The paper trail of multiple invention

Ina Ganguli[†] Jeffrey Lin[*] Nicholas Reynolds[**]

[†] University of Massachusetts, Amherst

[*] Federal Reserve Bank of Philadelphia

[**] Brown University

June 18, 2015

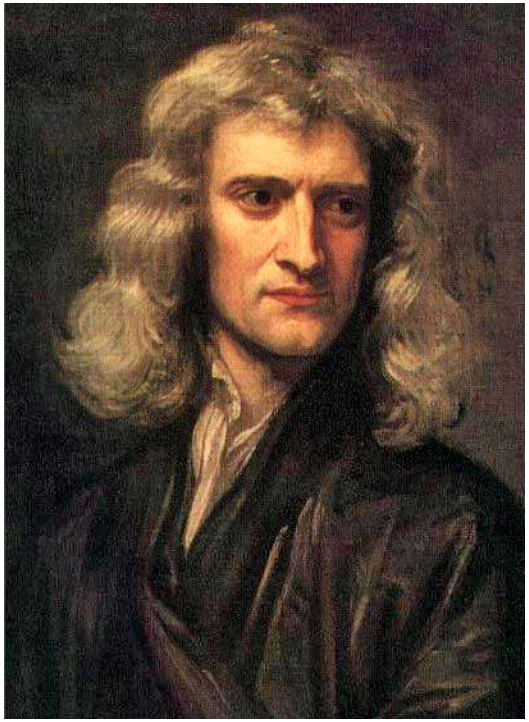
Multiple invention

Simultaneous, identical discovery or invention by independent researchers

— "Multiples" (Merton, 1961)

Calculus

Late 17th century



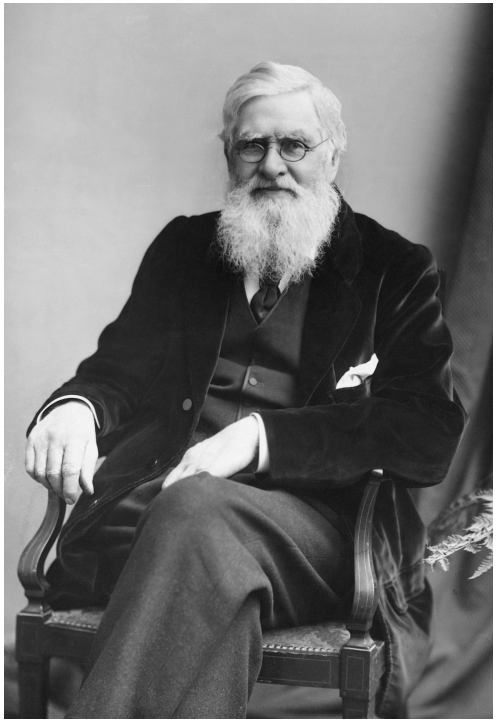
Newton

Leibniz

Natural selection

1858

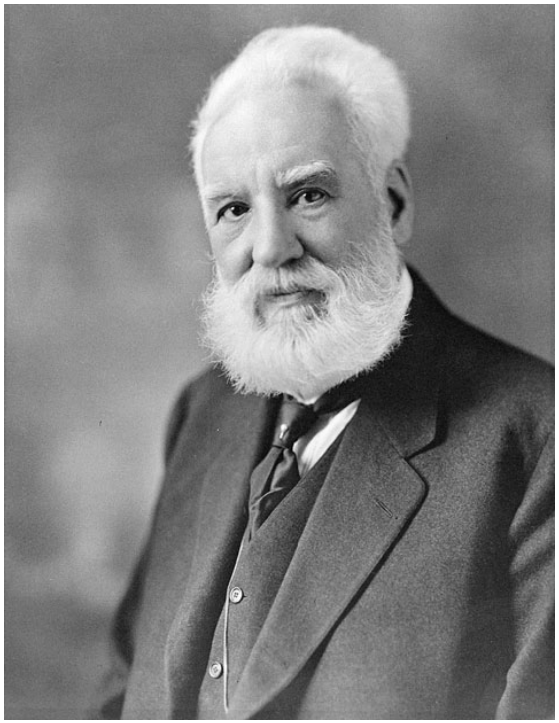
Darwin



Wallace

Telephone

February 14, 1876



Bell

Gray

Classic questions

- "In the air?" Might be explained by many inventors sharing similar scientific and technological knowledge inputs

Classic questions

- "In the air?" Might be explained by many inventors sharing similar scientific and technological knowledge inputs

- Are inventions inevitable? Direction of technological change might not depend on "lone genius" (Ogburn & Thomas, 1922)

Classic questions

- "In the air?" Might be explained by many inventors sharing similar scientific and technological knowledge inputs
- Are inventions inevitable? Direction of technological change might not depend on "lone genius" (Ogburn & Thomas, 1922)
- Is duplication desirable? Redundant inventions offer little social return, yet because research is uncertain, "parallelism need not imply waste" (Dasgupta & Maskin, 1987)

The paper trail

- Multiples offer insight into the diffusion of knowledge, the direction of technological change, and the duplication of research effort
- Ogburn & Thomas (1922): List of 148 "notable" scientific multiples

The paper trail

- Multiples offer insight into the diffusion of knowledge, the direction of technological change, and the duplication of research effort
- Ogburn & Thomas (1922): List of 148 "notable" scientific multiples
- Our approach: Use USPTO patent interferences

What was a patent interference?

- Until 2013, USPTO awarded patent to "first to invent" not "first to file"
- Examiner declared interference if multiple inventors independently and simultaneously submitted identical claims
- Interfering inventors submitted "independent corroboration"—lab books, eyewitnesses, news reports, etc.—to show they were "first to invent" to Board of Interferences, a rotating 3-judge panel

How interferences ended

- Judges could issue decision on priority, parties could settle, or case might end because of violation of interference rules

Rules of interferences rule out non-multiples

- Not common factors or within-firm spillovers (common ownership rule)
- Not copying or stealing (timing, concealment, and derivation rules)
- Not incumbents delaying disclosure (concealment rule)
- Not firm strategy (examiner declares an interference, not firm or inventor)
- Not similar-but-not-identical ideas (no-interference-in-fact rule)

Data

Interferences

- Interference decisions issued 1998–2014 (FOIA)
- Registers of interferences 1863–1903 (NARA)
- Aggregate interference statistics 1950–62, 1979–94 (USPTO)

Inventors, applications, and patents (FOIA sample only)

- Inventor names, patent/application numbers, assignees, seniority (first-to-file), judges, lawyers, interference counts and corresponding claims, settlements, and decisions (Decisions, Filings)
- Citations, location, 3/6-digit technology classes for issued patents and failed applications (Google Patents, PAIR, Lai et al., MCF)

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 276

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

RONALD A. HITZEMAN, ARTHUR D. LEVINSON
and DANIEL G. YANSURA

Junior Party,[1]

v.

WILLIAM J. RUTTER, PABLO D.T. VALENZUELA,
BENJAMIN D. HALL and GUSTAV AMMERER

Senior Party[2]

Patent Interference No. 102,416

FINAL HEARING: January 20, 1999

Before SOFOCLEOUS, DOWNEY and ELLIS, ***Administrative Patent Judges***.

ELLIS, ***Administrative Patent Judge.***

Interference No. 102,416

FINAL DECISION

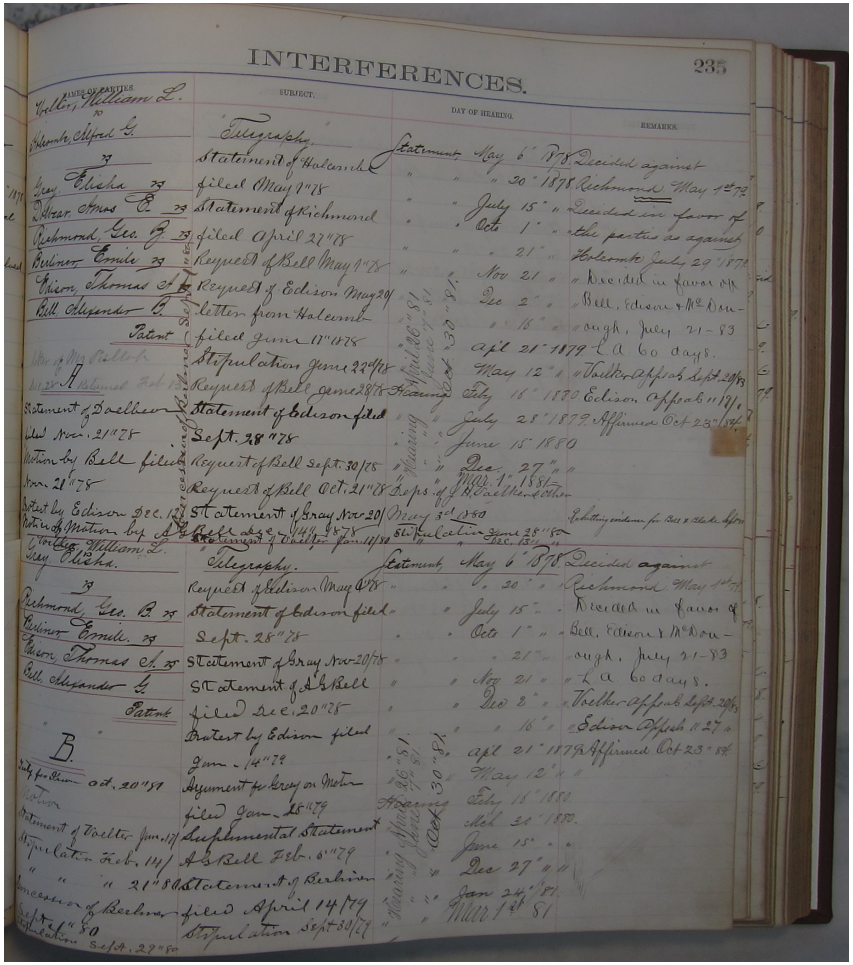
This is an interference between HITZEMAN et al. and RUTTER et al. Rutter is senior party by virtue of Application 06/289,915, filed August 4, 1981.

As a preliminary matter, we point out that the subject matter of the present proceeding, Interference 102,416, is related to Interference 102,989, and many of the issues raised on appeal are the same. Consequently, the parties presented arguments for both interferences at the final hearing on January 20, 1999. Thus, concurrent with the present decision, this merits panel is also rendering a decision in Interference 102,989. However, we are not consolidating the interferences. The issues raised in each interference have been considered only on the basis of the evidence provided therein.

I.
Background

Hepatitis B virus (a.k.a. serum hepatitis) is a major world-wide health problem which causes, ***inter alia***, severe liver damage and death. It has been reported, prior to the filing of the present applications, that the plasma of humans infected with the virus show three major particulate structures containing the

Pages from an interference decision, showing inventors, background, etc.



INTERFERENCES. 235

NAMES OF PARTIES.	SUBJECT.	DAY OF HEARING.	REMARKS.
Walker, William L.	"Telegraphy."	Statement May 6" 1878	Decided against
to	Statement of Halcomb	" " " 20" 1878	Richmond May 1st 72
Halcomb, Alfred G.	filed May 1" 78	" " July 15" "	Decided in favor of
to	Statement of Richmond	" " Oct 1" "	the parties as against
Gray, Elisha "	filed April 27" 78	" " " 21" "	Halcomb July 29 1872
Hear, Thos. B. "	Request of Bell May 1" 78	" " Nov 21 "	Decided in favor of
Richmond, Geo. B. "	Request of Edison May 20	" " Dec 2" "	Bell, Edison & McDon-
Berliner, Emile "	Letter from Halcomb	" " " 16" "	ough, July 21-83
Edison, Thomas A. "	filed June 17" 1878	" " April 21" 1879	L A 60 days.
Bell, Alexander G.	Stipulation June 22" 78	" " May 12" "	Walker Appeals Sept 29 83
Patent	Request of Bell June 28 78	" " July 15" 1880	Edison Appeals 11/81
	Statement of Edison filed	" " July 28" 1880	Affirmed Oct 23" 84
	Sept. 28" 78	" " June 15" 1880	
	Request of Bell Sept. 30 78	" " Dec 27" "	
	Request of Bell Oct. 21" 78	" " May 1" 1881	
	Statement of Gray Nov 20	May 3rd 1880	
	Bell assg. July 8" 78	" " June 28" 80	
	Statement of Walker Jan 11/80	" " Dec 13" "	
Walker, William L.	"Telegraphy."	Statement May 6" 1878	Decided against
Gray, Elisha.	Request of Edison May 1" 78	" " " 20" "	Richmond May 1st 72
to	Statement of Edison filed	" " July 15" "	Decided in favor of
Richmond, Geo. B. "	Sept. 28" 78	" " Oct 1" "	Bell, Edison & McDon-
Berliner, Emile. "	Statement of Gray Nov 20/78	" " " 21" "	ough, July 21-83
Edison, Thomas A. "	Statement of A G Bell	" " Nov 21 "	L A 60 days.
Bell, Alexander G.	filed Dec. 20" 78	" " Dec 2" "	Walker Appeals Sept 29 83
Patent	Protest by Edison filed	" " " 16" "	Edison Appeals 11 27 "
B.	Jan. 14" 79	" " April 21" 1879	Affirmed Oct 23" 84
Motion for Dec. Oct. 20" 81	Argument for Gray on Motion	" " May 12" "	
Motion	filed Jan 25" 79	" " July 15" 1880	
Statement of Walker Jan. 11/80	Supplemental Statement	" " Aug 30" "	
Stipulation Feb. 11/	A G Bell Feb. 8" 79	" " June 15" "	
" " 21" 80	Statement of Berliner	" " Dec 27" "	
Non-Concession of Berliner	filed April 14/79	" " Jan 24" 81	
Sept. 1" 80	Stipulation Sept 30/79	" " Mar 1st 81	
Stipulation Sept. 27" 80			

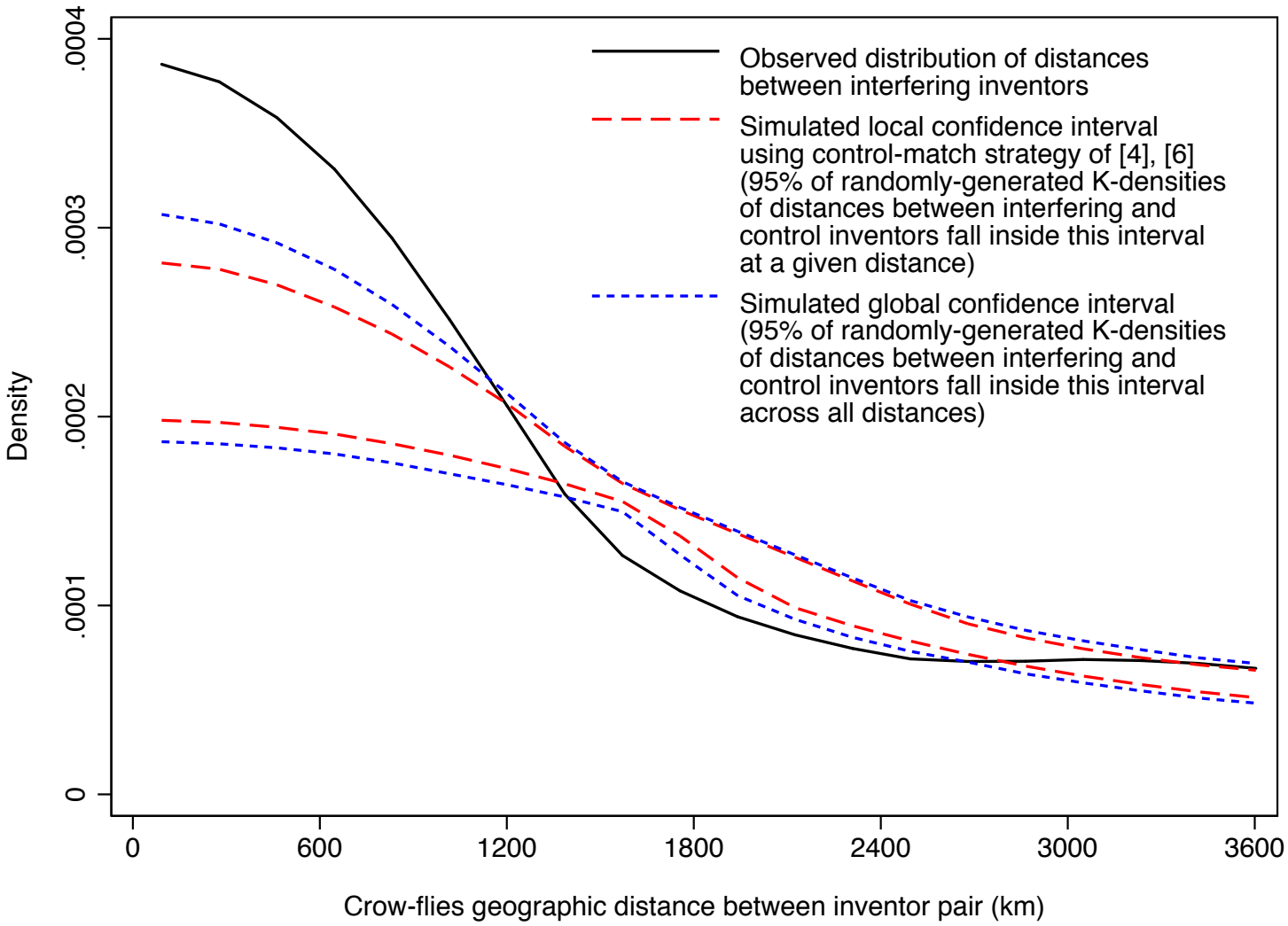
A page from a Register of Interferences, showing inventors, subject, disposition, etc.

Result 1. Interfering inventors share knowledge inputs

	Interfering pairs	Control pairs* (95% CI)
Backward citations	18.2	14.0–16.5
Shared citations by pair	3.9	0.4–1.2
6-digit classes	5.4	4.3–5.7
Shared 6-dig. classes by pair	2.4	1.4–1.5

*—A "control pair" includes 1 interfering application and 1 issued control patent that share a technology class and application date. Simulated CIs based on 1,000 random draws from eligible control pairs.

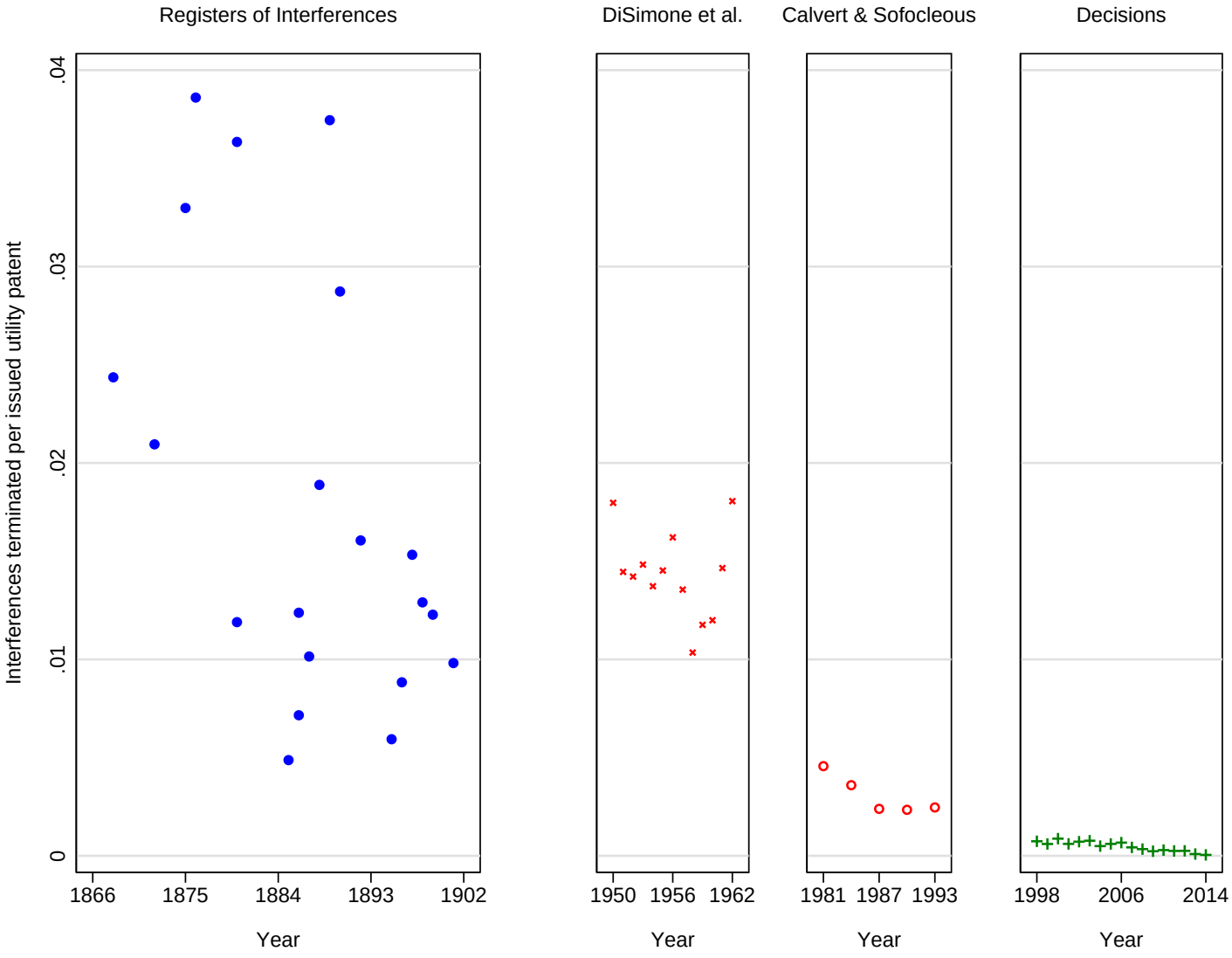
Interfering pairs are more geographically localized vs. control pairs



Interfering inventors share codified and tacit knowledge inputs

- Geographic distribution of interfering inventor pairs versus similar control pairs suggests that tacit knowledge spillovers contribute to clustering of inventive activity

Result 2. Many interferences, yet rare



Mean interferences per year: Registers—497, DiSimone—650, Calvert—237, Decisions—76.

The rate of interferences has declined over the long run

- Part changes in PTO practice, but short-run declines unexplained
- Future work: Examine roles of state of knowledge, number of researchers
- Is the direction of technological change no longer "inevitable"?

Result 3. More interference cases end with settlement vs winner-take-all

Sample	Full	E-file
Number of cases	1,325	977
Dispositions (%)		
Conceded, total	59.6	58.1
. . . settled (secretly)	.	32.8
. . . abandoned	7.0	5.5
. . . conceded, all other reasons	52.6	19.8
Decided on priority	20.3	19.7
Unpatentable	7.7	9.6
Common ownership*	4.8	4.7
No interference in fact	3.5	3.4
Other	4.1	4.5

*—Another common way to settle interference disputes

Interference dispositions depart from "winner-take-all" compensation

- Duplicated inventions offer little added value to society
- Yet patents are approximately "winner take all"
- Dasgupta & Maskin's (1998) conclusion of "too much" duplication rests on wedge between private, social gains
- Did interference settlements reduce welfare losses from excess duplication?

Conclusions

- Multiple invention offers insights on the diffusion of knowledge, the direction of technological change, and the duplication of research effort
- Interfering inventors shared codified and tacit knowledge inputs
  - Geographic distribution of interfering inventors suggest tacit knowledge spillovers in clusters
- The rate of interferences declined over the long run
- More interferences ended in settlement than "winner-take-all"

Jeffrey Lin

Federal Reserve Bank of Philadelphia
jeff.lin@phil.frb.org

The views expressed here are those of the authors and do not necessarily represent the views of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.