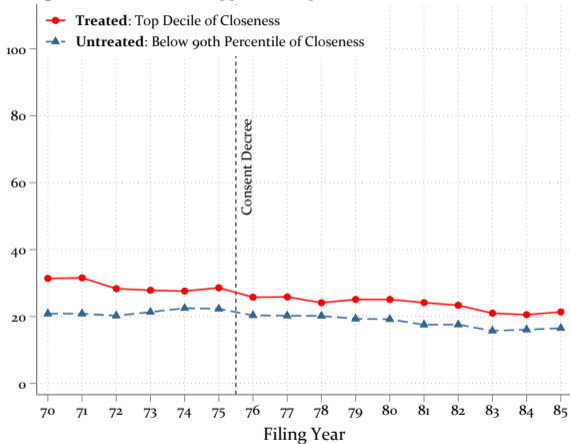
# Firm-Level Patenting Trends by Country and Closeness to Xerox

Average Number of Patent Applications per Firm



(A) Japan

Average Number of Patent Applications per Firm



(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?

# What Did Japanese Entrants Do Differently?

The meeting's about to start... and the copies aren't ready yet. We've got a fast cure: A Kodak copier that turns out 4200 fine-looking copies an hour—that's 70 a minute! Already collated, if you like. And stapled, too, automatically, at the push of a button.

People are telling us it's the best quality in the business. A few of these machines in your offices can end a lot of bottlenecks. And the service is Kodak quality also. We'd like to demonstrate.

Write: Eastman Kodak Company,  
CD0338, Rochester, NY 14650.

**Kodak copiers can unplug your bottlenecks.**

1880  1980

A 100-year start on tomorrow



Kodak Ektaprint 100AF copier-duplicator

(A) Kodak (US)

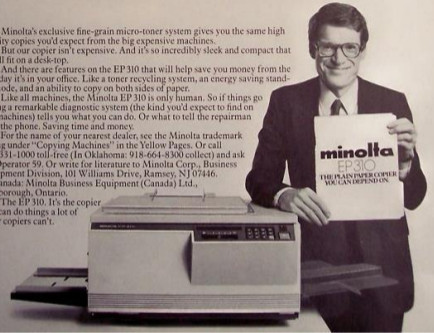
Minolta's exclusive fine-grain micro-toner system gives you the same high quality copies you'd expect from the big expensive machines. But our copier isn't expensive. And it's so incredibly sleek and compact that it will fit on a desk-top.

And there are features on the EP310 that will help save you money from the first day it's in your office. Like a toner recycling system, an energy saving standby mode, and an ability to copy on both sides of paper.

Like all machines, the Minolta EP 310 is only human. So if things go wrong a remarkable diagnostic system (the kind you'd expect to find on big machines) tells you what you can do. Or what to tell the repairman over the phone. Saving time and money.

For the name of your nearest dealer, see the Minolta trademark listing under "Copying Machines" in the Yellow Pages. Or call 800-331-1000 toll-free (In Oklahoma: 918-664-8300 collect) and ask for Operator 59. Or write for literature to Minolta Corp., Business Equipment Division, 101 Williams Drive, Ramsey, NJ 07446. In Canada: Minolta Business Equipment (Canada) Ltd., Scarborough, Ontario.

The EP 310. It's the copier that can do things a lot of other copiers can't.



(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

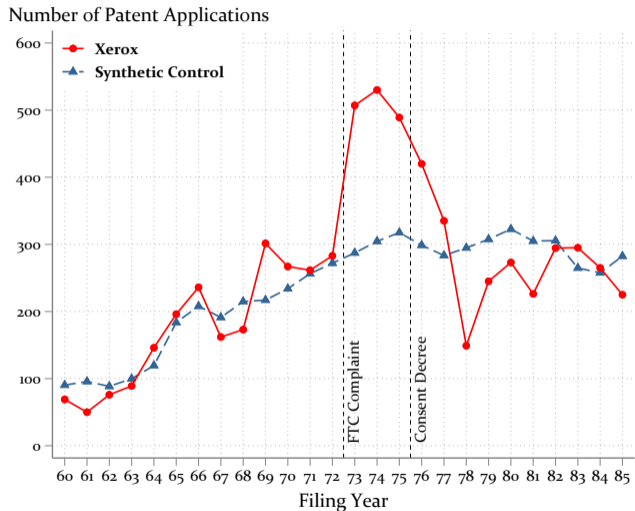
## Descriptive Evidence Consistent With This Narrative

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

**Thank you for your attention!**

---

Contact: [robin.mamrak@econ.lmu.de](mailto:robin.mamrak@econ.lmu.de)

Website: <http://robin.mamrak.de>