A Method for Assessing the Strength and Value of a Set of Patents

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Context

- Part of a larger study with Lei Zhen addressing:

1)Predictability of patent grants

2)International harmonization

3)Examiner behavior

4)“Rational ignorance

Problem

- In a world of proliferating patent portfolios, it is desirable to distinguish in a large portfolio patents that are:

1)Strong

2)Valuable

Problem

- Detailed analysis of each patent to confirm that it is both strong and valuable is ***expensive***

- A procedure that can economically distinguish patents that are significantly more likely to be strong and valuable could be very useful part of the evaluation toolkit

Our Goal

- A procedure that can identify a set of patents that are with significant probability

  1. stronger than others
  2. higher-value than others

Weak Patents

- Can my legal colleagues help with the definition?
- Here (provisionally):
  - Patents that should have not been issued in light of all prior art

Working Definition 1: Weak Patents

- **Patent weakness**

  Probability of being held as invalid

  in a perfect *re-examination* or in an *ideal court trial*

- **Courts' invalidity decisions:** ***Non-novelty/ and non-obviousness dominates***

  Allison & Lemley (1998): 191 court cases finding invalidity

  80: non-novelty
  58: obviousness
  45: enablement, written description, claim indefiniteness, best mode

Working Definition 2:
Low-Value Patents

- **Patents that:**

1) **remain valid eight years after grant, but**

2) **are not renewed in the United States 8 years post-grant**

    - **Misclassifies patents if they have generated high value initially, but the value is almost fully spent by the eighth year.**

Key Hypotheses

US examiners:

- **can distinguish strong from weak applications**
- **devote more search effort to the weak**

⟶ A higher share of missed prior art means a stronger patent

Key: Examiner's Role

Assume:
examiner can distinguish relative patentability:

Bears burden of proof of non-patentability

Wants to disposes of applications quickly

Undergoes checks on his performance

Targets applications deemed less patentable

Dedicates more effort to these "weak" applications in search for prior art

How do we know which granted patents are stronger?

Empirical Study:

Use independent (noisy?) signal of a strength of US patent

Exploit availability of international patenting data

Data:
22420 US patents with priority years 1990-1995

US patents with related applications filed at EPO
One single USPTO application
One single EPO application
EPO application outcomes

How do we know which granted patents are stronger?

Key Variable:

Share of prior art missed by examiner:

$$\left(\frac{\text{Missed Prior}}{\text{Missed Prior + Examiner Citations}} \right)$$

Measure of Examiner's Search Effort:

- **Share of missed prior art** $= \dfrac{\text{Missed prior patents}}{\text{Missed prior patents + citations}}$

- **Missed prior patents?:**

  Impossible to literally find for a large set of patents

  Strategy:
  Use Natural Language Processing (NLP) algorithm:

  Linguistic / semantic mapping

  - Provided by courtesy of M-CAM

Empirical Results I:

A higher share of missed prior patent

→ A *stronger* patent

- **Less likely to be withdrawn at the EPO**
- **Less likely to be rejected, conditional on non-withdrawal**
- ***Results are very robust***

  Examiner by technology by year

  Examiner by assignee

Empirical Results:

A higher share of missed prior patent

→ **A *stronger* patent**

Implications:
US examiners can and do distinguish more patentable applications from less patentable ones, and search harder for the latter

Empirical Results II:

A higher share of missed prior patents

→ **A** *higher-value* **patent**

- **More likely to be renewed at the USPTO**

- ***Results are very robust:***

  Examiner by technology by year

  Examiner by assignee

Why search harder for less patentable applications? (1)

Examiner's burden of proof of non-patentability

I do not have to prove my invention is patentable.

It is the (patent) examiner who is to prove my invention is unpatentable.

Burden of proof is on examiners.

- Quote from a patent prosecutor

Insight #1:

Examiners search prior art to prove an application is unpatentable.

An allowance does not require them to prove anything.

Why search harder for less patentable applications? (2)

Examiner's burden of proof of non-patentability

I felt very sad when I had a gut feeling about a (bad) application,

but could not find the prior art (to reject it).

- Quote from an ex-examiner

Insight #2:

Examiners are not allowed to use "common sense" to reject;

They have to provide prior art to justify a rejection.

Why search harder for less patentable applications? (3)

Examiner's burden of proof of non-patentability

MPEP Section 904.03 Conducting the search:

It is normally not enough that references be selected to meet only the terms of the claims alone,…, the search should, insofar as possible, also cover all subject matter which the examiner reasonably anticipates might be incorporated into applicant's amendment.

Insight #3:

To reject an application, examiners need to search harder,

not only for the original claims but also for anticipated amended claims.

Why search harder for less patentable applications? (4)

Examiner's incentives and constraints

- ***Biweekly points goal***

  One point is awarded: writes a FOAM,
  or disposes of an application

  Bonus if production exceeds 110% of the goal

  Want to dispose of applications quickly

- ***Quality control mechanisms***

  Quality review: *Error rate*

  Informal controls: *reputation concern*

Insight #4: Examiners plausibly give bad applications more scrutiny

Why search harder for less patentable applications? (5)

Pro-"customer" procedures and policy

USPTO, funded by the fees it collects, refers to applicants as "customers"

Management wants to process applications quickly

Applicants never have to accept rejection

Negotiations after a final rejection

Continuations

Examiners search for more prior art to show difficulty/cost of persisting, or to narrow down claims

Insight #5: More prior art for deterrence

Inference:

US examiners can distinguish good applications from bad ones:

- **Need to process applications as quickly as possible**
- **Target bad applications, which they:**

Try to reject

Bear burden of proof of non-patentability

Search for prior art for both original and anticipated amended claims and discourage applicants from keeping coming back

Dubious patents have *SMALLER* share of missed prior

Conclusion

- **We have a method that significantly predicts for US Patents:**

- **Withdrawal in Europe**
- **Grant in Europe**
- **Post-grant Opposition outcomes (less strongly)**

- **Renewal in US at 8 yrs**

Conclusion

- **Examiners know more about the patents they grant than some theories imply**

- **We can use this knowledge, revealed in their behavior, to screen patents for strength and value**

Thank you !

Application outcomes at EPO

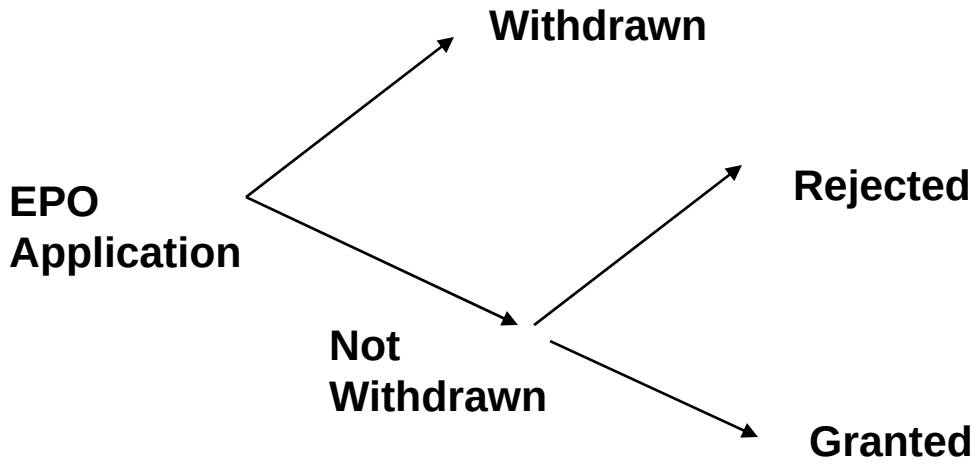
	Not Withdrawn	**Granted, (given no withdrawal)**	**Success at EPO**
SMPP	**0.0819**	**0.0308**	**0.0974**
	(0.0185)* **	**(0.0143)** **	**(0.0204)*** **
Have assistant examiner	0.0057	0.0134	0.0090
	(0.0130)	(0.0093)	(0.0141)
# of LLPP (log)	0.0024	-0.0024	0.0021
	(0.0067)	(0.0053)	(0.0072)
# of claims	0.0004	-0.0004	-0.0001
	(0.0004)	(0.0003)	(0.0004)
# of classifications	-0.0005	-0.0006	-0.0007
	(0.0019)	(0.0013)	(0.0019)
# of inventors	0.0003	-0.0026	-0.0011
	(0.0026)	(0.0019)	(0.0030)
# of assignees	0.0730	0.0261	0.0823
	(0.0212)***	(0.0187)	(0.0244)***
# of total prior patents	-0.0004	-0.0000	-0.0003
	(0.0004)	(0.0004)	(0.0005)
# of total subseq patents	0.0001	0.0002	0.0002
	(0.0001)	(0.0001)***	(0.0001)
Innovation stage	-0.0634	-0.0166	-0.0709
	(0.0243)***	(0.0180)	(0.0276)**
Wait of total prior patents	-0.0011	0.0007	0.0000
	(0.0016)	(0.0012)	(0.0017)
Lag of total subseq patents	0.0021	0.0015	0.0031
	(0.0025)	(0.0020)	(0.0028)
# of primary classes in total prior patents	-0.0039	-0.0017	-0.0055
	(0.0024)	(0.0016)	(0.0026)**
# of primary classes in total subseq patents	0.0014	-0.0018	0.0004
	(0.0017)	(0.0014)	(0.0019)
Observations	17525	11664	16568

SMPP:
Predict US patent renewal decisions

	(1)	(2)	(3)
	whole sample		
	Renewed at 4th year	Renewed at 8th year, given a 4th year renewal	Maintained after 8 years
SMPP	**0.0168**	**0.0706**	**0.0792**
	(0.0114)	**(0.0161)*** **	**(0.0168)*** **
Examiner fixed effect	yes	yes	yes
Control variables	yes	yes	yes
Tech and Year dummies	yes	yes	yes
Observations	17599	15734	16975

EPO Application Outcomes for US patents

Application outcomes in EPO	
Withdrawn	6321 (28.2%)
Rejected	1242 (5.5%)
Granted	13445 (60%)
Pending	1310 (5.8%)
Missing	102 (0.5%)
Total	22420 (100%)



How Good Is M-CAM Analysis?

Patents that have been invalidated by PUBPAT

	Patents Invalidated	Prior Patent that Invalidates	Whether the invalidating prior is included in LLPP	Whether the invalidating prior is included in MPP
WARF Stem cell patent	**5843780**	**5166065**	**Y**	**Y**
Pfizer Lipitor patent	**5969156**	**5273995**	**Y**	**N**
Forgent JPEG	**4698672**	**4541012**	**Y**	**Y**
EpicRealm Website	**5894554**	**5701451**	**Y**	**Y**
Monsanto	**5352605**	**4407956**	**Y**	**N**
Patriot Scientific Microprocessor	**5809336**	**4691124**	**N**	**N**

SMPPs and Grant rates for different technologies