IMPACT EVALUATION: REPLICATION PROJECT

- LOUM Khadijatou
- LAINES MEDINA Betsy
- SIMATOVIC Lucas

SELECTED PAPER

Paper: Moser and Voena (AER 2012) Compulsory Licensing: Evidence from the Trading with the Enemy Act

What is Compulsory Licensing?

A government policy allowing firms to produce foreign inventions **without the consent** of the patent owner.

Pros (Developing Countries)

- Crucial for fighting climate change.
- Enables local production of life-saving drugs (e.g., Brazil, India, Thailand).
- Lowers costs for essential goods.

Cons (Inventing Countries)

- "Expropriation of intellectual property."
- Destroys incentives for future R&D.
- Allows "copying" rather than innovating.

Research Question

Does compulsory licensing discourage or increase domestic innovation?

The Theoretical Tension:

Destruction of Local R&D?

Learning-by-doing Opportunity?

The Natural Experiment

Trading with the Enemy Act (1917)

Context: World War I acted as an exogenous shock to the chemical industry.

The Shock: In 1917, the US confiscated over **4,500 German patents** (Bayer, BASF, etc.) which were previously dominant.

The Treatment: These patents were licensed to US firms (like Du Pont) via the *Chemical Foundation*.K

Goal: To break the German monopoly and jumpstart the American chemical industry.

Data Construction

Outcome Data

USPTO

129,943 Chemical Patents (1875-1939)

Analysed patents granted to US inventors per subclass.

Treatment Data

Chemical Foundation

Historical records of 727 licensed enemy patents.

Mapped to 336 "Treated" subclasses.

Cleaning

LexisNexis & OCR

Identified nationality of inventors.

Validated OCR accuracy with manual checks of 625 patents.

Methodology: Difference-in-Differences

The Approach

Comparing the change in innovation between two groups after the 1917 Act.

- **Treated Group:** 336 subclasses containing at least one licensed German patent.
- **Control Group:** 391 technologies/subclasses not affected by licensing.
- **Comparison:** Pre-1919 vs. Post-1919.

The Model

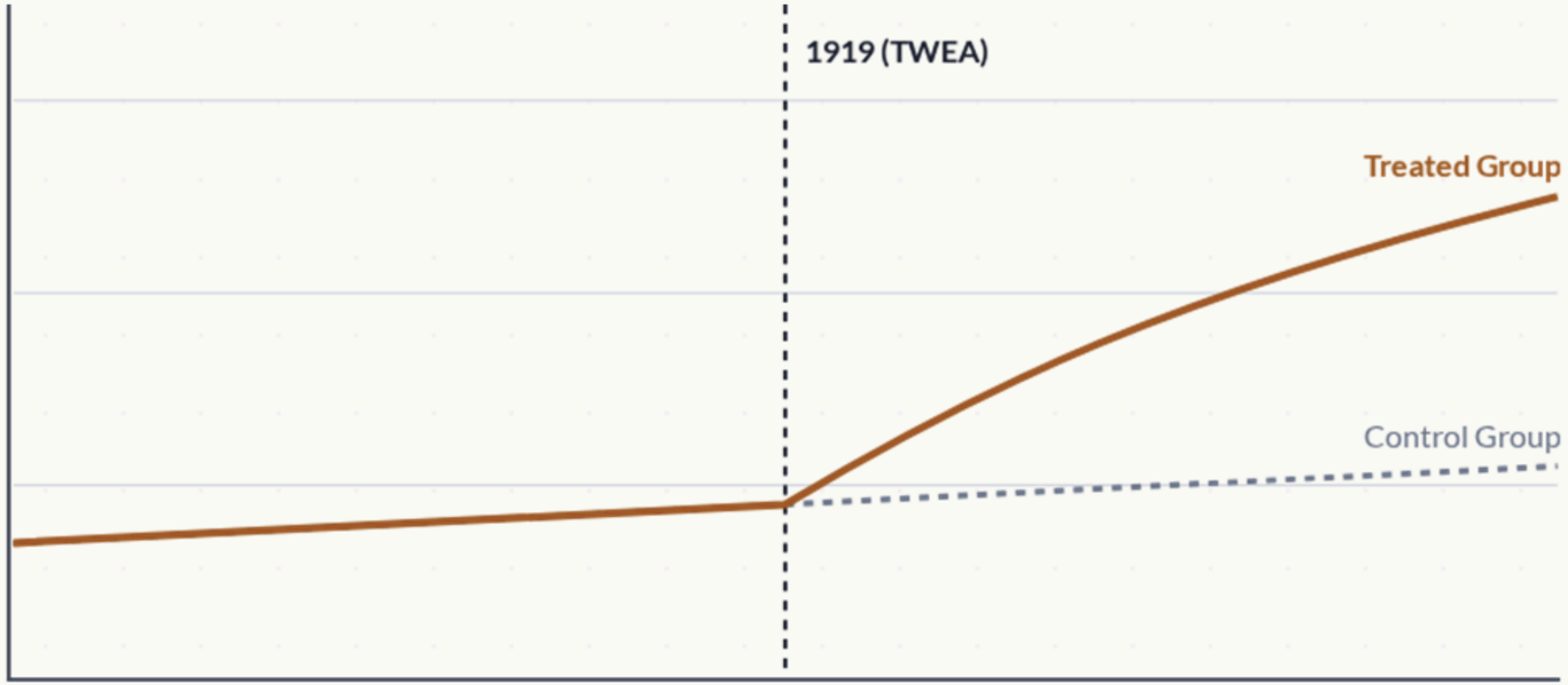
Ideally, if compulsory licensing works, we expect to see:

$$\text{Innovation}_{\text{Treated}} > \text{Innovation}_{\text{Control}}$$

(After controlling for year fixed effects and subclass differences)

Result: A 20% Increase in Innovation

Domestic inventors produced an average of **0.151 to 0.255 additional patents** per year in treated subclasses.



Visual approximation of the Difference-in-Differences result.

Mechanism: Learning by Doing

US firms needed **"time to learn"** tacit knowledge (e.g., complex formulas like Haber-Bosch).

1919-1926

Patents Licensed

1927-1928

Initial Statistical Effect

1931

Strongest Impact

Physical plants built, chemists trained.

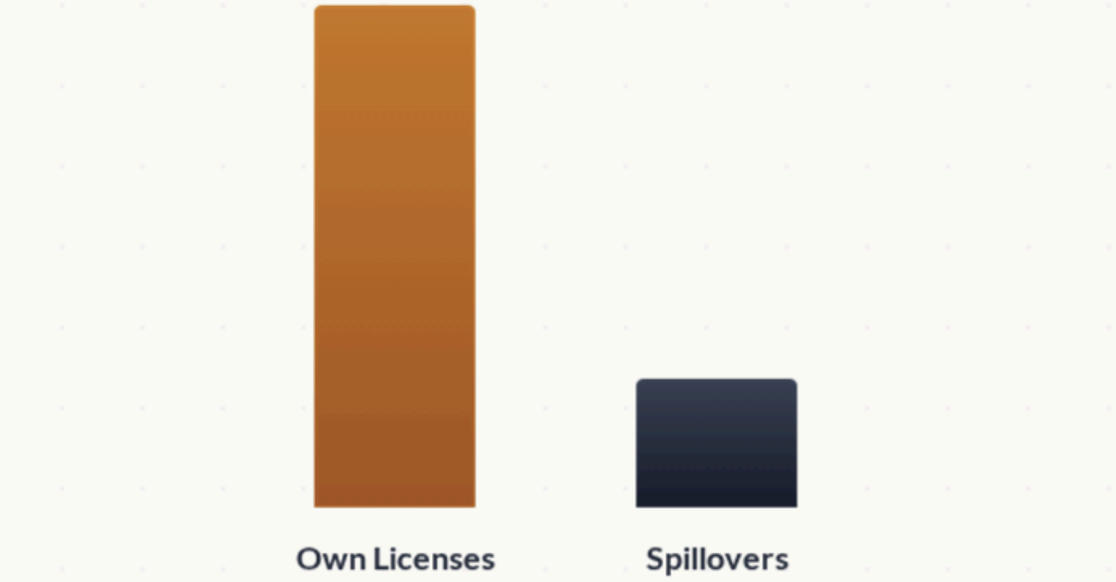
Firm Level: The Du Pont Case

Direct Access vs. Spillovers

Does the benefit come from *holding* the license or just *knowing* it exists?

- **Own Licenses:** 4x larger effect.
- **Competitor Licenses:** Small positive spillover.

Conclusion: "Learning by doing" is the primary driver.



Increase in patents per year (Du Pont)

Robustness Checks

Triple Differences

Compared US inventors to other **non-German foreign inventors** operating in the US.

Result: Confirmed Boost

Placebo Test

Simulated a "fake treatment" for **French inventors** (who didn't get licenses).

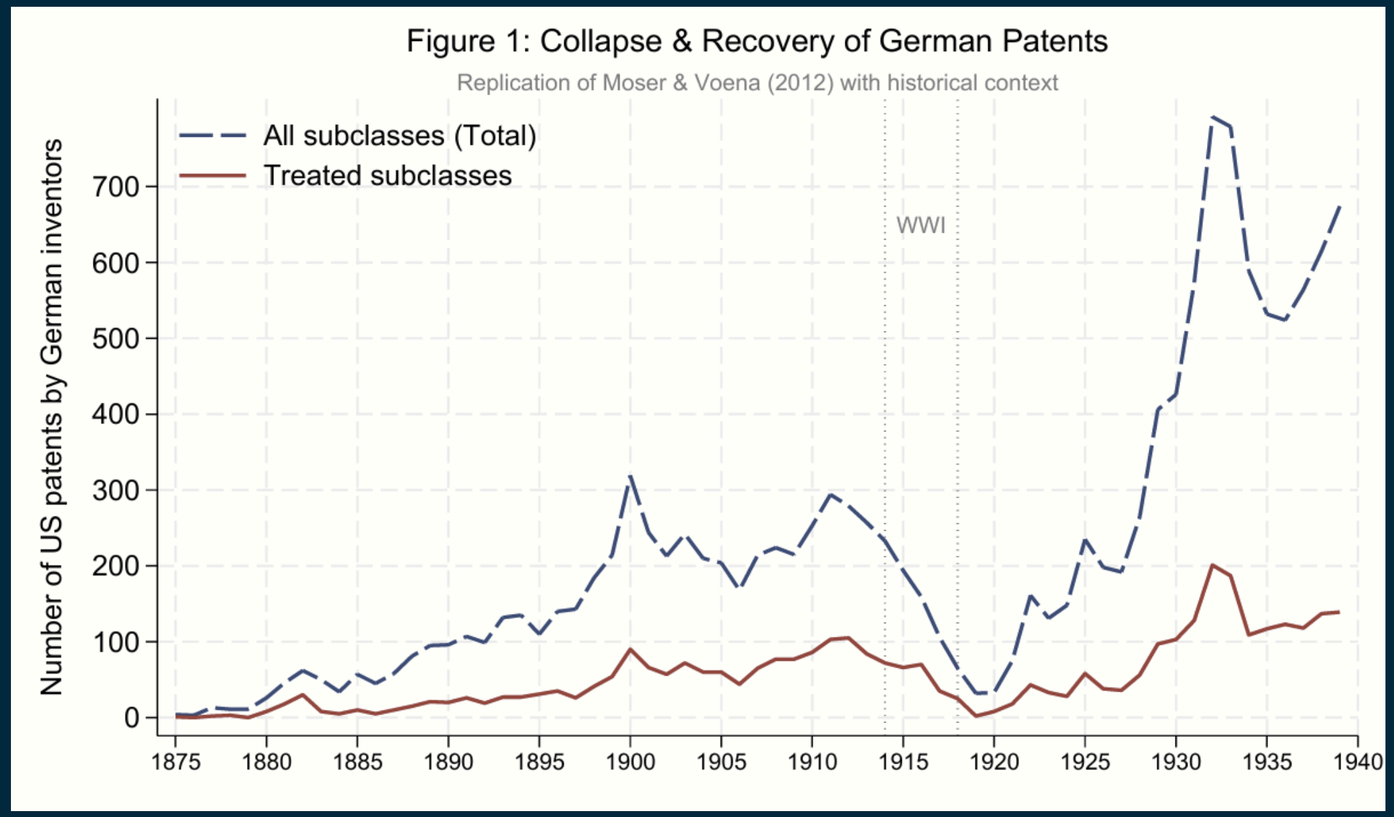
Result: No Effect

Instrumental Variable

Controlled for selection bias by using the count of **all confiscated enemy patents** (ITT).

Result: Robust Estimates

FIGURE 1



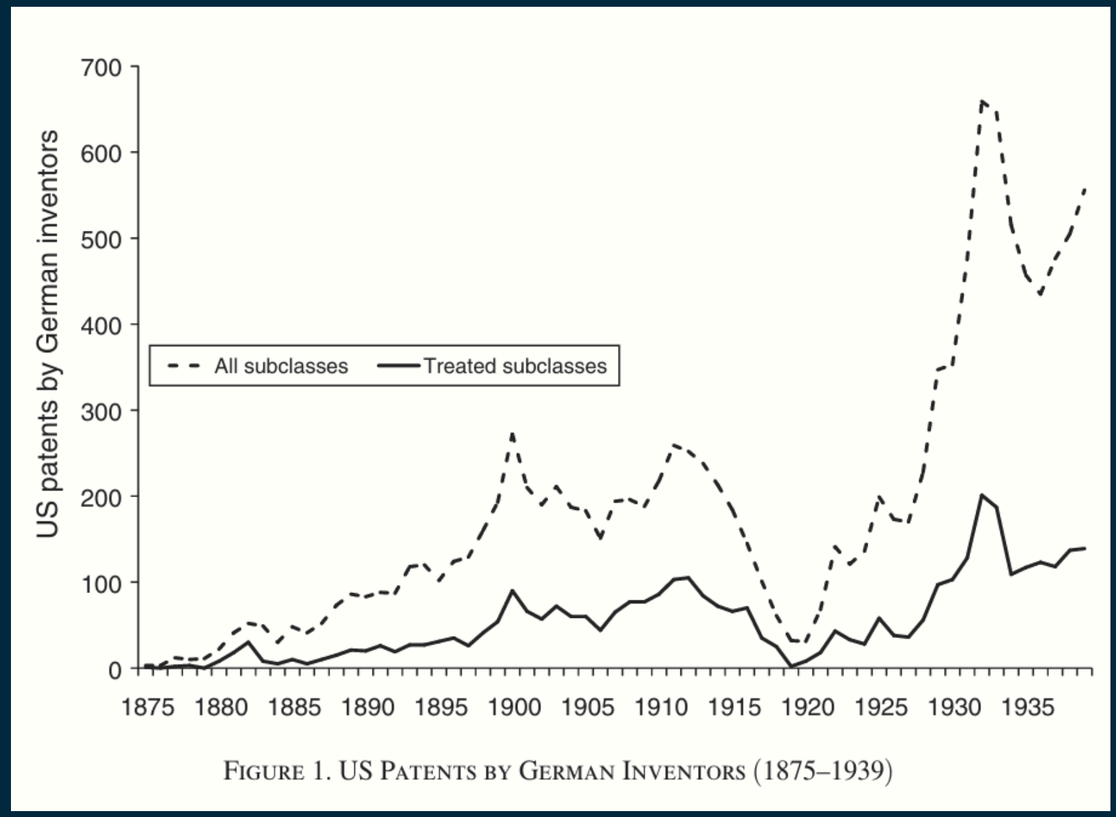
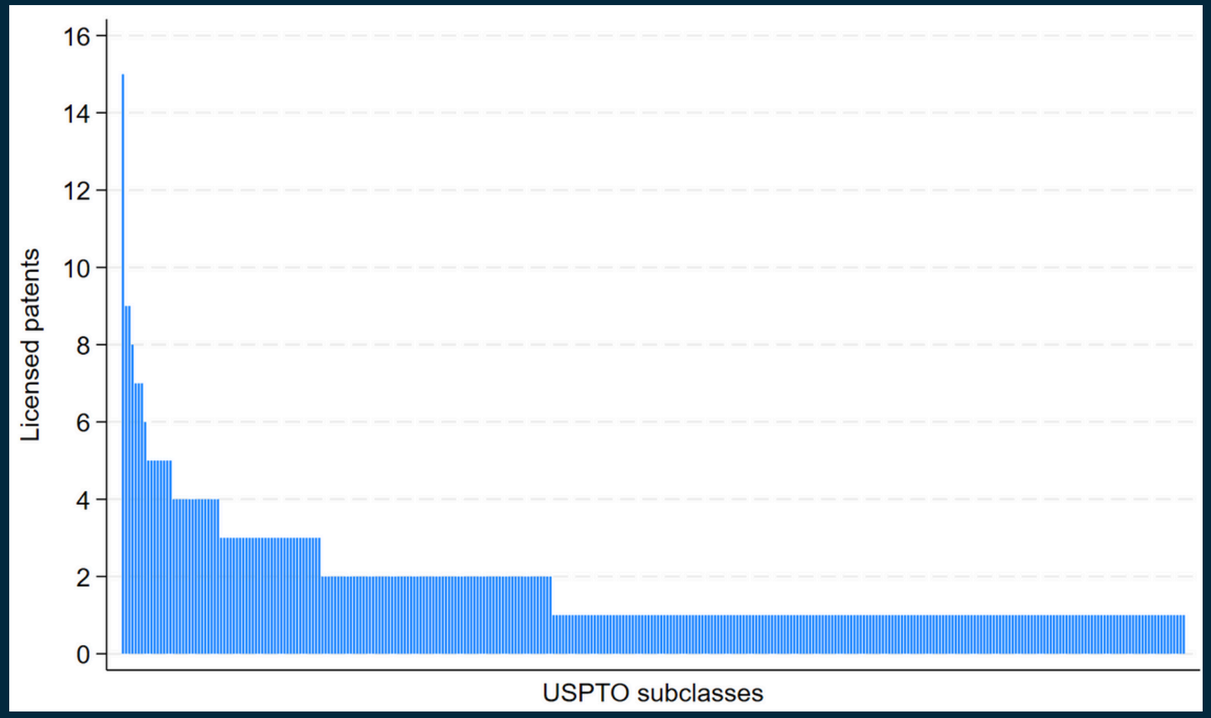
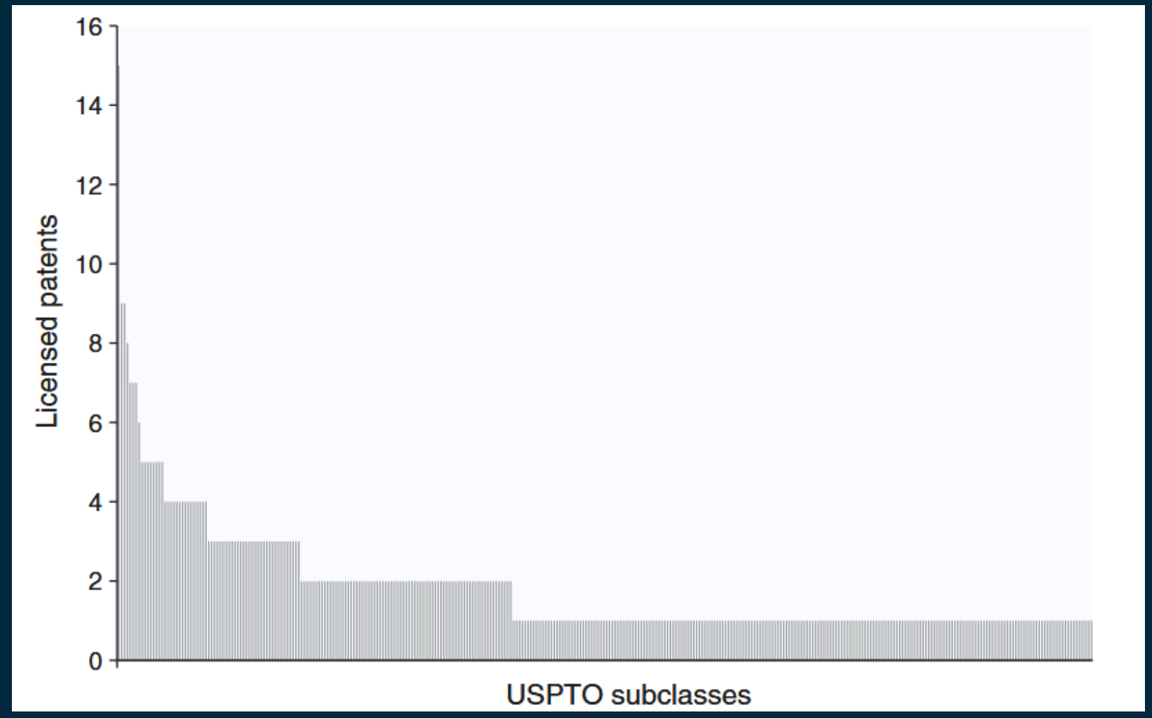


FIGURE 1. US PATENTS BY GERMAN INVENTORS (1875–1939)

US VS. GERMAN INNOVATION (1875-1939)

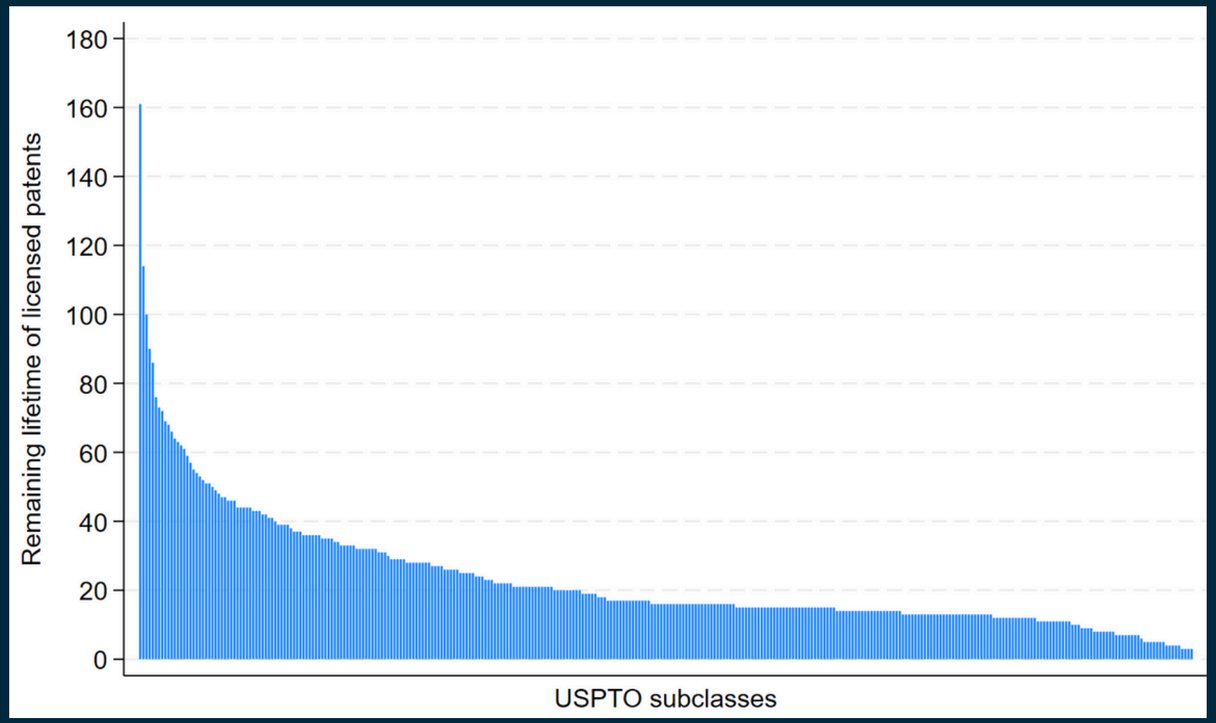
FIGURE 2

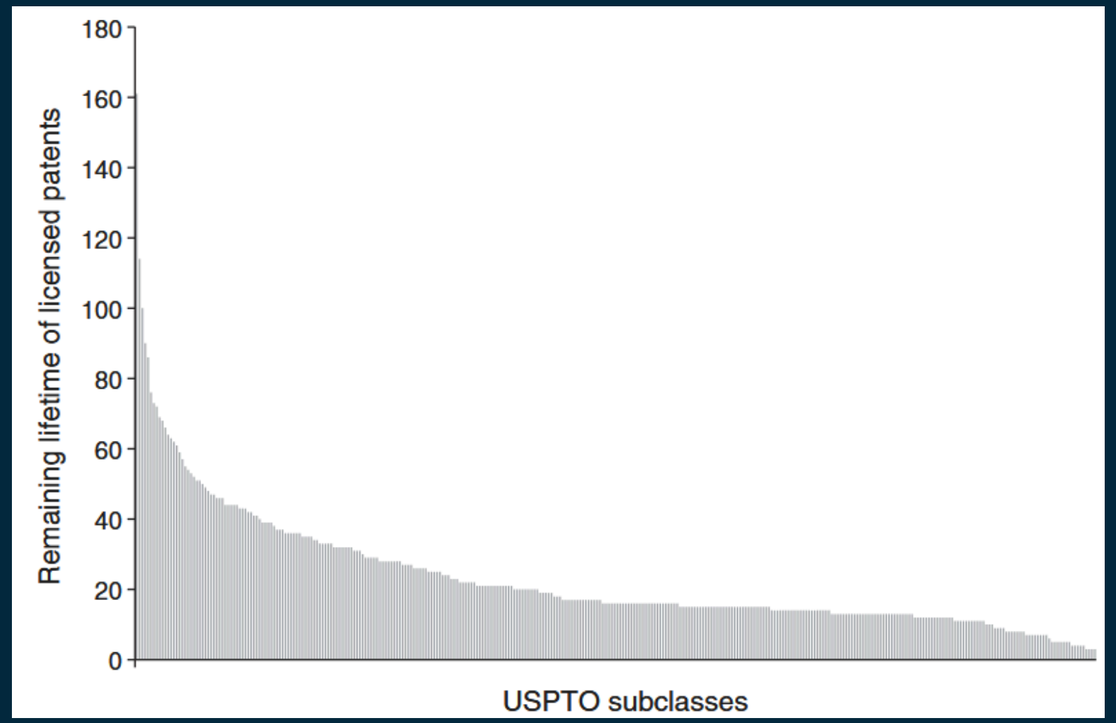




DIFFUSION OF GERMAN TECHNOLOGY

FIGURE 3

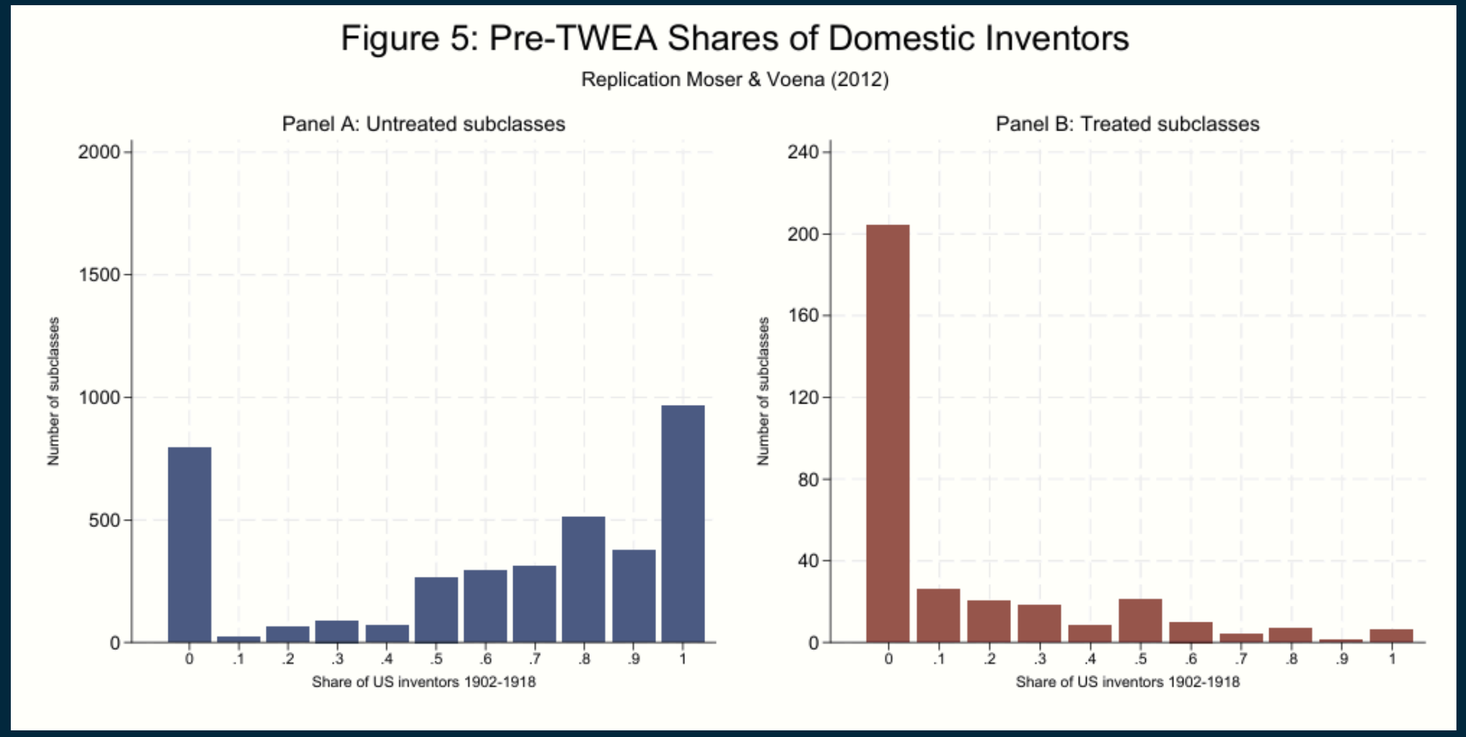




US INVENTION BY CHEMICAL SUBCLAS

FIGURE 5

PRE-TREND ANALYSIS



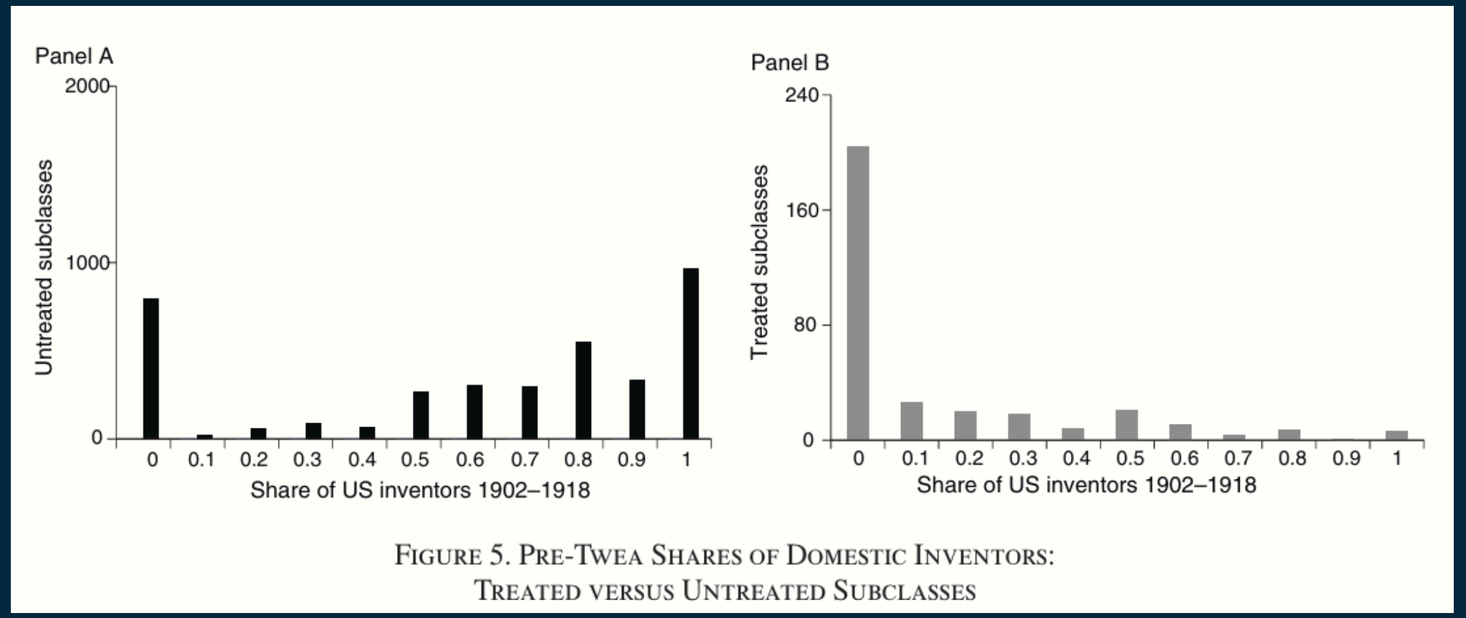
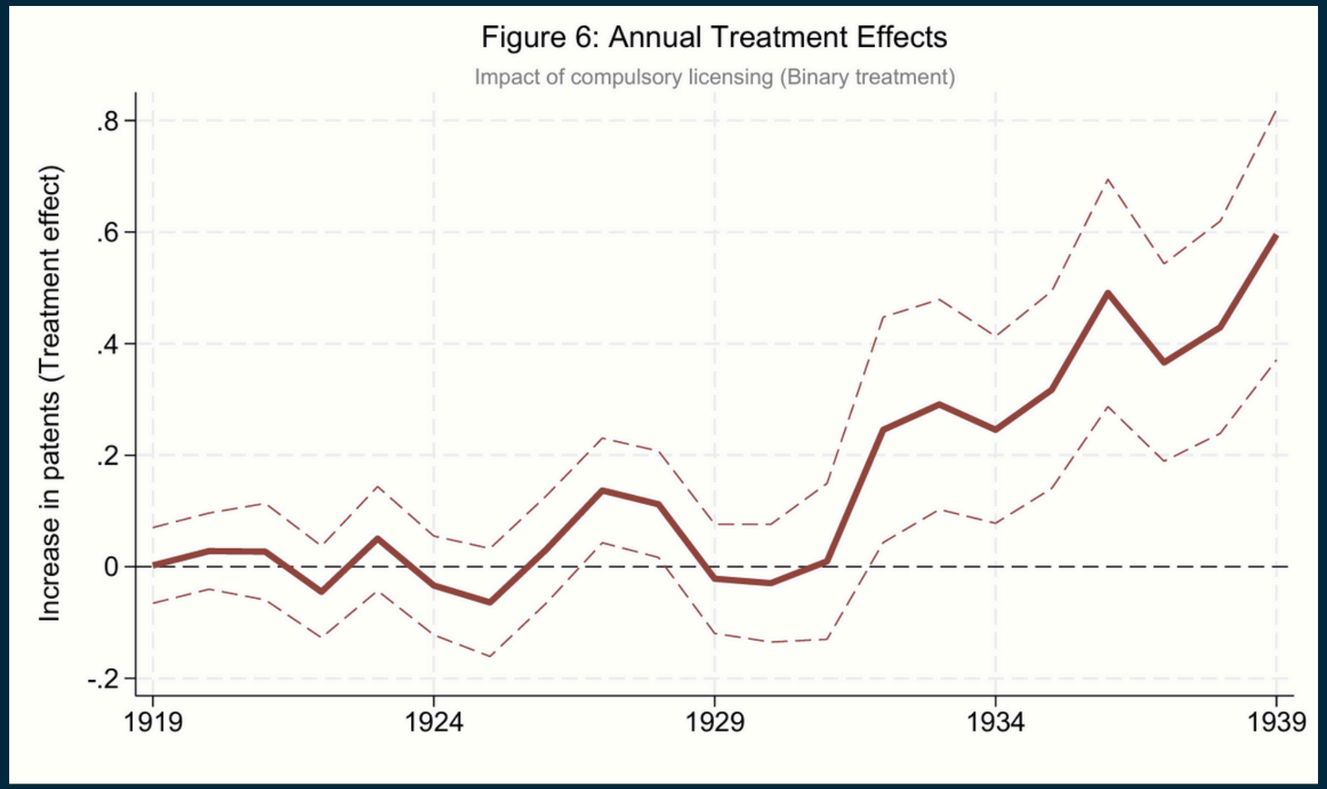


FIGURE 5. PRE-TWEA SHARES OF DOMESTIC INVENTORS: TREATED VERSUS UNTREATED SUBCLASSES



ENTRY OF NEW INVENTORS

FIGURE 6

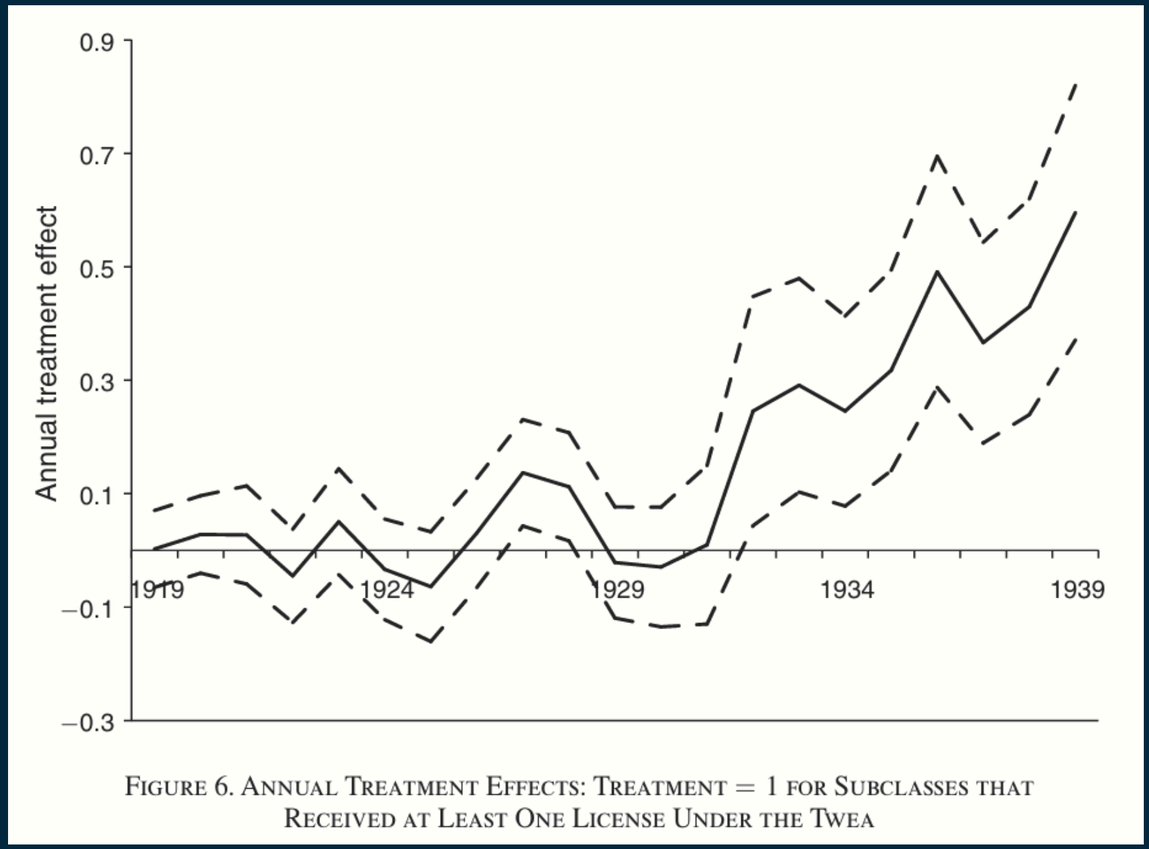
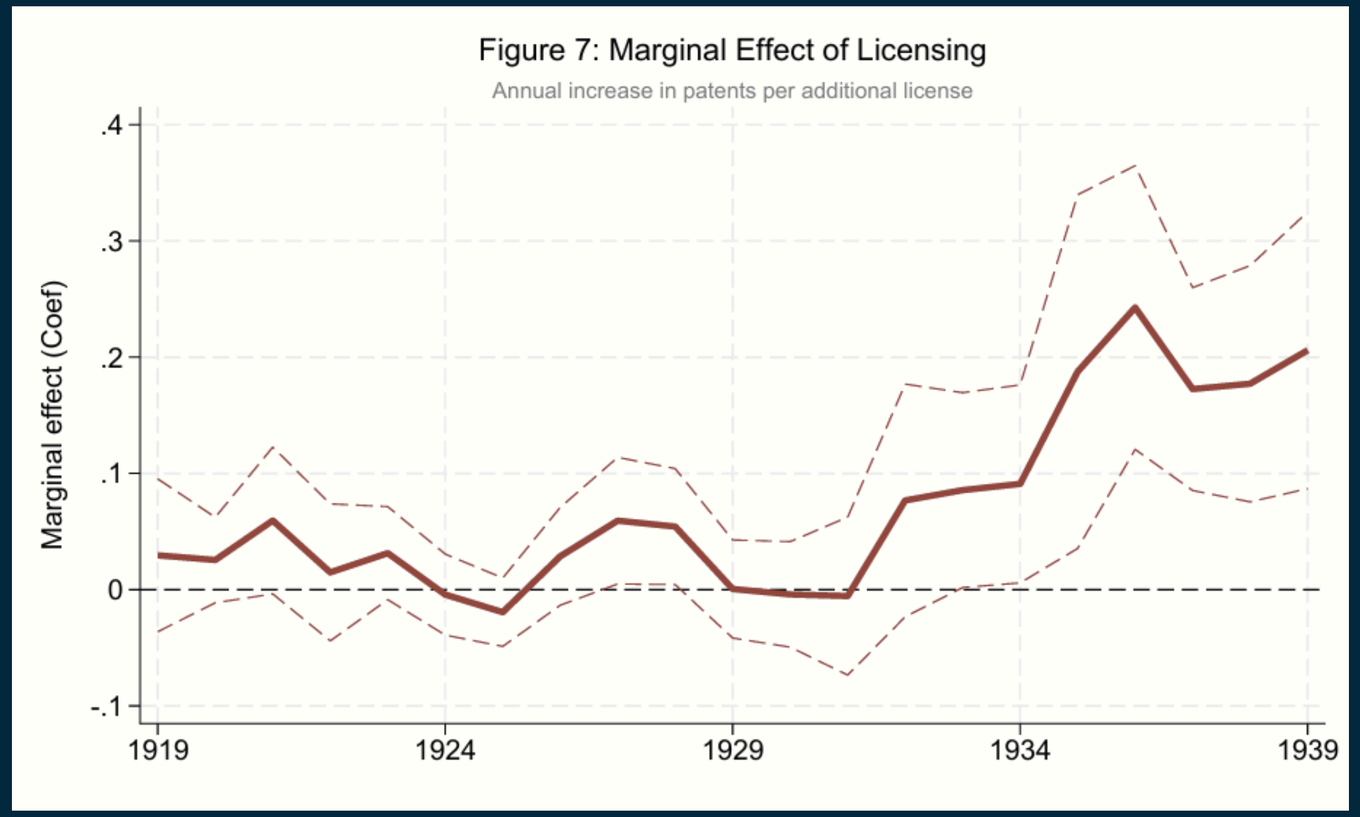


FIGURE 6. ANNUAL TREATMENT EFFECTS: TREATMENT = 1 FOR SUBCLASSES THAT RECEIVED AT LEAST ONE LICENSE UNDER THE TWEA



LAGGED IMPACT ON INNOVATION

FIGURE 7

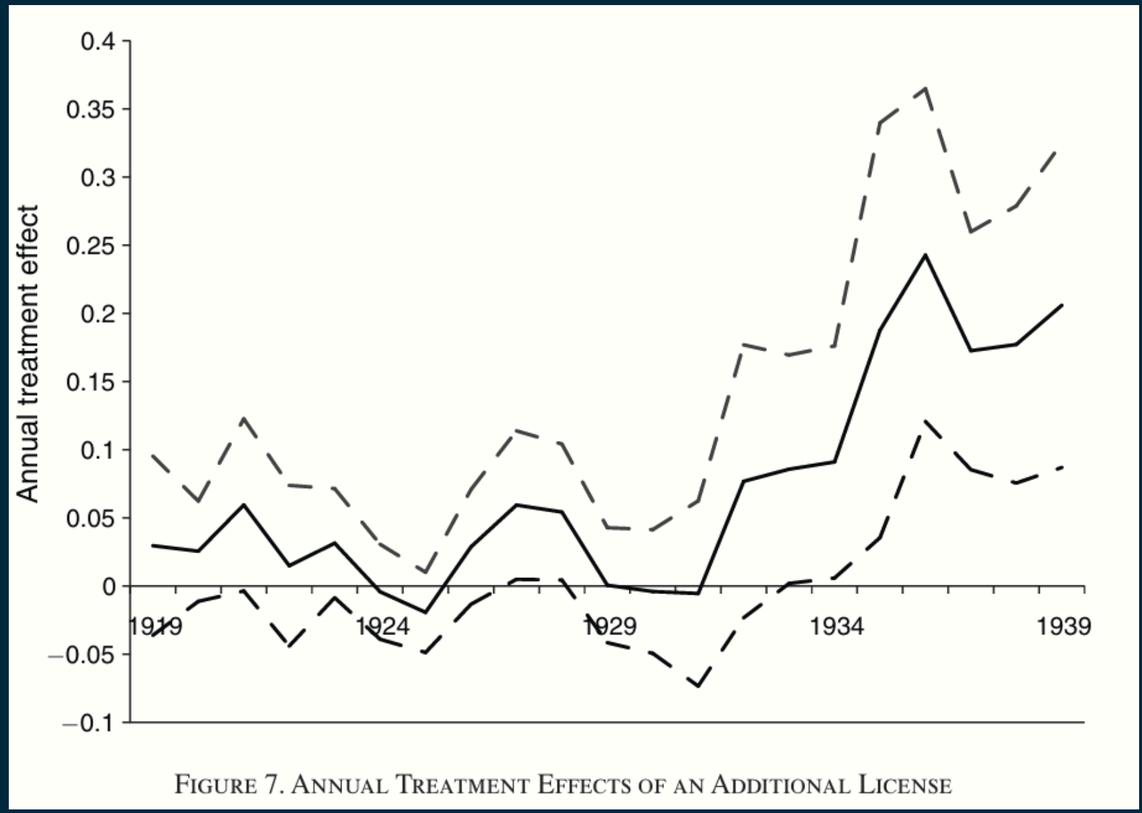


FIGURE 7. ANNUAL TREATMENT EFFECTS OF AN ADDITIONAL LICENSE

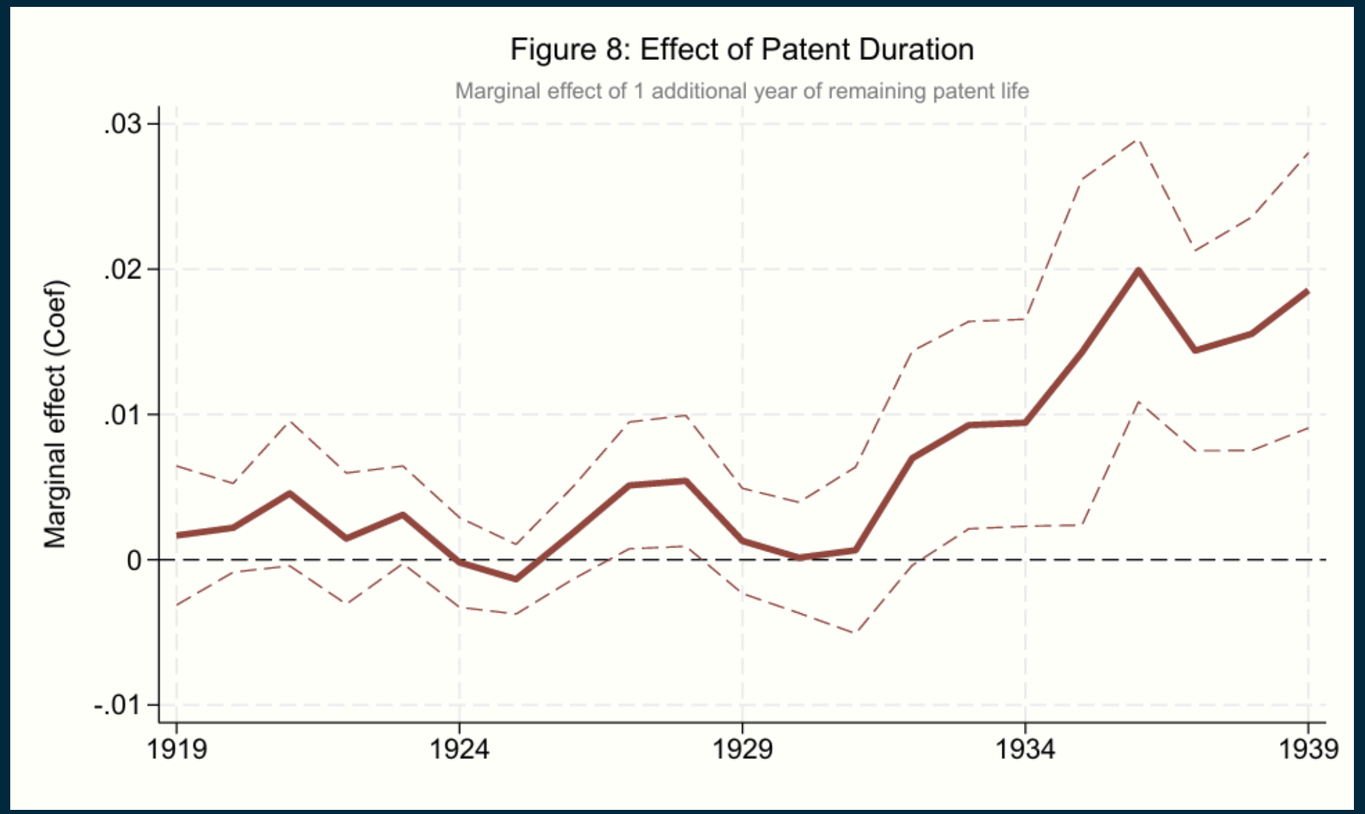
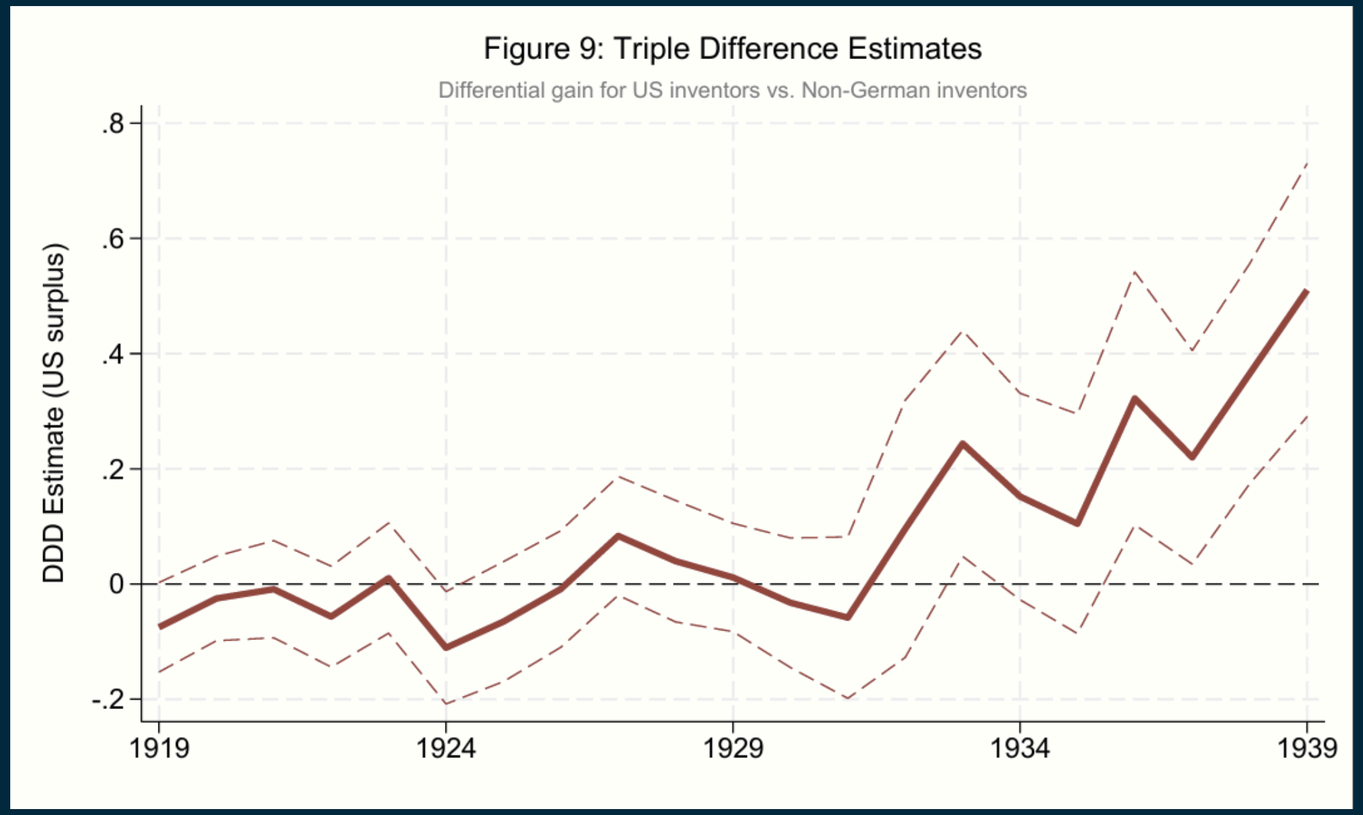


FIGURE 8

EFFECT OF PATENT DURATION

FIGURE 8. ANNUAL TREATMENT EFFECTS OF AN ADDITIONAL YEAR OF PATENT LIFE

FIGURE 9



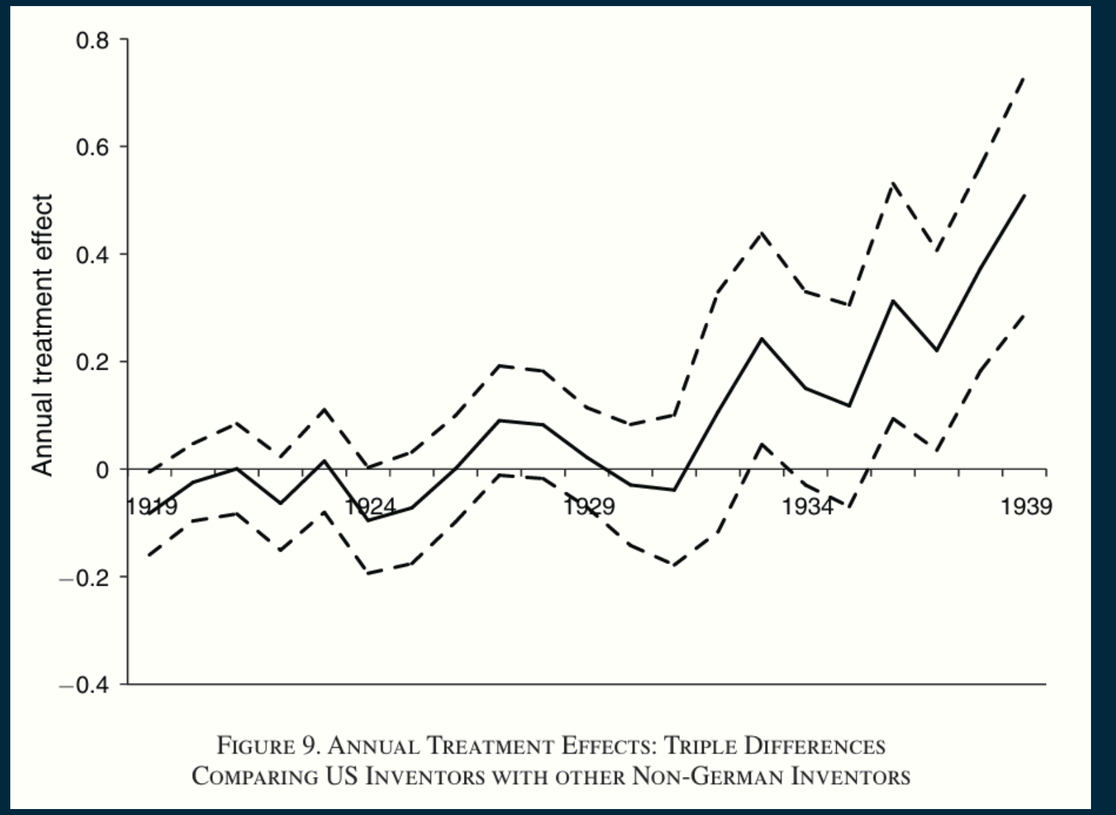


FIGURE 9. ANNUAL TREATMENT EFFECTS: TRIPLE DIFFERENCES COMPARING US INVENTORS WITH OTHER NON-GERMAN INVENTORS

TRIPLE DIFFERENCE (DDD) ESTIMATES

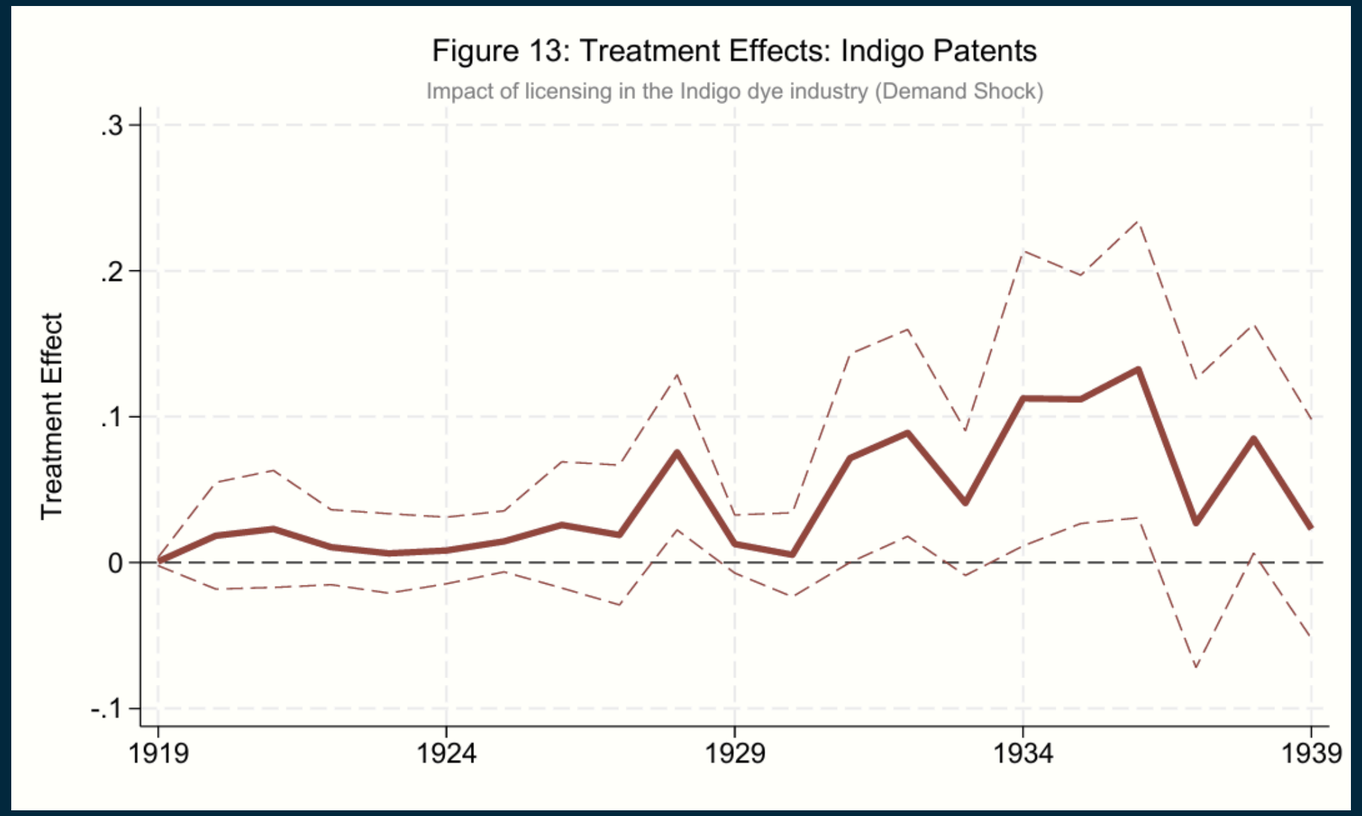


FIGURE 12

SPILLOVER EFFECTS AND MARKET DYNAMICS

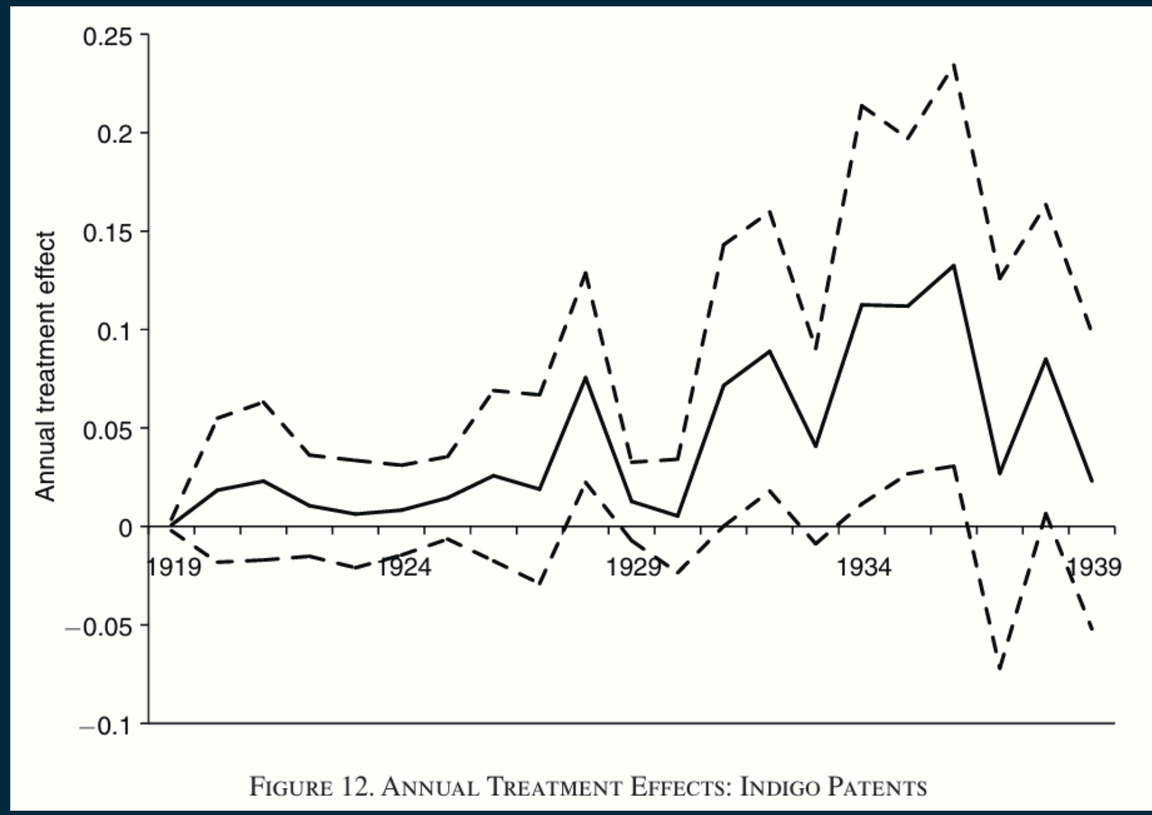


FIGURE 12. ANNUAL TREATMENT EFFECTS: INDIGO PATENTS

THANK YOU!