

Entrepreneurial Firms and Patents: Entry Deterrence or Entry Assistance?

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The research question

- Do large firms have an advantage protecting and/or challenging patents?
 - Are large firms more likely to win patent challenges?
 - Does patent-holder size deter potential challengers?

Why should we care?

- Small firms might be more likely to produce “radical” innovations
 - Henderson (1993)
 - Anderson and Tushman (1990)
 - Tushman and Anderson (1986)
- May want a level playing field

Previous work

□ Costs of patent enforcement

- Bhagat et al 1994 – 3.1% fall in market value of firms involved
- Lanjouw 1998 – doubling legal costs reduces patent value 30%

□ Patent litigation and small firms

- Lerner (1995) – small biotechs avoid areas with large litigators
- Lanjouw and Schankerman (2004) – prob of suit inversely related to patent portfolio size

This paper

- Directly investigates the role of firm size
 - in the probability of EPO opposition
 - in the determination of the EPO outcomes
- Still preliminary
 - data not complete

Outline

- Why opposition?
- What is opposition?
- Previous work on opposition
- An econometric model
- Data
- Preliminary results

Why opposition?

- Opposition solves the problem of small sample sizes
 - Tests using litigation data are difficult
 - 30 of our opposed patents are litigated
- Policy implications for the US
 - HR 2795

What is the EPO (1)?

- Centralized patent process
 - Cost saving for applicants and challengers
- Patent requirements
 - Novel (analogous to US “novel”)
 - Inventive Step (roughly analogous to US “non-obvious”)
 - Industrial Application (roughly analogous to US “useful”)

What is the EPO (2)?

- EPO examiners rule on oppositions
 - validity only (not infringement)
 - time limit: 9 months from patent grant
- Examiners rule to
 - reject opposition
 - amend the patent
 - revoke the patent

Previous work on opposition

- Valuable patents opposed more frequently
- German patents get slightly more favorable and slightly quicker outcomes.
- Harhoff and Reitzig (2004)
- Graham et al (2003, 2004)

Econometric model

- Two equations
 1. Binary discrete choice:
P (oppose | expected outcome of opp)
 2. Ordered discrete choice:
P (outcome=reject, amend, revoke | opposition)
- Note that the probability of opposition depends on **unconditional** outcome probability whereas (2) predicts outcome probability **conditional** on opposition

Data

- All EPO patents granted 1980 to 1997 that were opposed, in two broad technology groups:
 - biotechnology/pharmaceuticals
 - semiconductors/computers/software
- 8% sample of non-opposed EPO patents as controls

Variables

- Patent holder characteristics
 - size, type of org, nationality, age if firm
- Opposer characteristics
 - size, type of org, nationality, age if firm
- Patent characteristics
 - accelerated exam, accelerated search, PCT, N of designated states, grant lag, claims, NP refs, P refs, forward cites, grant year
- US equivalent characteristics
 - existence, US claims, US grant lag, US P refs, US forward cites, US generality

Data

	Biotechnology/ pharmaceuticals		Semiconductor/ computer/SW	
	Opposed	Controls	Opposed	Controls
Number of patents	1267	903	766	1958
Number with US equivalents	522 (41%)	459 (51%)	514 (67%)	1486 (76%)
Number of oppositions	1846	0	849	0
Firms only sample	976 (77%)	717 (79%)	697 (92%)	1859 (96%)

Holders and opposers (weighted by patents or oppositions)

	Biotechnology/ pharmaceuticals		Semiconductor/ computer/SW	
	Holders (%)	Opposers (%)	Holders (%)	Opposers (%)
Large firms	44	53	66	55
Non-large firms	35	40	23	43
Government	2.9	2.0	2.4	0.4
NGOs	4.5	2.5	1.4	0.7
University	6.7	0.4	0.4	0.0
Individuals	7.3	2.4	6.1	1.2

Most frequent opposers

Biotechnology/ pharmaceuticals		Semiconductors/ computer/ SW	
Boehringer Mannheim (DE)	78	Siemens AG (DE)	175
Hoechst AG (DE)	71	Deutsche ITT Industries (DE)	52
Boehringer Ingelheim (DE)	43	Philips N V (NL)	46
DSM (NL)	42		

Outcomes

	Biotechnology/ pharmaceuticals		Semiconductor/ computer/SW	
	Number	Share	Number	Share
Still pending	352	28%	104	14%
Opp. rejected	175	14%	177	23%
Patent amended	347	27%	174	23%
Patent revoked	290	23%	264	34%
Opp. closed	193	8%	47	6%

Preliminary results - opposition

	Biotechnology/ pharmaceuticals	Semiconductors/ computer/ SW
Positive determinants	acc. exam, PCT, more states, grant lag, claims, NP refs, P refs, forward cites, US claims, US generality	acc exam, more states, claims, forward cites, no US P refs, US generality, German or Japanese holder
Negative determinants	No forward cites, Japanese holder	acc. search, NP refs, large firm
Insignificant	type of org, size of firm , whether US equivalent, US pat citations	type of org , US claims, US grant lag, whether US equivalent, US forward cites

Preliminary results - outcomes

Determinants of revocation/narrowing	Biotechnology/ pharmaceuticals	Semiconductors/ computer/ SW
Positive determinants	opp by Boehringer Mannheim or Boehringer Ingelheim	PCT
Negative determinants	all designated states, claims, large opposer	US holder, opp by Deutsche ITT or Philips N V
Insignificant	other patent characteristics, size of holder , nationality of holder and opposer	patent characteristics, size of holder , nationality of holder and opposer

Why are there no firm size effects?

- A statistical artifact?
 - weak instruments
 - insufficient information in the size proxy
- But maybe firm size doesn't matter
 - opposition cheaper/faster than litigation
 - 20K Euros (GHHM 2002) vs. \$1M-\$3M (AIPLA 1999)

Conclusions

- Little compelling evidence of large firms using opposition toward small firms disproportionately
- Industries differ in terms of prob of opps and opposer identities (type, nationality, etc)
- Patent and firm characteristics predict prob of opp much better than its outcome

Future work

- Add missing data on opp outcomes, EPO citations, firm identities
- Improve econometric model