# DO INVENTORS VALUE SECRECY IN PATENTING?
## EVIDENCE FROM THE AMERICAN INVENTOR'S PROTECTION ACT OF 1999

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# Background and Previous literature: Do Inventors forgo the benefits of secrecy by patenting?

- Grand bargain – *quid pro quo*
  - Patents require "publication of a specification containing a description not only [to] distinguish the invention . . but also to enable one skilled in the art to use the invention" (US Patent Act)
- Inventors value secrecy for their inventions
  - Publication informs rivals about invention
  - Reduces competitors' costs of "inventing around"
  - Imitators can use knowledge freely after patent expires
- But inventors can also benefit from patent disclosure
  - Sets the legal date from which inventors can collect royalties
  - Publication notifies rivals and licensees about property rights (Scotchmer 2004)
  - Reduces search costs in the market for ideas (Gans, Hsu & Stern 2008; Hegde & Luo, 2013)

# Motivation

- 1999 American Inventors Protection Act (AIPA)
  - 18-month publication of application
  - Harmonize USA with ROW wrt patent application disclosure
  - Lobbying by independent inventor interests (history, to 1980)
- Opt-out provision was included after intense lobbying
  - "[18-month disclosure] will prove very damaging to *American small inventors* and thereby discourage the flow of new inventions that have contributed so much to America's superior performance…. It will do so by curtailing the protection they obtain through patents relative to the large multi-national corporations" (Letter to US Senate by 25 Nobel Laureates)

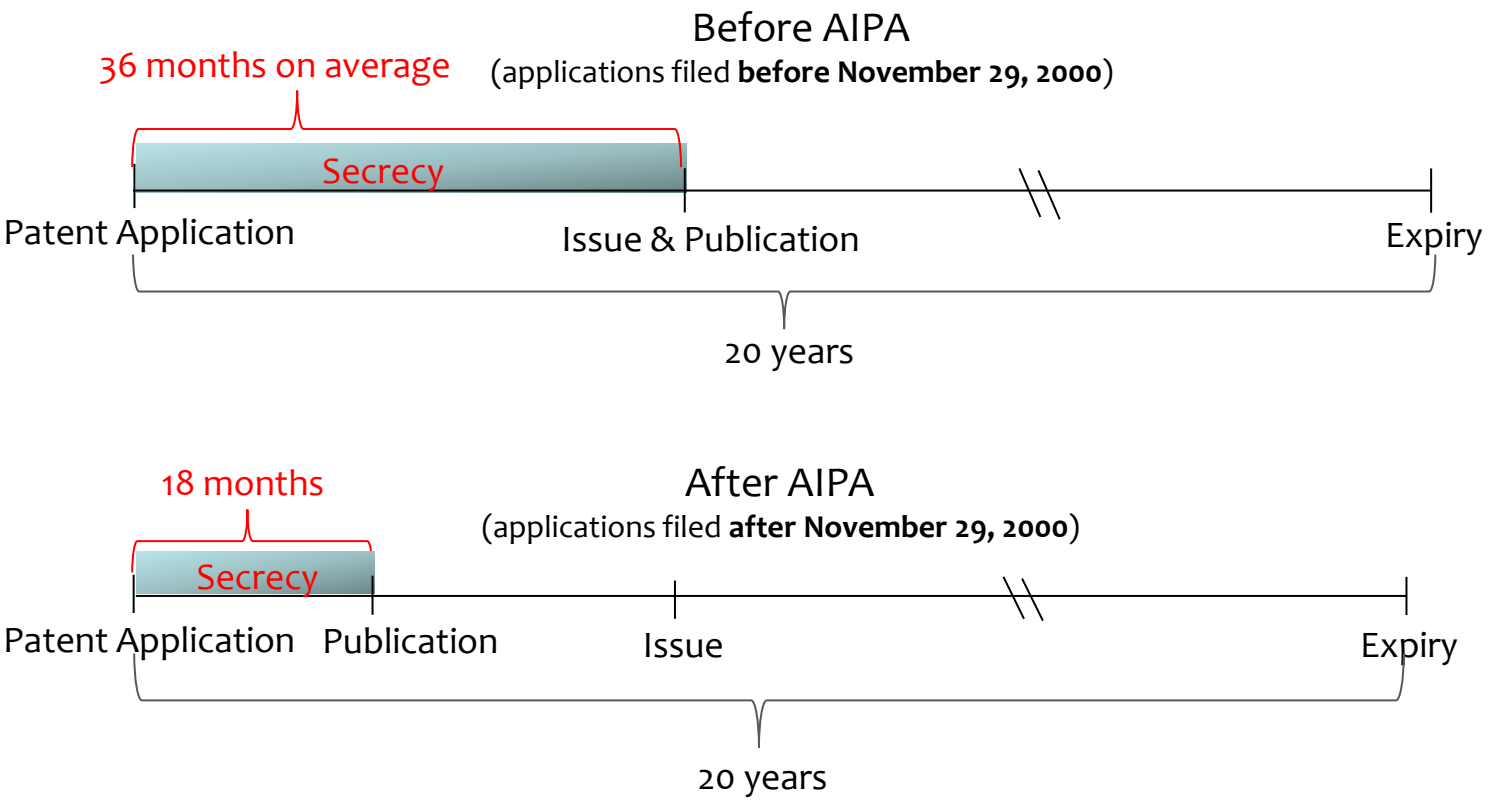
# 25 Nobel Signatories

- Roald Hoffman (1981 Chemistry) Cornell
- Dudley Herschbach (1986 Chemistry) Harvard
- Herbert Hauptman (1985 Chemistry) Hauptman-Woodward Medical Research Institute
- Mario Molina (1995 Chemistry) MIT
- Herbert C. Brown (1979 Chemistry) Purdue
- Richard Smalley (1996 Chemistry) Rice
- Robert F. Curl (1996 Chemistry) Rice
- Sidney Altman (1989 Chemistry) Yale
- Herbert A. Simon (1978 Economics) Carnegie-Mellon
- Paul Samuelson (1970 Economics) MIT
- Franco Modigliani (1985 Economics) MIT
- Robert Solow (1987 Economics) MIT
- William Sharpe (1990 Economics) Stanford
- Merton Miller (1990 Economics) U. of Chicago
- John C. Harsanyi (1994 Economics) UC Berkeley
- Milton Friedman (1976 Economics) University of Chicago
- Douglass North (1993 Economics) Washington University
- James Tobin (1981 Economics) Yale
- Daniel Nathans (1978 Medicine) Johns Hopkins
- Har Gobind Khoran (1968 Medicine) MIT
- Gertrude Elion (1988 Medicine) Wellcome Research Laboratories
- David M. Lee (1996 Physics) Cornell
- Henry Kendall (1990 Physics) MIT
- Jerome Friedman (1990 Physics) MIT
- Clifford Shull (1994 Physics) MIT

## *Loophole:* AIPA allows inventors to opt out of 18-month publication by agreeing to forego foreign patent protection

- AIPA allows US applicants *who agree not to pursue equivalent foreign protection* to publish their application after grant
  - Applicants indicate whether they want to “opt out” on filing
  - Applicants can change their decision within 18 months of filing by submitting a petition to the USPTO

# The American Inventors Protection Act (AIPA) required 18-month publication of US patent applications



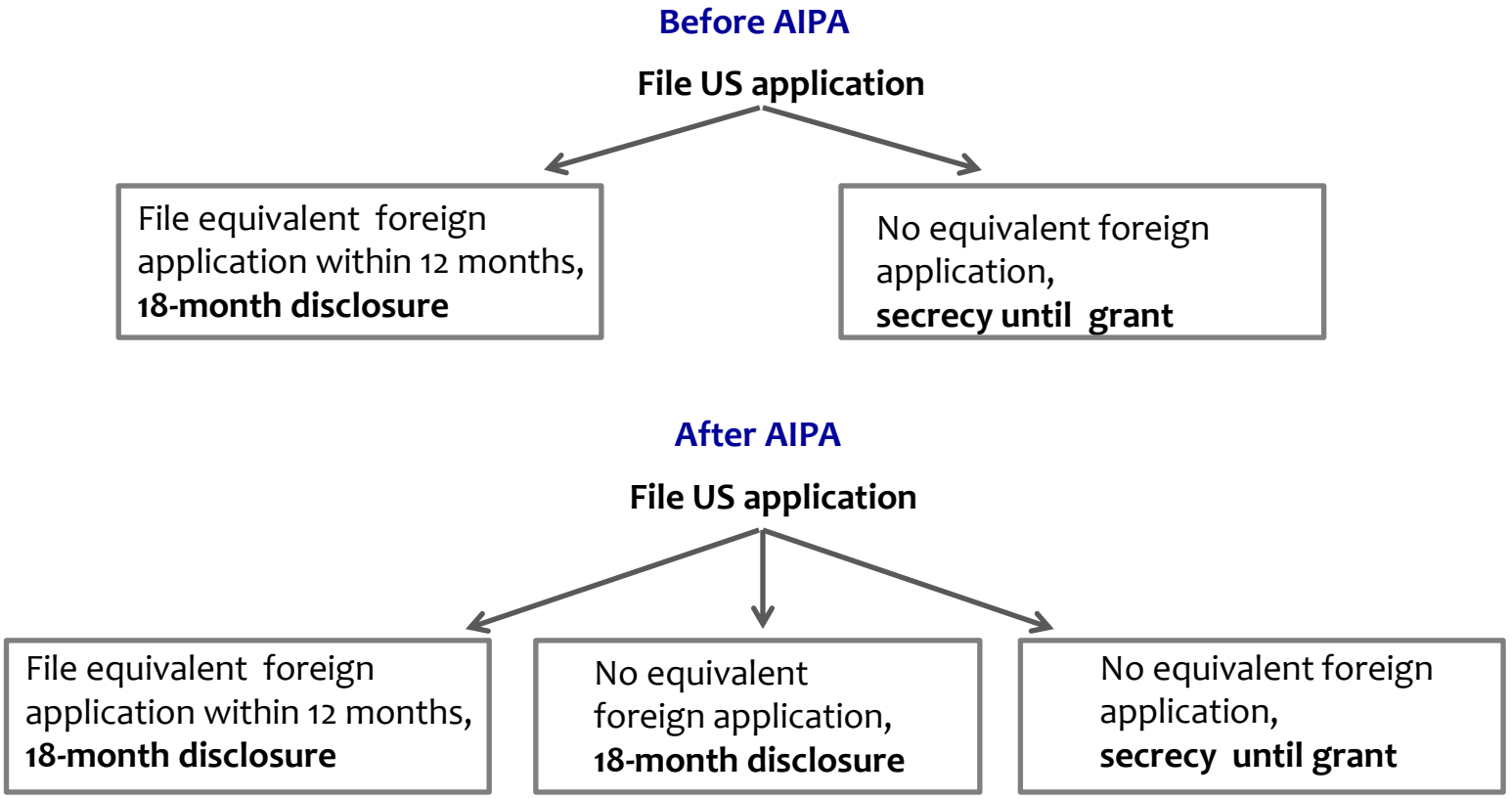

112 countries have required 18 month disclosure before AIPA (at least since 1970)
With AIPA, U.S. harmonized its publication rules with the rest of the world

# Research Questions

What can we discover about the “revealed preferences” for pre-grant secrecy among inventors when they patent?

- Do inventors show a preference for (i.e., value) secrecy?
- Do inventors value secrecy more (or less) in some technologies?
- Do “small” inventors value secrecy more?
- Do “small” inventors value secrecy more for their most valuable inventions?

# We analyze US applicants' disclosure choices after AIPA



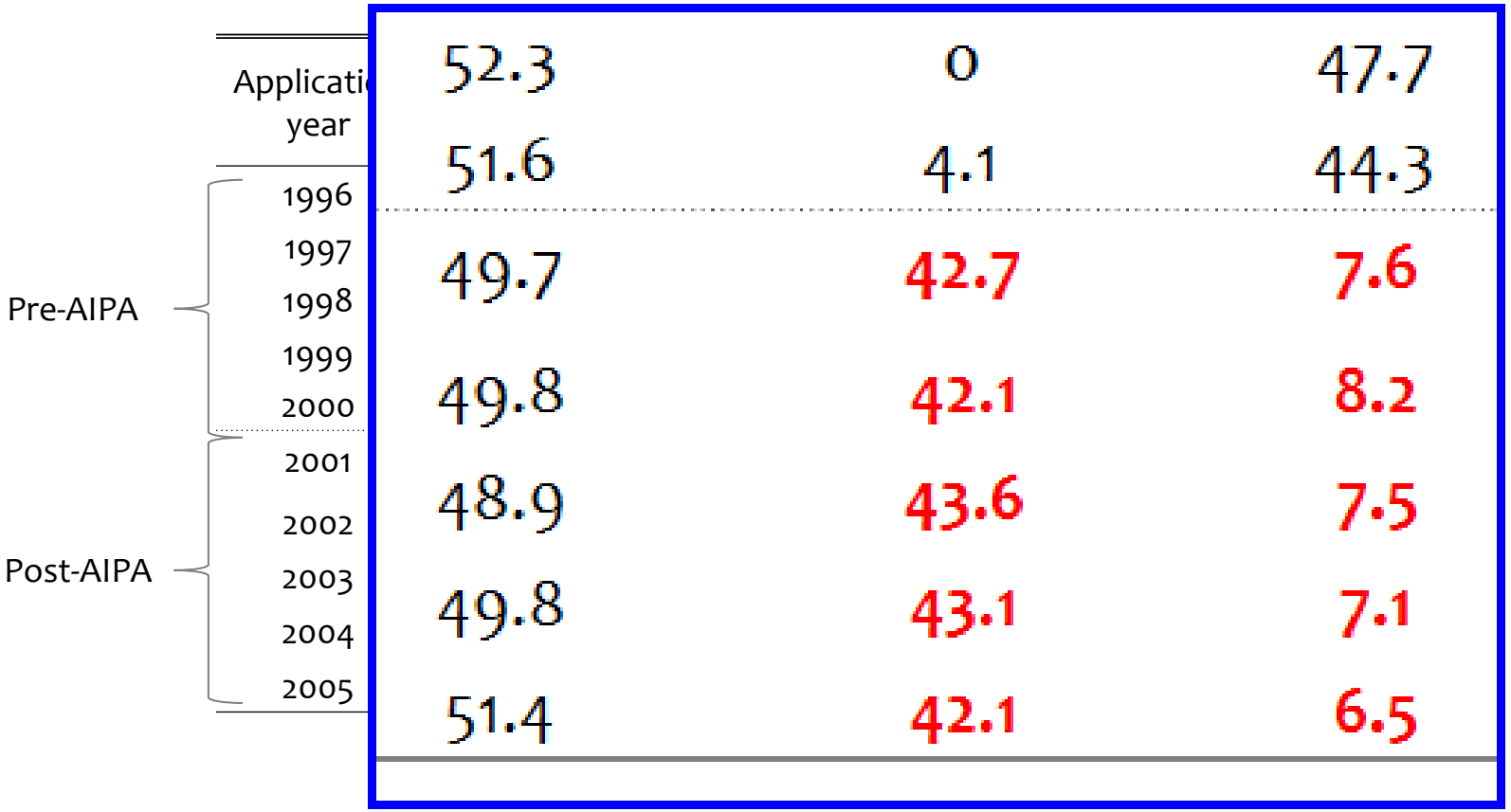
# Data

- All US-granted patents filed between 1996-2005 and granted to June 30, 2012 (N = 1.81 million)
  - Spans the AIPA effective date, with (in some cases) sufficient time for latent information to develop
  - Additional characteristics
    - Foreign priority / foreign equivalents (PATSTAT)
    - Technology class information
    - Identity type (from USPTO organization type indicator)
      - “small inventor” = US small entity (<500 emp) or individual
    - Grant lags (pendency)
    - No. of claims
    - Payment of maintenance fees (latent)
    - Forward citations (citations received, latent), including examiner-added cites

# Finding: Inventors overwhelmingly choose disclosure over pre-grant secrecy

| | Application year | N of US applications | % pursuing foreign protection | % opting disclosure | % opting secrecy |
|---|---|---|---|---|---|
| Pre-AIPA | 1996 | 144,796 | 52.0 | 0 | 48.0 |
| | 1997 | 169,233 | 50.1 | 0 | 49.9 |
| | 1998 | 167,695 | 52.3 | 0 | 47.7 |
| | 1999 | 178,424 | 52.3 | 0 | 47.7 |
| | 2000 | 190,877 | 51.6 | 4.1 | 44.3 |
| Post-AIPA | 2001 | 197,793 | 49.7 | **42.7** | **7.6** |
| | 2002 | 197,778 | 49.8 | **42.1** | **8.2** |
| | 2003 | 191,274 | 48.9 | **43.6** | **7.5** |
| | 2004 | 188,581 | 49.8 | **43.1** | **7.1** |
| | 2005 | 183,481 | 51.4 | **42.1** | **6.5** |

# Finding: Inventors overwhelmingly choose disclosure over pre-grant secrecy



| Application year | | | |
|---|---|---|---|
| | 52.3 | 0 | 47.7 |
| | 51.6 | 4.1 | 44.3 |
| Pre-AIPA 1996 | 49.7 | 42.7 | 7.6 |
| 1997 | | | |
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| 1999 | 49.8 | 42.1 | 8.2 |
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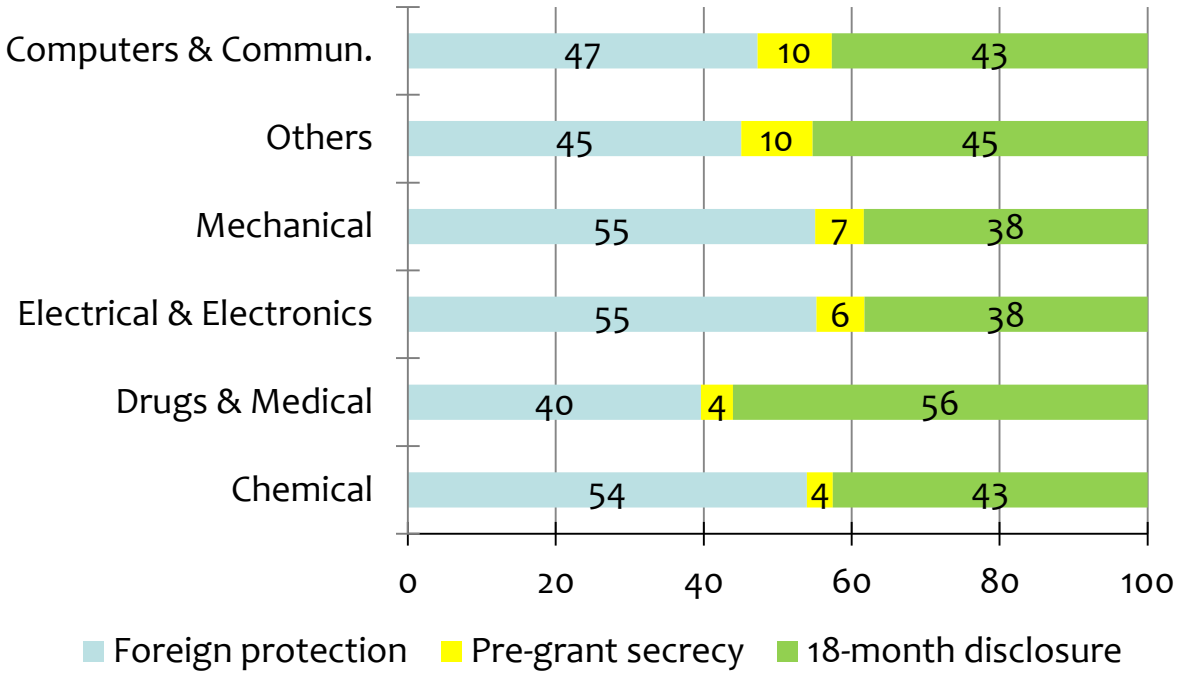
| 2004 | | | |
| 2005 | 51.4 | 42.1 | 6.5 |

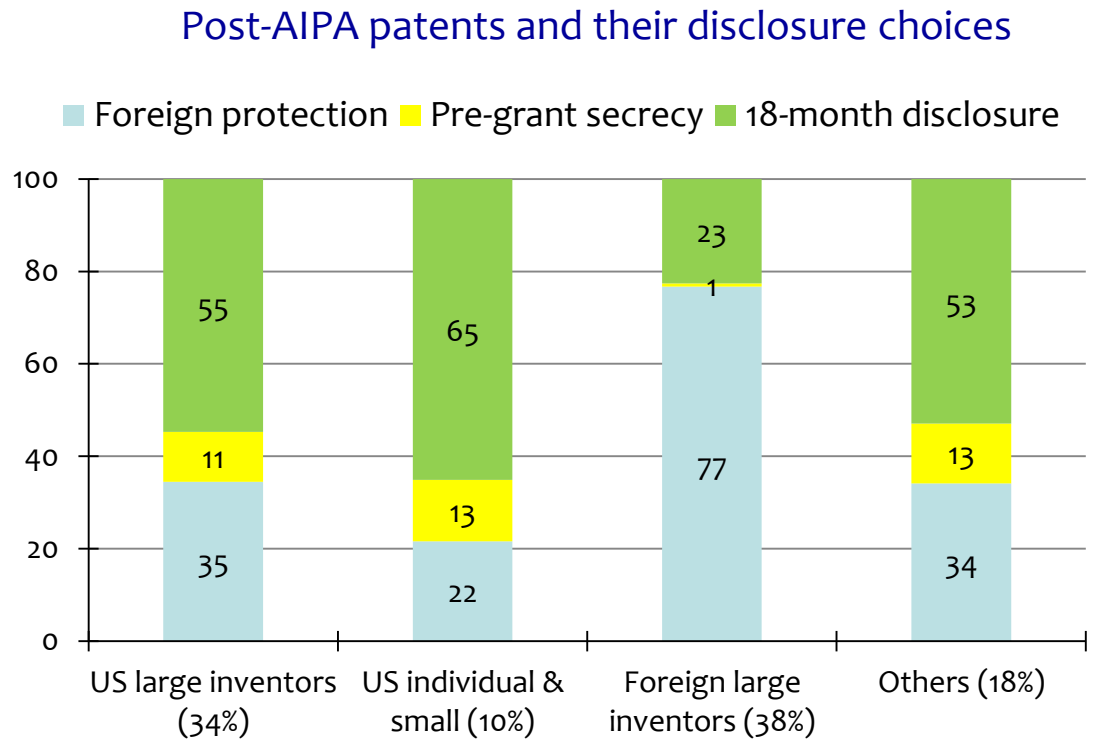
# Finding: Inventors prefer 18-month disclosure over secrecy in all technology fields

Post-AIPA patents and their disclosure choices




The use of pre-grant secrecy is higher in technologies associated with "strategic patenting" (*i.e.*, patenting for fencing, litigation, and submarine patenting)

# Finding: All types of inventors prefer 18-month disclosure over secrecy




NOTE: US small firms are those that officially qualified for "small entity" status (< 500 employees)

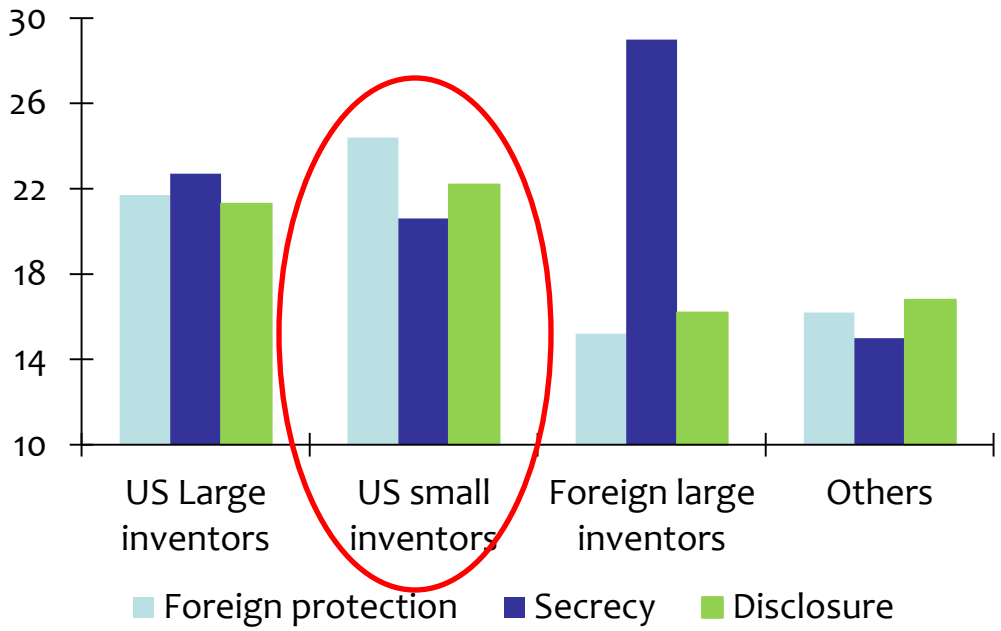
Conditional on not pursuing foreign protection, US individual inventors and small firms are not more likely than their larger counterparts to prefer secrecy

# Disclosure choice and "importance"

- We use four indicators to investigate "importance" or "value"
  - No. of claims – scope, importance (Lerner, 1994; Lanjouw and Schankerman, 2001)
  - Maintenance fee payments (Pakes, 1986)
    - In US, inventors must maintain their patents in force at 3.5, 7.5 and 11.5 years by paying $1100, $3000 and $5000
  - Forward citations (Trajtenberg, 1990)
    - Applicant added versus examiner added (Sampat, 2005; Alcacer and Gittleman, 2006)
  - Pendency lag (driven by negotiations, continuing processes)

# Do small inventors value secrecy more for their important inventions?

Post-AIPA patents and number of claims




For US small inventors, patents emerging from pre-grant secrecy have the *lowest* number of claims, on average

# Do small inventors value secrecy more for their important inventions?

## Post-AIPA patents and patent renewal rates

Inventors have to maintain their patents in force at 3.5, 7.5 and 11.5 years by paying $1100, $3000 and $5000

| | Foreign protection | Secrecy | Disclosure |
|---|---|---|---|
| *3.5-year renewal rate* | | | |
| **US small inventors** | **90.6%** | **84.8%** | **85.9%** |
| US Large inventors | 91.8% | 95.7% | 89.9% |
| Foreign large inventors | 87.4% | 95.3% | 89.4% |
| Others | 81.5% | 69.6% | 77.6% |
| *7.5-year renewal rate* | | | |
| **US small inventors** | **72.4%** | **61.4%** | **65.1%** |
| US Large inventors | 77.7% | 86.0% | 75.5% |
| Foreign large inventors | 68.4% | 85.7% | 72.7% |
| Others | 55.0% | 35.2% | 47.0% |

Application dates from 11.29.2000 granted by end 2007

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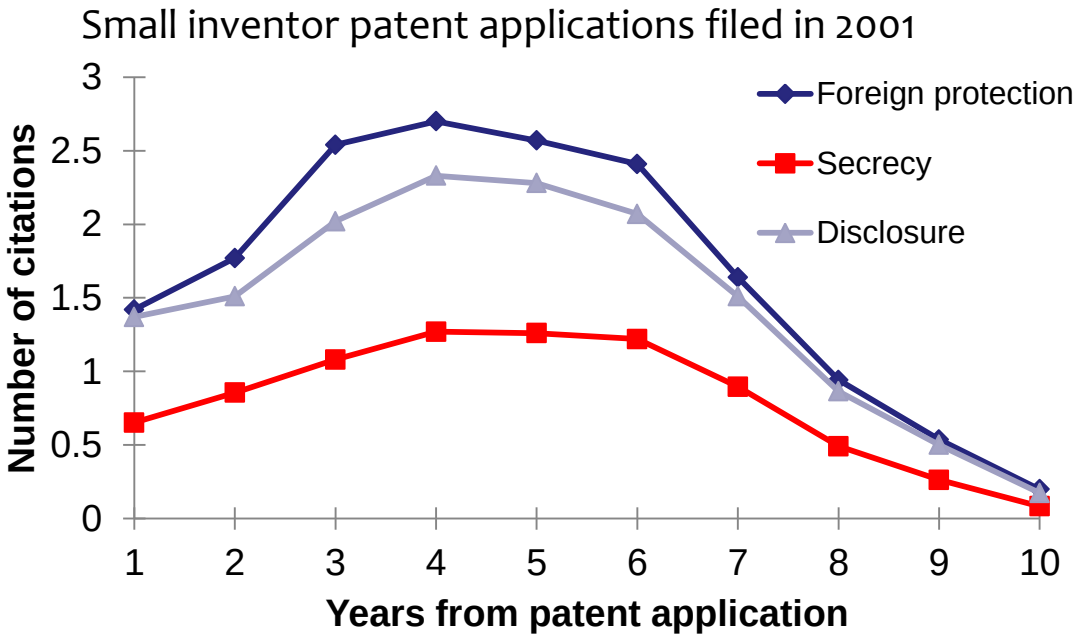
# Do small inventors value secrecy more for their important inventions?

US small inventors' post-AIPA patents and patent forward citations

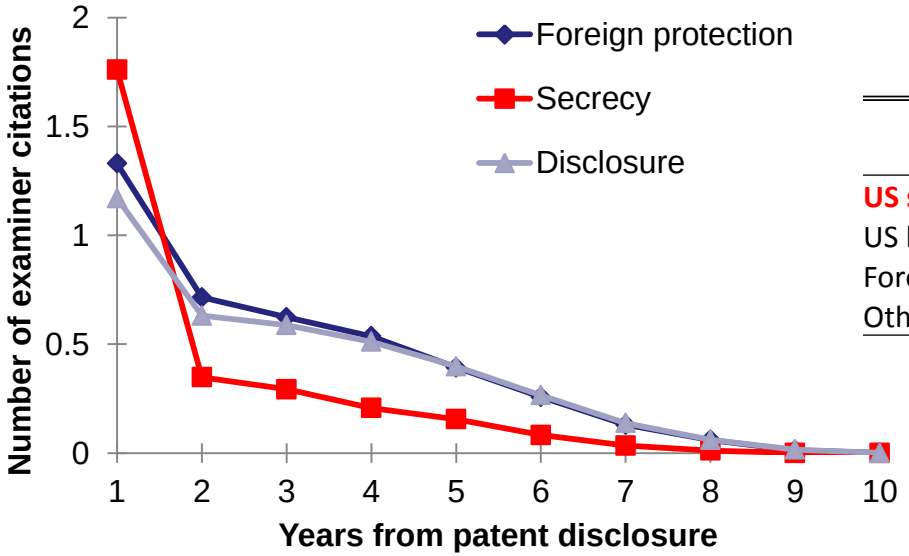



For US small inventors, patents associated with pre-grant secrecy have, on average, the *least* citations

# Do small inventors value secrecy more for their important inventions?

## US small inventors' post-AIPA patents and patent forward citations

- Patents disclosed early may have higher visibility and thus attract more citations
- Compare citations from disclosure date; use only examiner-inserted citations

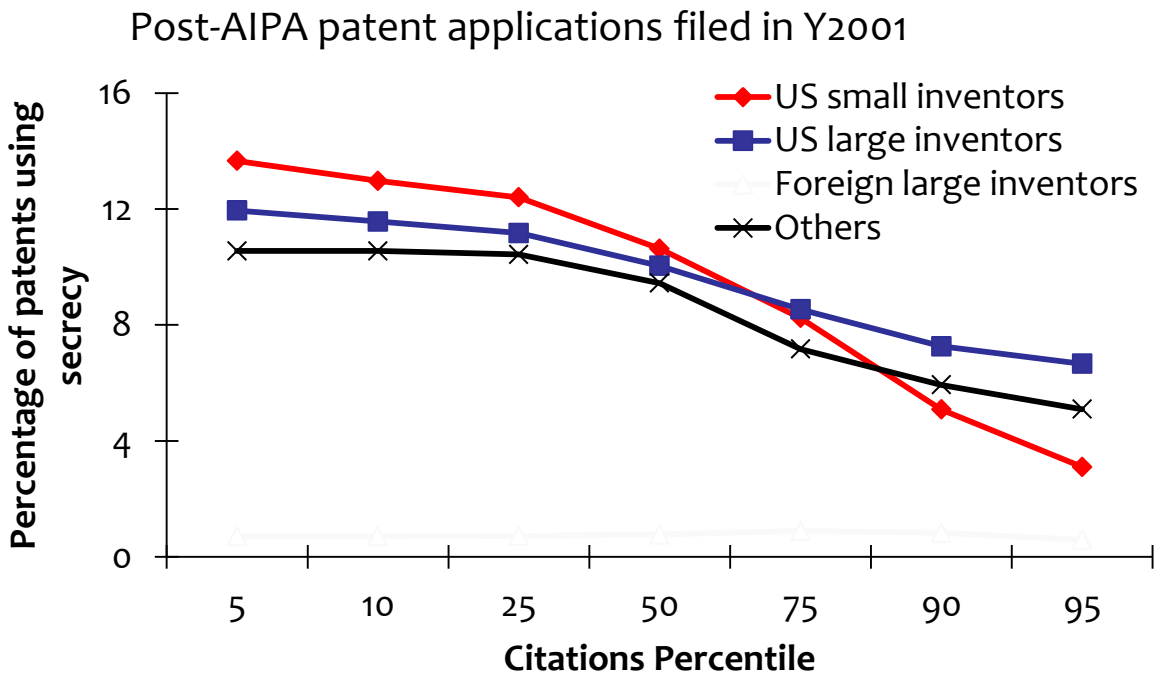



| | Foreign protection | Secrecy | Disclosure |
|---|---|---|---|
| **US small inventors** | **4.1** | **2.9** | **3.8** |
| US large inventors | 3.8 | 3.3 | 3.7 |
| Foreign large inv. | 3.1 | 3.7 | 3.0 |
| Others | 2.3 | 2.0 | 2.7 |

For US small inventors, patents associated with pre-grant secrecy have, on average, the *least number* of examiner-inserted citations

# Do small inventors value secrecy more for their important inventions?

## Post-AIPA patents, secrecy, and citations distribution




For US small inventors, probability of using secrecy *decreases* towards the right-tail of the citations distribution (*only one of the top-200 cited 2001 patents used secrecy*!)

# Do small inventors value secrecy more for their important inventions?

Post-AIPA patents, secrecy, and pendency lag

| Priority-Grant lag | Foreign protection | Pre-grant secrecy | 18-month disclosure |
|---|---|---|---|
| **US small inventors** | **45.8** | **42.1** | **46** |
| US Large inventors | 43.2 | 47.2 | 46.2 |
| Foreign large inventors | 37.1 | 46.9 | 48.3 |
| Others | 37 | 32.8 | 40 |

For small inventors, patents issuing from secrecy take the *shortest* time to issue

# Small inventor's most important inventions are more likely to opt for disclosure *(controlling for technology field effects)*

| DV = Disclosure Choice | Foreign Protection | 18-month disclosure | Foreign Protection | 18-month disclosure | Foreign Protection | 18-month disclosure | Foreign Protection | 18-month disclosure |
|---|---|---|---|---|---|---|---|---|
| **US Small X Ln Claims** | **0.37**** | **0.20**** | | | | | | |
| Ln Claims | -0.10** | -0.14** | | | | | | |
| **US Small X 4-Yr Renewal** | | | **0.62**** | **0.22**** | | | | |
| 4-Yr Renewal | | | -0.01 | -0.09** | | | | |
| **US Small X Ln Cites** | | | | | **0.24**** | **0.10**** | | |
| Ln Cites | | | | | 0.26** | 0.29** | | |
| **US Small X Ln Examiner Cites** | | | | | | | **0.19**** | **0.14**** |
| Ln Examiner Cites | | | | | | | 0.29** | 0.27** |
| US Small | -1.78** | -0.69** | -1.25** | -0.32** | -1.18** | -0.30** | -0.91** | -0.28** |
| Foreign Large | 3.60** | 1.91** | 3.67** | 1.98** | 3.72** | 2.06** | 3.67** | 2.00** |
| Other Inventors | -0.11** | -0.10** | -0.09** | -0.09** | -0.01 | 0.03 | -0.04+ | -0.02 |
| Technology field effects | Y | Y | Y | Y | Y | Y | Y | Y |
| Constant | 1.55 | 2.02 | 1.26 | 1.7 | 0.84 | 1.14 | 0.97 | 1.36 |
| Model chi-square | 45798.96 | | 44119.06 | | 47049.45 | | 46378.2 | |
| Log-likelihood | -156328.1 | | -150184.67 | | -155702.85 | | -156038.47 | |
| Observations | 197,793 | | 190,986 | | 197,793 | | 197,793 | |

MNML choice models estimated through MLE; Base class is pre-grant secrecy; ** p<0.01, * p<0.05, + p<0.1.

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MNML choice models estimated through MLE; Base class is pre-grant secrecy; ** p<0.01, * p<0.05, + p<0.1.

# Inventors, particularly small ones, prefer 18-month disclosure over pre-grant secrecy

- A small fraction of inventions (<8%) opt for secrecy after AIPA, even when applicants are not pursuing foreign protection
  - Use of secrecy is more common in complex product industries (Computers, Communication, Electronics)
- Small inventors prefer disclosure for their important inventions
  - Evidence from patent claims, citations, renewal rates, pendency lags
  - Preference for disclosure particularly strong at the top-end of the quality distribution
- Recent legislative proposals (*e.g.*, H.R. 5980) seek to limit or dilute pre-grant disclosure to patent abstracts

Thank you!

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