Economics: Measurement and Evaluation in IP Policy Making

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China IP Data Workshop
USD – USPTO
19 May 2015

Economics at the USPTO

- Economics (and econometrics)
  - A discipline with generally-accepted (peer review) methods based on measurement and evaluation
- How does economic research play a role
  - An input into evidence-based policymaking
  - Gaining, and contributing to, knowledge about the workings of the IP system, and the role that the USPTO plays and may play in that system
  - Requires actively building an infrastructure to do and support economics and statistical research

How PTO economists contribute

- Support evidence-based policymaking
  - Bringing capabilities into the government to analyze ongoing and planned efforts
- Support research on important economic questions
  - Internally
  - Externally, by partnering with foundations, research organizations, and scholars
- Communicating economic thinking about IP
  - Internally, at the USPTO (managers, and examiners)
  - Externally, to important stakeholders
- Rationalizing data
  - Making internal data usable for research
  - Facilitate data migration to external researchers, and public
  - Supporting data matching efforts, to other microdata sources

Exemplary research

- Understanding technological change
- Evaluating IP Policy
  - Effects in the larger innovation economy
  - Organizationally, at the USPTO
- Data transparency
  - Focused on patents
  - Focused on trademarks
  - Focused on matching to microdata

Measuring technology change

ANNALS OF ECONOMICS AND STATISTICS
NUMBER 115/116, DECEMBER 2014

Nanotechnology and the Emergence of a General Purpose Technology

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OFCE, Sciences-Po, and SKEMA Business School

This article examines how closely nanotechnology resembles a general purpose technology (GPT). Using patented nanotechnology inventions during 1975-2006, we test for characteristics of GPTs identified in the prior literature, and find evidence that nanotechnology shows both "pervasive" adoption and "spawning" of follow-on innovation. Offering a methodological contribution, we employ concentration indexes such as the Gini index and Lorenz curve to construct "knowledge dissemination curves" for different technologies, thereby providing evidence that nanotechnology shares relevant characteristics with other GPTs. Using an entirely new dataset, we use three different definitions of a "nanotechnology patent" and calculate patent generality indexes, finding that nanotechnology patents are significantly more likely to be referenced across

Evaluating External IP Policy

RAND Journal of Economics
Vol. 44, No. 2, Summer 2013
pp. 275–312

Trading and enforcing patent rights

Alberto Galasso* Mark Schankerman** Carlos J. Serrano***

We study how the market for innovation affects enforcement of patent rights. We show that patent transactions arising from comparative advantages in commercialization increase litigation, but trades driven by advantages in patent enforcement reduce it. Using data on trade and litigation of individually owned patents in the United States, we exploit variation in capital gains tax rates across states as an instrument to identify the causal effect of trade on litigation. We find that taxes strongly affect patent transactions, and that trade reduces litigation on average, but the impact is heterogeneous. Patents with larger potential gains from trade are more likely to change ownership, and the impact depends critically on transaction characteristics.

Evaluating External IP Policy

- GSS (2013) Research questions:
  - How does the trading of patents affect enforcement (litigation)?
    - Are there differences when trades are driven by commercialization or enforcement (royalties)?
  - Do tax rates matter in the markets for patents?
- Data
  - Basic (bibliographic) US patent data
  - Comprehensive data on US patent litigation
  - Data on patent trades (transactions)
    - Plus *identities*

Evaluating External IP Policy

- GSS (2013) Findings:

  (1) Trading tends to reduce litigation, overall

  - When buyers are commercializers, litigation increases
  - When buyers are enforcers, litigation decreases

  – *Implication:* Allowing for specialization, division of labor, may be an improved (efficient) outcome

  (2) Tax rates strongly affect the trade in patents.

Evaluating External IP Policy (2)

INTELLECTUAL PROPERTY

Disclosing patents' secrets

Inventors prefer to disclose know-how before patent grant

By **Stuart Graham**[1] *and* **Deepak Hegde**[2]*

The patent system is built on a grand bargain: To gain exclusive rights to practice their inventions, inventors must disclose their proprietary knowledge publicly. Economists have studied incentive benefits of exclusivity while implicitly assuming that disclosure of know-how in patent applications is costly for inventors. Yet, apart from facilitating diffusion of knowledge, disclosing know-how in a patent

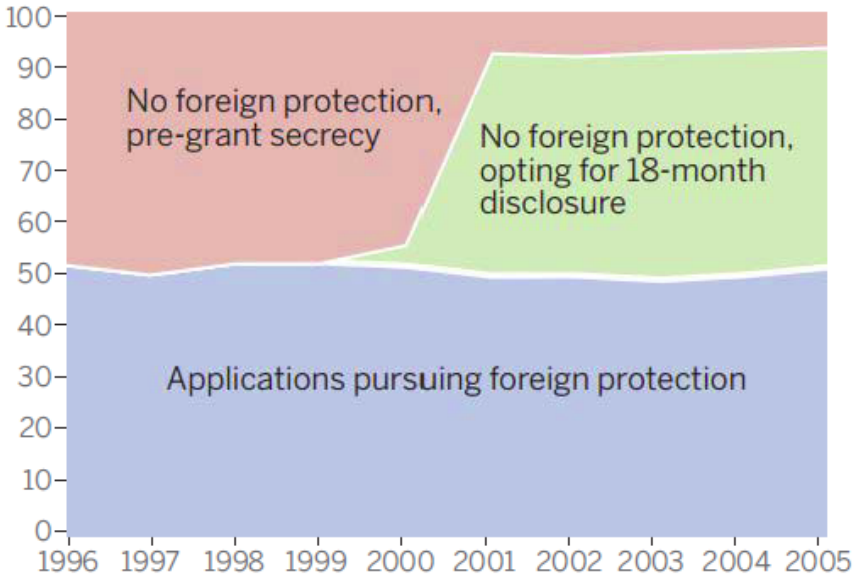
POLICY

value. We investigate these "revealed preferences" using data on all 1.81 million applications filed with the U.S. Patent & Trademark Office (USPTO) in 1996–2005 and granted by mid-2012. Our focus on preferences, conditioned on the decision to patent, cannot measure benefits or costs of secrecy in general. Our findings are relevant to recent legislative proposals seeking to restrict pregrant publication (*5*) and to recommendations to eliminate the secrecy loophole altogether (*6*, *7*). Disclosure provisions are a sticking point in international patent-system harmonization;

Evaluating External IP Policy (2)

U.S. patents and their disclosure status

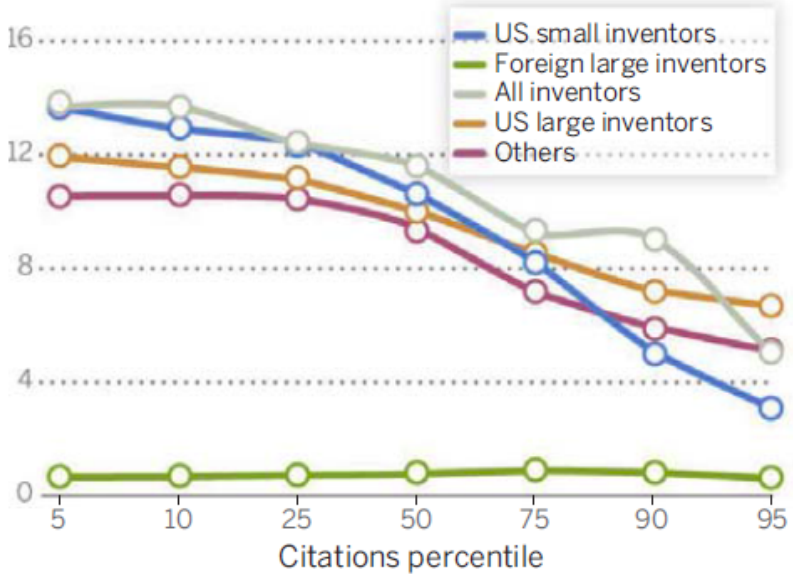
USPTO patent applications (share, %)



Disclosure status of all 1,809,932 patent applications filed at the USPTO between 1996 and 2005 for which patents were granted through mid-2012. Applicants shifted toward disclosing know-how after AIPA became effective 29 November 2000.

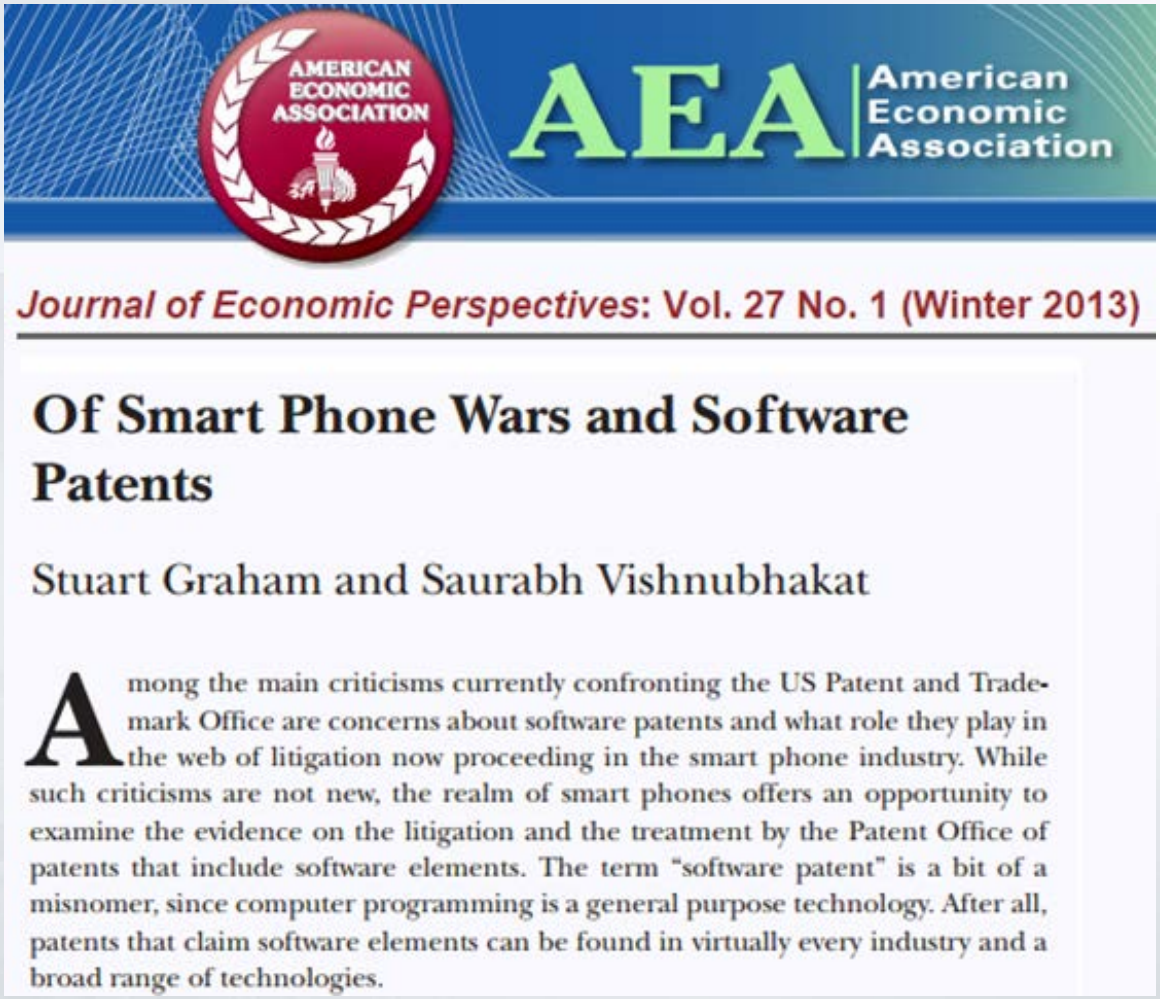
Disclosure choices by citation's percentile, across patentee types

Patents granted after pre-grant secrecy (share, %)



Share of patents filed in 2001 opting for pregrant secrecy. Scaled by citation percentiles for the different patent applicants in our data set. Higher percentiles indicate patents receiving higher numbers of citations. Larger invention impact is inversely correlated with opting for pregrant secrecy.

Evaluating Internal PTO Policy



AEA American Economic Association

Journal of Economic Perspectives: Vol. 27 No. 1 (Winter 2013)

Of Smart Phone Wars and Software Patents

Stuart Graham and Saurabh Vishnubhakat

Among the main criticisms currently confronting the US Patent and Trademark Office are concerns about software patents and what role they play in the web of litigation now proceeding in the smart phone industry. While such criticisms are not new, the realm of smart phones offers an opportunity to examine the evidence on the litigation and the treatment by the Patent Office of patents that include software elements. The term "software patent" is a bit of a misnomer, since computer programming is a general purpose technology. After all, patents that claim software elements can be found in virtually every industry and a broad range of technologies.

Research questions

- How much of the ongoing “smart phone” patent litigation is driven by software patents?
  - And, are “low quality” patents at the heart of these controversies?
- How does USPTO treatment and outcomes on software patent applications compare to those in other technology areas?
  - What can we say empirically about how software patents compare with all other patents?

Descriptive approach

- US smart phone patent litigation, 2011-2012
  - 13 litigation events among large firms
    - *Motorola, Microsoft, Apple, Samsung*
  - 133 patents asserted in litigation, filtered down to 73
    - 65 of these contained at least one “software” claim (48.8%)
  - 21 of 65 with sufficient process to test validity
    - 17 of 21 found by courts valid, or likely valid (80.8%)
  - In sum, little evidence that this litigation was driven by low-quality software patents

Descriptive approach

- USPTO "software" patents; definitional issues

[7] The class-subclass pairs are as follows. Class 29: Subclasses 026000-065000, 560000-566400, 650000-650000; Class 73: Subclasses 455000-487000, 570000-669000; Class 84: Subclasses 600000-746000; Class 235; Class 236; Class 244: Subclasses 003100-003300, 014000; Class 250; Class 257; Class 307; Class 315; Class 318: Subclasses 700000-832000; Class 320; Class 323; Class 324; Class 326; Class 327; Class 330; Class 331; Class 340: Subclasses 850000-870440; Class 340: Subclasses 002100-010600, 825000-825980; Class 340: Subclasses 286010-693900, 901000-999000; Class 340: Subclasses 815400-815730, 815740-815920; Class 341: Subclasses 020000-035000, 173000-192000; Class 341: Subclasses 001000-017000, 050000-172000, 200000-899000; Class 342: Subclasses 001000-465000; Class 343; Class 345: Subclasses 001100-215000, 418000-428000, 440000-472300, 473000-475000, 501000-517000, 518000-689000, 690000-698000, 699000; Class 348; Class 353; Class 355; Class 356: Subclasses 002000-003000, 004090-004100, 006000-027000, 030000-139000, 140000, 142000-151000, 153000-900000; Class 358: Subclasses 001100-003320, 260000-517000, 518000-540000; Class 359: Subclasses 326000-332000; Class 361: Subclasses 001000-270000, 437000; Class 363; Class 365; Class 367: Subclasses 001000-008000, 009000, 010000-013000, 014000-080000, 081000-085000, 086000, 087000-092000, 093000-094000, 095000-191000, 197000-199000, 900000-910000, 911000-912000; Class 368; Class 369: Subclasses 001000-032000, 043000-054000, 058000-062000, 064000, 069000-070000, 083000-095000, 097000, 100000-126000, 128000-152000, 174000-175000, 275100-276000, 300000; Class 370; Class 374; Class 375; Class 378: Subclasses 004000-020000, 210000-901000; Class 379: Subclasses 067100-088280, 188000-337000; Class 380; Class 381; Class 382; Class 385; Class 386; Class 396: Subclasses 028000, 048000-304000, 310000-321000, 373000-386000, 406000-410000, 421000, 449000-501000, 505000-510000, 529000-533000, 563000; Class 398; Class 438: Subclasses 009000, 689000-698000, 704000-757000; Class 455; Class 463: Subclasses 001000-047000, 048000-069000; Class 473: Subclasses 065000, 070000, 136000, 140000-141000, 151000-156000, 407000; Class 482: Subclasses 001000-009000, 051000-053000, 057000-065000, 069000-070000, 112000-113000; Class 600: Subclasses 001000-015000, 019000-041000, 300000-406000, 407000-480000, 481000-507000, 529000-595000, 920000-921000; Class 606: Subclasses 001000-052000, 163000-164000; Class 623: Subclasses 024000-026000; Class 700; Class 701; Class 702; Class 703: Subclasses 001000-010000, 011000-012000, 013000-999000; Class 704; Class 705; Class 706; Class 707; Class 708; Class 709; Class 710; Class 711; Class 712; Class 713; Class 714: Subclasses 001000-100000, 699000-824000; Class 715; Class 716; Class 717; Class 718; Class 719; Class 725; Class 726; Class 901; Class 902.

Descriptive approach

USPTO “software” patents

– Comparisons of outcomes: “software” vs. non-software applications, by examiners’ treatment

1. *First final action rejections (examiner action)*
2. *First action allowances (examiner action)*
3. *Quality review process (internal to USPTO)*
4. *Administrative appeals (applicant appeals from rejection)*
5. *Court appeals (applicant appeals from rejection)*

Figure 1

Share of US Patent Office First Final Actions that Were Rejections, FY 2003–FY 2012

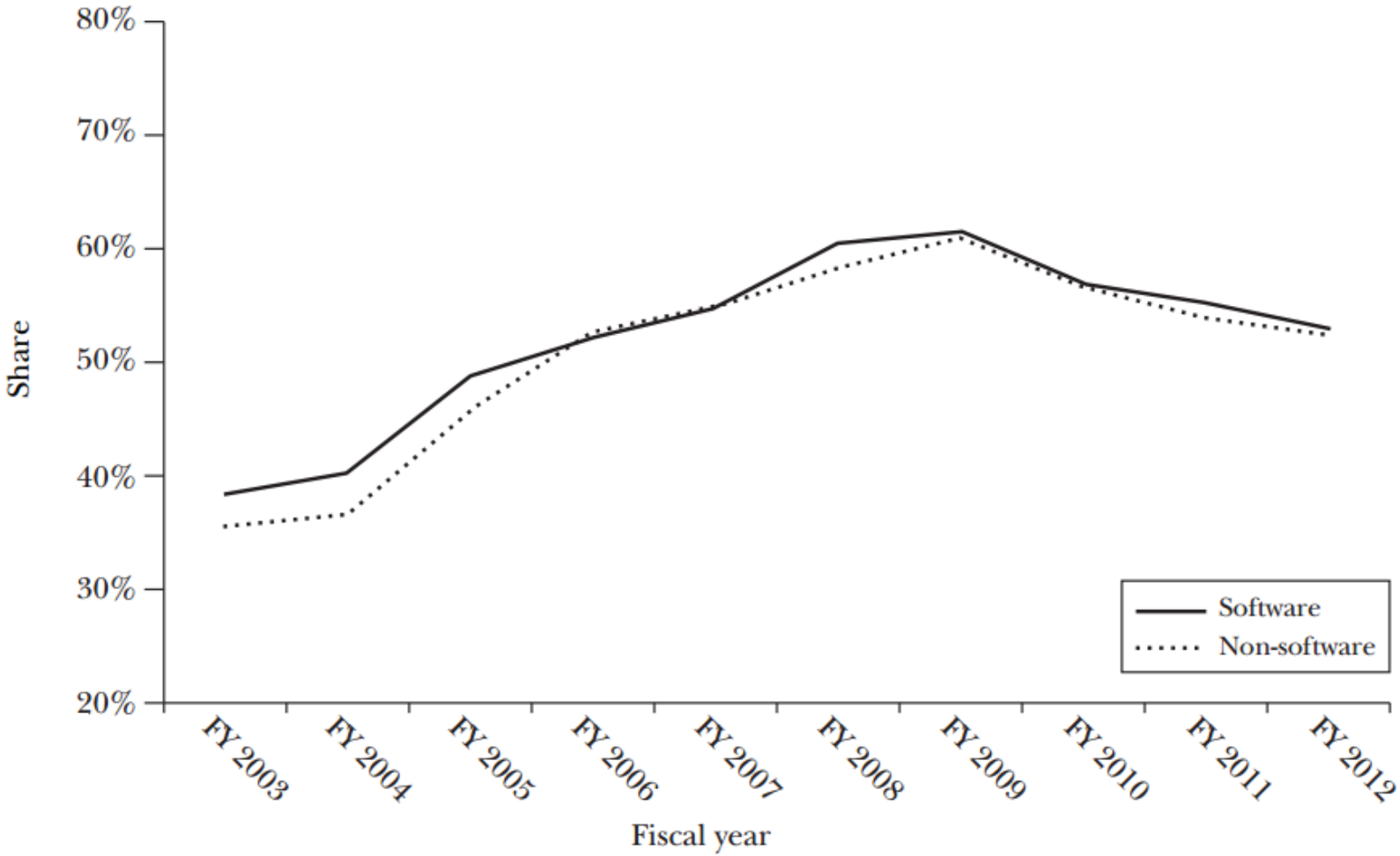
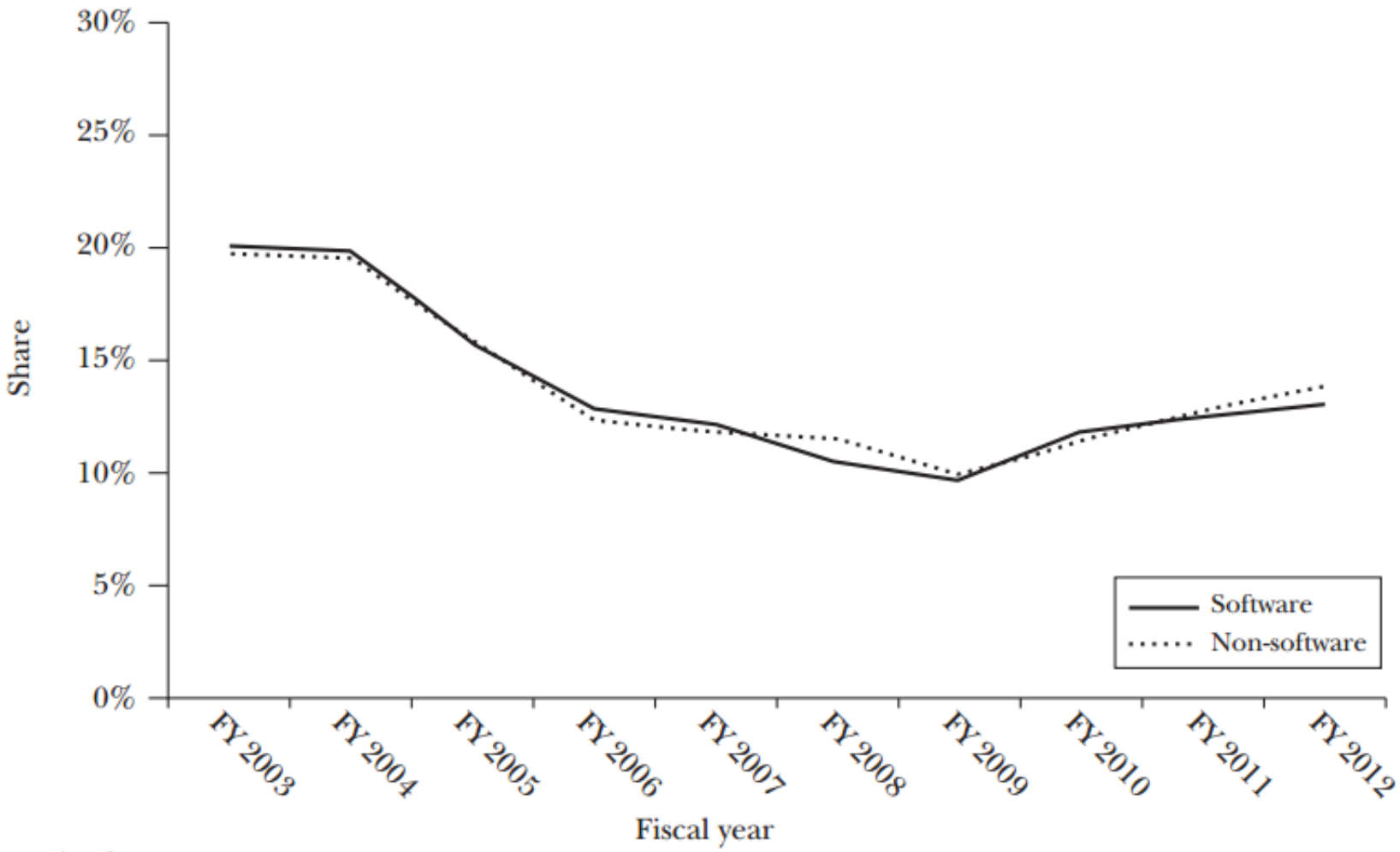


Figure 2

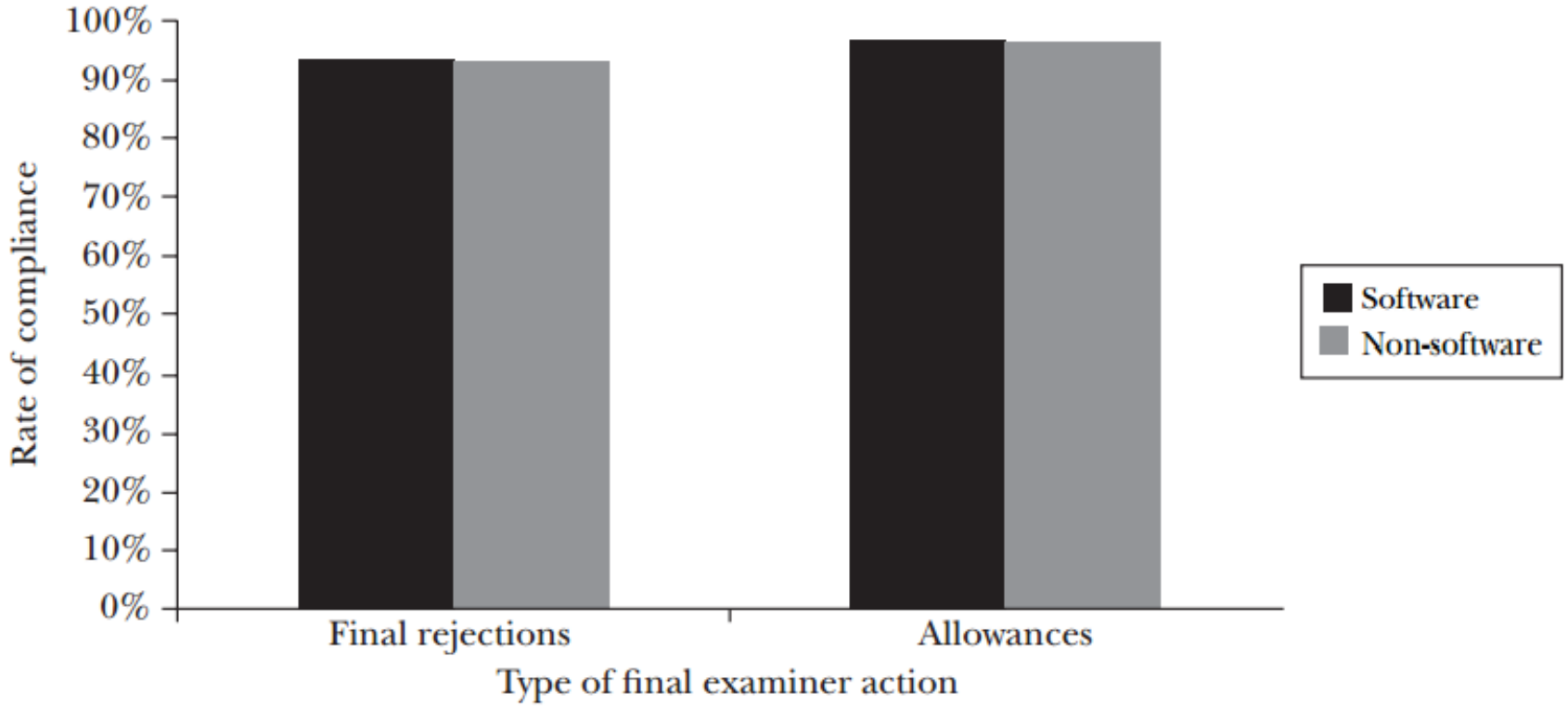
Share of US Patent Office First Actions that Were Allowances, FY 2003–FY 2012



Source: Authors.

Figure 3

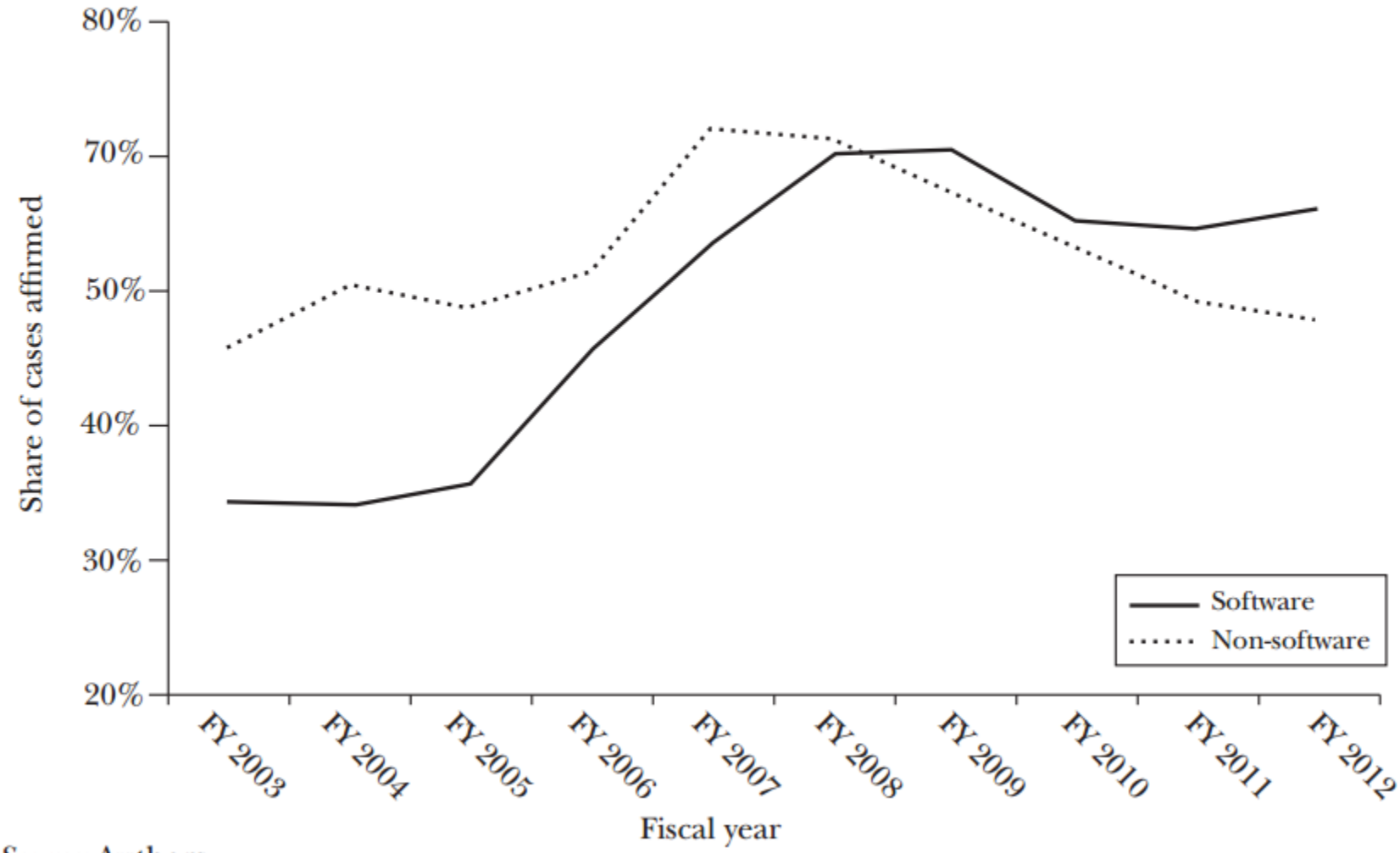
Findings from USPTO Quality Assurance Review: Final Actions on Software and Non-software Applications, Rate of Compliance with Applicable Laws and Regulations Governing Patent Examination, FY 2007–FY2012



Source: Authors.

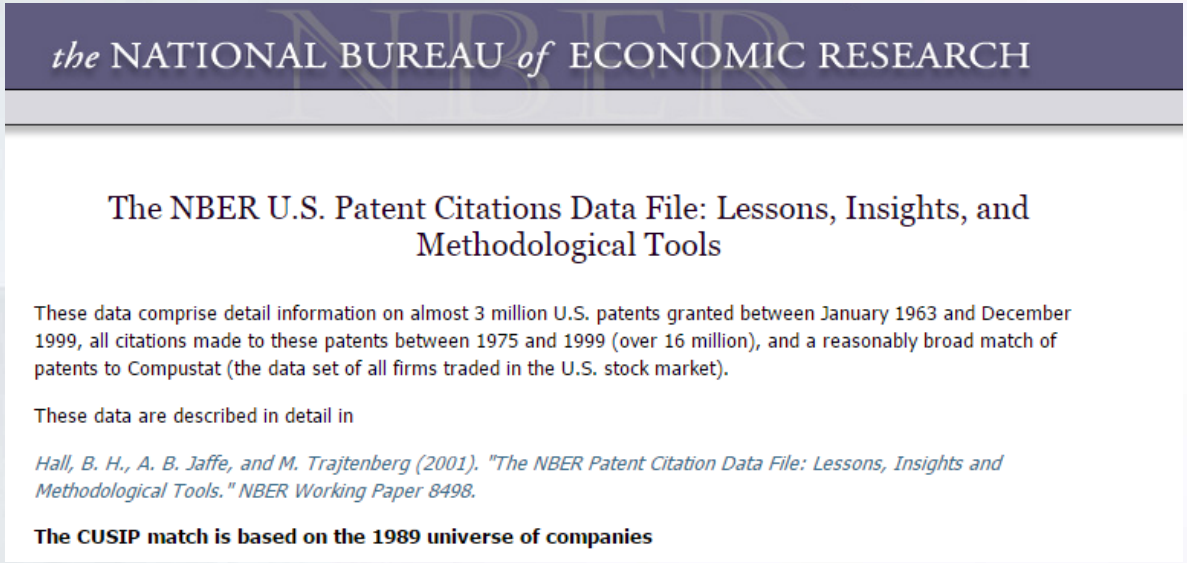
Figure 4

Affirmance of Administrative Appeals from USPTO Examiner Rejections in Software and Non-Software Applications, FY 2003–FY 2012



Source: Authors.

The Strength of Open Data



the NATIONAL BUREAU *of* ECONOMIC RESEARCH

The NBER U.S. Patent Citations Data File: Lessons, Insights, and Methodological Tools

These data comprise detail information on almost 3 million U.S. patents granted between January 1963 and December 1999, all citations made to these patents between 1975 and 1999 (over 16 million), and a reasonably broad match of patents to Compustat (the data set of all firms traded in the U.S. stock market).

These data are described in detail in

Hall, B. H., A. B. Jaffe, and M. Trajtenberg (2001). "The NBER Patent Citation Data File: Lessons, Insights and Methodological Tools." NBER Working Paper 8498.

The CUSIP match is based on the 1989 universe of companies

Government responsibilities

(a) to be transparent with data, both because it is Administration policy, and also to encourage the study and understanding of IP and innovation systems,

(b) to serve a fundamental function of government in creating “public good” platforms in these data, since the market is unlikely to create them, and

(c) to eliminate wasteful and redundant cleaning, converting and matching of these data by many individual researchers, thus freeing up researchers’ time to do what they do best – study IP, innovation, and technological change.

Datasets and Descriptives

- USPTO is providing datasets, and accompanying descriptive documentation:
  (1) *The USPTO Trademark Case Files Dataset*
  (2) *The USPTO Trademark Assignments Dataset*
  (3) *The USPTO Patent Assignments Dataset*
  (4) *The USPTO Public PAIR Dataset*
  (5) *Census-USPTO Joint Efforts*

Trademark Data Sets

The USPTO Trademark

Case

Descr

Stuart Gra

USPTO Economic Working Paper

Office of Chief Economist, U.S. Patent and Trademark Office

U.S. Department of Commerce

The USPTO Trademark Assignment Dataset: Descriptions and Insights

Office of Chief Economist
United States Patent and Trademark Office

April 2014

Chief Economist: Alan Marco
Economist: Amanda Myers
Expert adviser: Stuart Graham
Statistician: Kirsten Apple

Joint Census – USPTO initiative

Business Dynamics of Innovating Firms: Linking U.S. Patent Data with Administrative Data on Workers and Firms

April 1, 2015

Stuart Graham, Cheryl Grim, Tariqul Islam, Alan Marco, and Javier Miranda*

Abstract

This paper discusses the construction of a new longitudinal database tracking inventors and patent owning firms over time. We match granted patents between 2000 and 2011 to administrative databases of firms and workers housed at the U.S. Census Bureau. We use both the patent assignee and inventor information to triangulate the data and improve on patent owner disambiguation. The triangulated database allows us to maximize the match rates while providing validation for a large portion of them. We describe the data construction and explore basic features of the data. We find patenting firms, particularly young patenting firms, disproportionally contribute jobs to the U.S. economy. We find patenting is a relatively rare event among small firms but that most patenting firms are nevertheless small, and that patenting is not as rare an event for the youngest firms compared to the oldest firms. While manufacturing firms tend to patent

Opportunities - OECD

This year:
3-4 November 2015, Vienna
Co-hosted by EPO - OECD

In summary

- Including social scientists, with peer reviewed, disciplined methods of measuring, and evaluating, policy a valuable input to decision makers.
- Having primary data, linked to other data, is necessary in order to produce believable evidence.
- *The critical question:* How does an information-rich public agency shift to a position of increased openness, and a willingness to engage with questions that may be embarrassing?