Visibility of Technology and Cumulative Innovation: Evidence from Trade Secrets Laws

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The secrets of Cremona

ANTONIO STRADIVARI
Luthier
1644-1737

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Scientists are trying to uncover what makes Stradivarius violins special – but are they wasting their time?

December 19, 2016 2.59pm EST

Secrets Of Stradivarius' Unique Violin Sound Revealed, Professor Says

Date: January 25, 2009

Source: Texas A&M University

Summary: For centuries, violin makers have tried and failed to reproduce the pristine sound of Stradivarius and Guarneri violins, but after 33 years of work put into the project, one professor is confident the veil of mystery has now been lifted.

Patent or trade secret

Patented Feb. 12, 1924.   1,483,733

UNITED STATES PATENT OFFICE.

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PROCESS OF TREATING WOOD FOR THE MANUFACTURE OF MUSICAL INSTRUMENTS.

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  • Inherent visibility (e.g. products vs. processes)

  • Institutions

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Impacts on follow-on innovation

What happens when trade secrets protection becomes stronger?

1. Does stronger trade secrets protection impact **what is disclosed**?

   - How *visible* are patented inventions?

2. How does trade secrets protection impact **welfare** from innovation?

   - And how does this depend on the invention's visibility?

- *We study these questions using the Uniform Trade Secrets Act (1979)*

Intuition (theoretical framework)

Visibility matters: the inventor's choice

Inventors want to patent *products:*

- Require visibility *(of use)* for enforcement

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- Makes patents less attractive

- … especially for processes

  - (Higher disclosure-cost of patenting)

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→ relatively fewer process patents

Institutions and data

The Uniform Trade Secrets Act (1979/85)

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- 47 states adopted between 1981 and 2013

- Png (2017) measures changes in TS protection

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- TS strength increased for most states

Anecdotal evidence shows stronger trade secrets laws impact litigation

... and adoption happened for somewhat whimsical reasons

Change in TS protection index (Png, 2017)
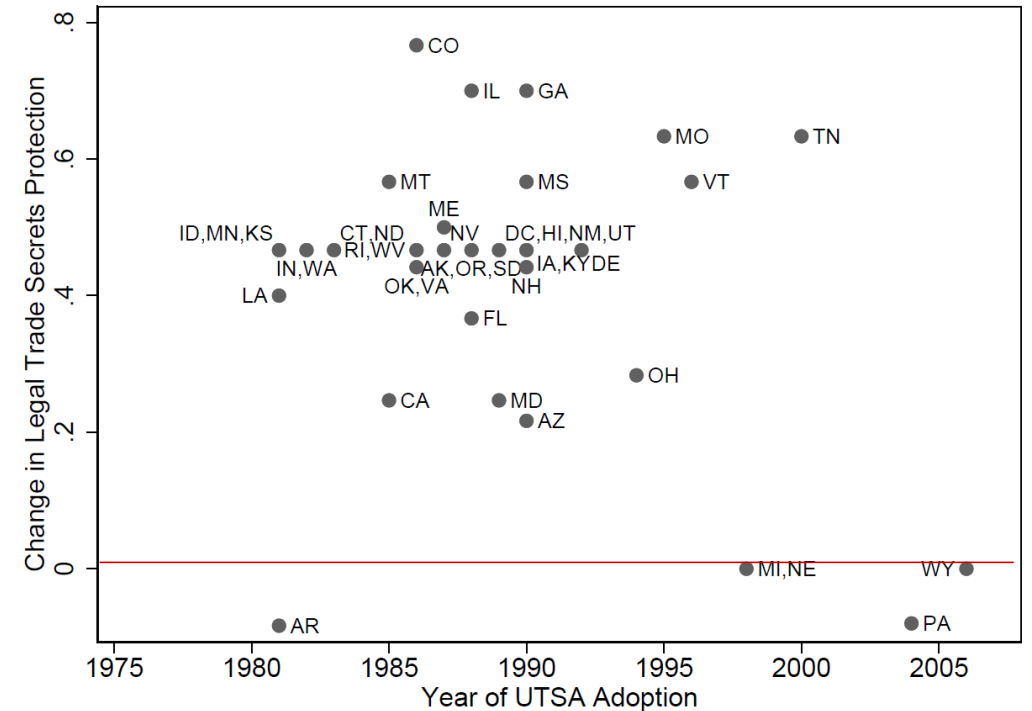
Patents and their types

- ~1.5 million single-state U.S. utility patents, between 1976 and 2008

- **Process** vs. **product patent** indicators (Ganglmair et al, 2020)

  - Process patent if at least 1 claim describes a process

I claim:

1. A method of tuning a stringed instrument adapted to be stroked with a bow and having a string supporting bridge positioned adjacent the center of said instrument comprising:

Question 1:
Does stronger trade secrets protection affect what is disclosed?

Empirical strategy

The <u>likelihood of process patents</u>:

$$process_{jst} = \boxed{\alpha\,TS_{st}} + \beta X_{jt} + \nu_s + \mu_t + \eta_j + \epsilon_{jst}$$

- TS_{st}: trade secrets protection index (Png, 2017)

- X_{jt}: patent complexity and value

- State, year, and USPC class FEs

- Std. errors clustered by USPC class and state

Baseline estimation results

Dep Var: =1 if process patent	(1)	(2)	(3)	(4)
Trade secrets protection	-0.018**	-0.021**	-0.026***	-0.026***
Complexity controls	N	Y	N	Y
Value controls	N	N	Y	Y
State, year, UPC class FE	Y	Y	Y	Y
Obs.	1,475,058	1,465,095	907,867	899,932
R^2	0.300	0.345	0.289	0.337

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UTSA leads to a **mean decrease of 2.2%** in the probability that a patent is a process patent

- Mean increase in TS protection = 0.36

- Baseline share of process patents = 0.43

Driven by individuals/small firms, and chemicals, electronics, mechanics

Identification and robustness checks

- Identification:

  - Placebo test: enactment 1, 2, 3, 4 years earlier ✓

  - Placebo test: randomized enactment ✓

  - State-specific pre-trends ✓

  - If anything, this is an under-estimate

- Robustness:

  - Alternative definitions for disclosure timing and location ✓

  - Alternative definitions for process patents ✓

Question 2:
How does trade secrets protection affect welfare from innovation?

Our (extended) model

- Stage 1: Ex ante R&D decision
  - Weigh cost of R&D against expected payoff

- Stage 2: Disclosure or trade secret
  - Weigh visibility and trade secrets protection

- Stage 3: Follow-on innovation (by others)
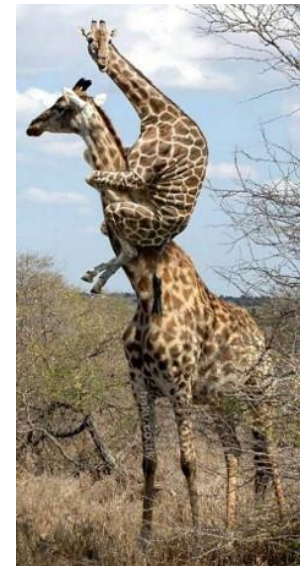 - Can others stand on your shoulders? Effective visibility and access

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With stronger trade secrets protection:

Stage 1: → Higher ex-ante incentives
→ More potential for follow-on innovation

Stage 2: → Larger DWL if choose secrecy
→ Less disclosure (and follow-on innovation)

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- Strength of trade secrets protection

- Share of process patents

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From the estimation, we get:

- Ideas, realized inventions, patents and trade secrets

  - For <u>varying TS protection</u>

  - And <u>assuming varying cost levels</u>

- This allows us to estimate how surplus changes with TS protection:

  - First, for no R&D costs

  - Then, for high R&D costs

Impact of trade secrets protection: **no R&D cost**

Initial and follow-on innovation value
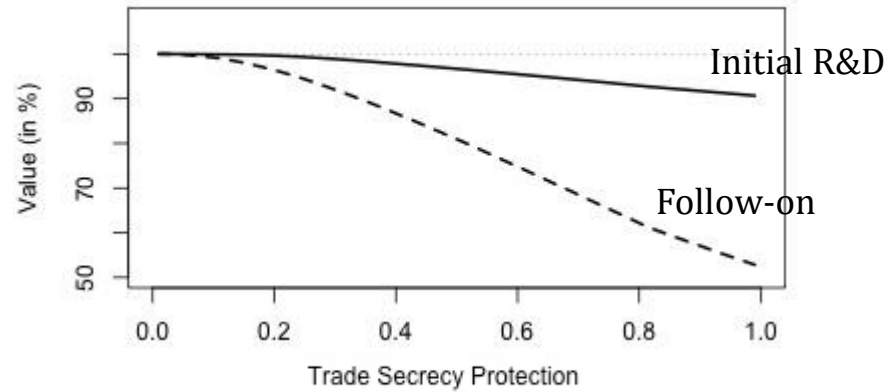
- All inventions are realized anyway

- And less disclosure

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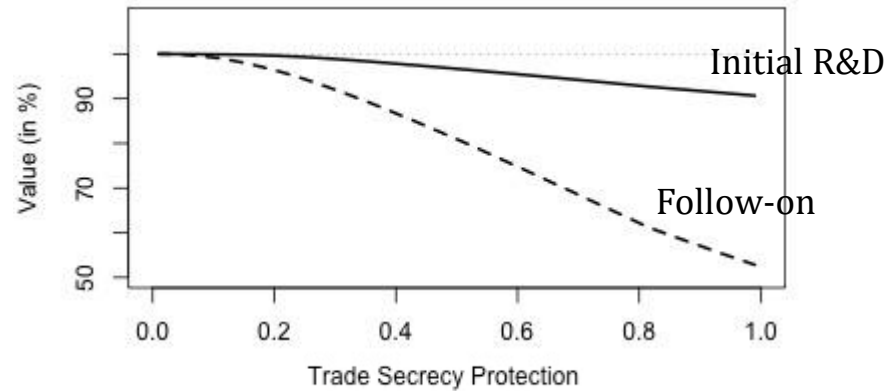
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Total value of inventions
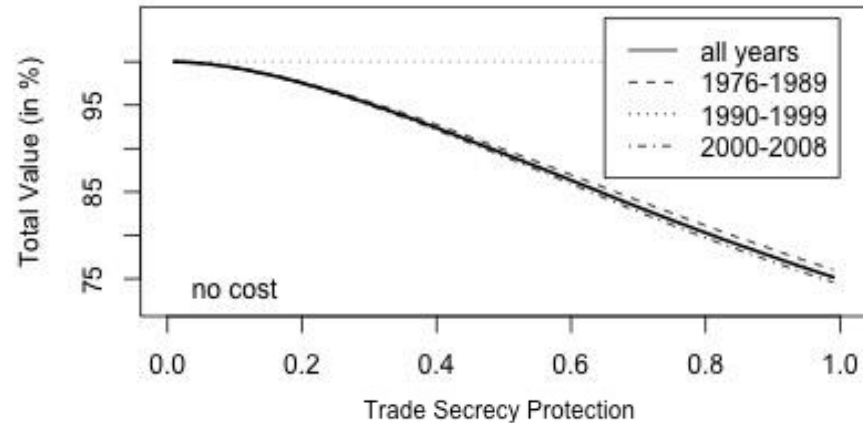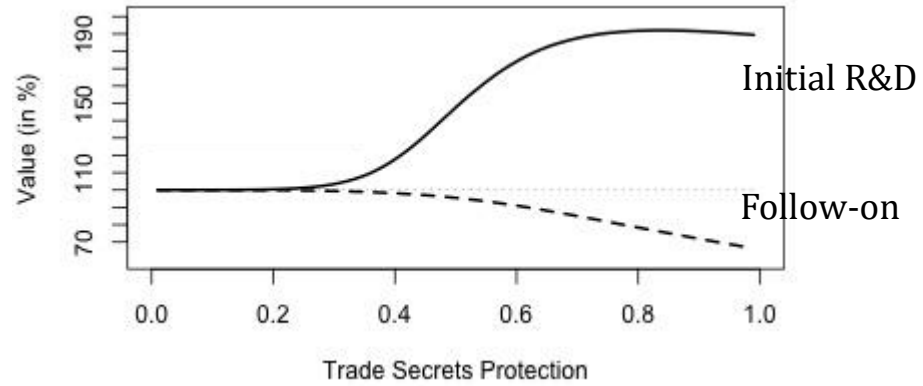
Impact of trade secrets protection: **high R&D cost**

Initial and follow-on innovation value

- More initial innovation

- But less disclosure

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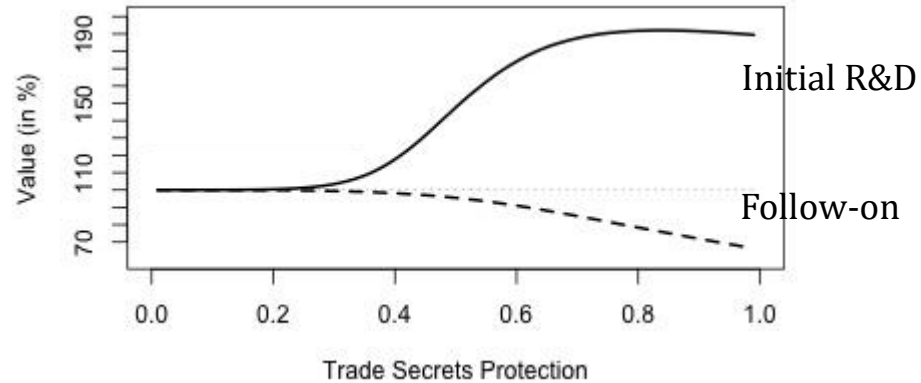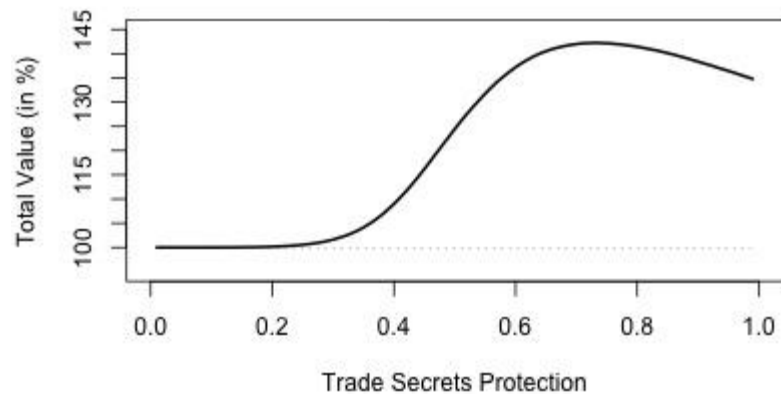
Initial and follow-on innovation value

Initial R&D

Follow-on

- More initial innovation

- But less disclosure

Total value of inventions

Impact of trade secrets protection: **high R&D cost**

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Follow-on

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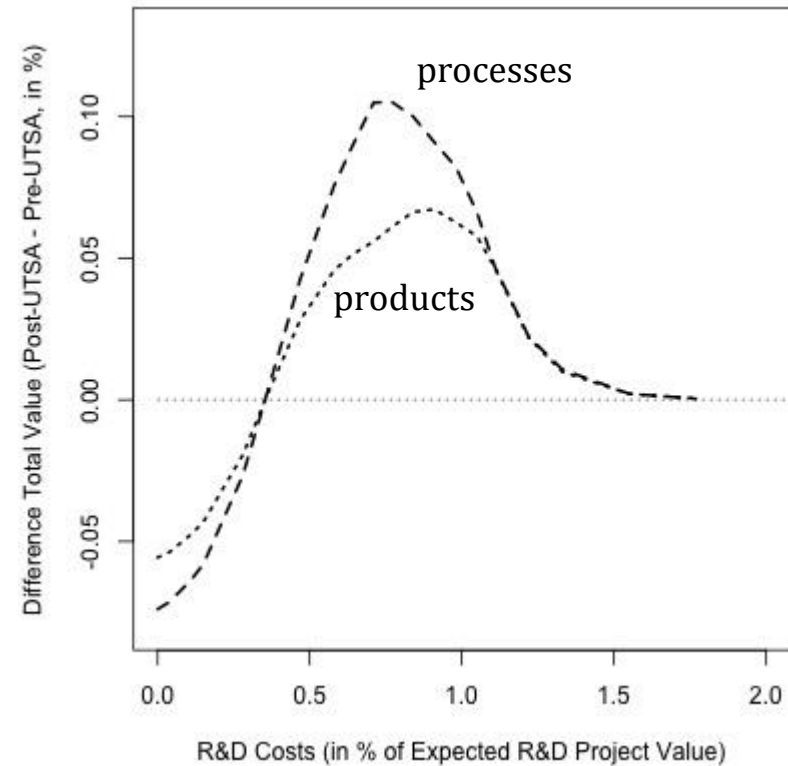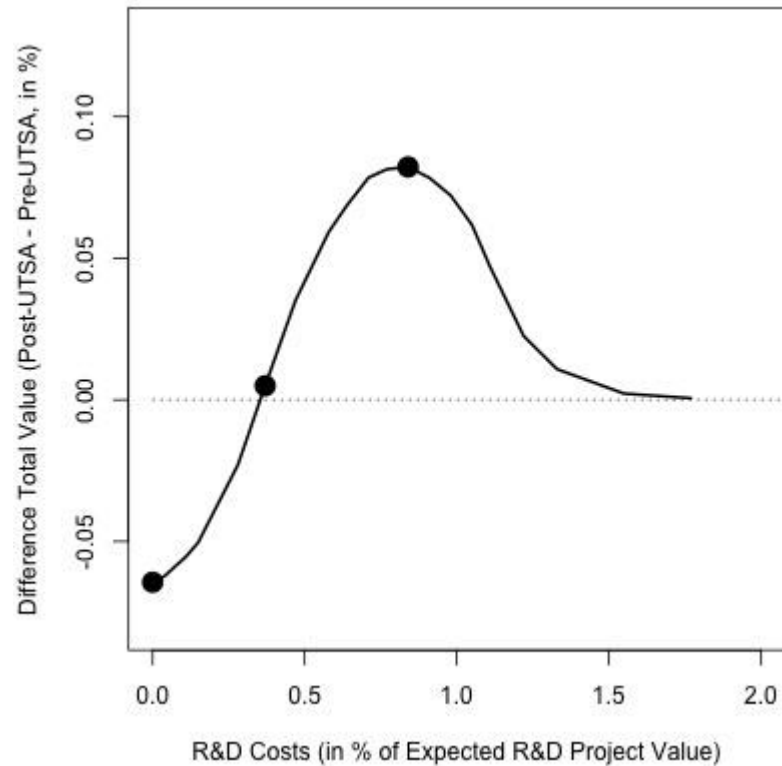
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Takeaways:
- Optimal trade secrets protection depends on costs of R&D
- That level is higher for higher costs

Application: impact of the UTSA

- Here we vary R&D costs

- And use the average change in TS protection from the UTSA

Thank you

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