

# How are patents “used” in Europe? (... and elsewhere?)

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## Patent data

- “A terrible pudding, and there is so little of it!” (Zvi Griliches, JEL)
- Patents have enabled us to understand a lot about innovation
- Yet, we’re reaching some limits

## Patent data

- Need complementary data, not in patent documents or related files
  - Eg data on patent value, use of patents, licensing, markets for technology, invention process, inventors' characteristics
- There is work in this direction ... but more is needed
- Surveys?
  - Of whom? Inventors? Applicants? ... different questions have to be asked to different interviewees, and possibly the same question to different interviewees in different organizations

## PatVal-EU Survey

- Six countries:
  - France (Lebas, Lyon)
  - Germany (Harhoff, LMU)
  - Italy, (Gambardella, LEM)
  - Netherlands (Verspagen, ECIS)
  - Spain (Garcia-Fontes, Pompeu Fabra)
  - UK (Geuna, Spru)

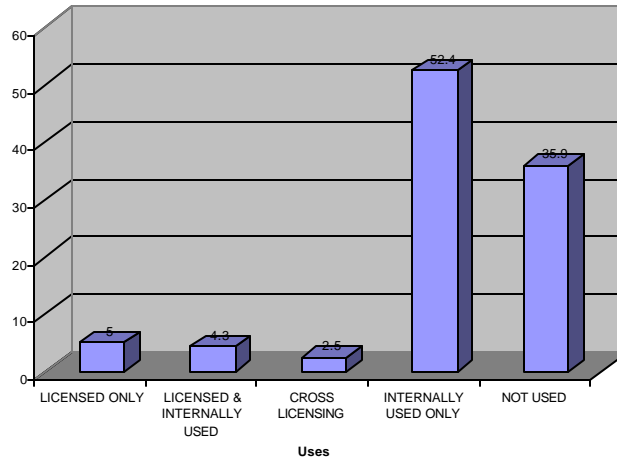
## PatVal-EU Survey

<b>Total Number of Surveyed Patents (Returned)</b>						
<b>France</b>	<b>Germany</b>	<b>Italy</b>	<b>Netherlands</b>	<b>Spain</b>	<b>UK</b>	<b>TOTAL</b>
1486	3346	1250	1124	256	1542	9004
<b>Total Number of Sent Patents/Questionnaires</b>						
4199	10215	1864	2594	814	7846	27532
<b>Response Rates</b>						
35.39%	32.67%	67.06%	44.53%	31.45%	19.70%	32.70%

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Opposed Patents	174 (11.71%)	334 (9.98%)	126 (10.08%)	73 (6.49%)	11 (4.30%)	56 (3.63%)	774 (8.60%)
Not Opposed Patents with ≥ 1 citations	395 (26.58%)	1733 (51.79%)	599 (47.92%)	157 (13.97%)	37 (14.45%)	193 (12.52%)	3114 (34.58%)
Other Patents	917 (61.71%)	1279 (38.22%)	525 (42.00%)	894 (79.54%)	208 (81.25%)	1293 (83.85%)	5116 (56.82%)
<b>Total</b>	<b>1486</b>	<b>3346</b>	<b>1250</b>	<b>1124</b>	<b>256</b>	<b>1542</b>	<b>9004</b>

## Uses of Patents



## Explanatory variables

- # of claims (PATENT SCOPE)
- Dummy family (PROTECTION)
- Res lab + sc. lit. (LINK w/ SCIENCE)
- Large, medium, small firms
- Entrepreneurs
- Spillovers from competitors
- Innovation race
- Blocking patents
- High cost projects
- Controls

	Mean	Median	Sd. Dev.	Min	Max
<b>Dependent variable</b>					
License Only	0.050	0	0.217	0	1
License AND internally Used	0.043	0	0.202	0	1
Cross License	0.025	0	0.155	0	1
Not Used	0.359	0	0.480	0	1
Internally Used Only	0.524	1	0.499	0	1
<b>Regressors</b>					
No. of Claims	10.513	9	6.827	1	131
Dummy family	0.379	0	0.485	0	1
Res. labs	1.287	0	1.664	0	5
Sc. Literature	2.592	3	1.841	0	5
Large Firm	0.771	1	0.420	0	1
Medium Firm	0.097	0	0.295	0	1
Small Firm	0.133	0	0.339	0	1
Entrepreneur	0.018	0	0.133	0	1
Competitors	2.264	3	1.853	0	5
Innovation race	0.293	0	0.455	0	1
Blocking patents	3.105	3	1.639	0	5
Log total costs	10.416	10.820	2.395	0	19.114
<b>Controls</b>					
Log area	11.355	11.225	1.680	8.517	13.816
Electrical Engineering	0.155	0	0.362	0	1
Chemical Pharmaceuticals	0.198	0	0.398	0	1
Instruments	0.095	0	0.293	0	1
Process Engineering	0.250	0	0.433	0	1
Mechanical engineering	0.303	0	0.460	0	1
France	0.045	0	0.208	0	1
Germany	0.463	0	0.499	0	1
Italy	0.147	0	0.355	0	1
Netherlands	0.149	0	0.356	0	1
Spain	0.018	0	0.132	0	1
Uk	0.178	0	0.383	0	1

**Multinomial logistic estimation, marginal effects in % (\*). Baseline alternative 'internal use only'**

	Licensed	Licensed and Internally used	Cross-Licensed	Not used
NUMBER OF CLAIMS	0.6***	-0.6	0.7	0.6
DUMMY FAM	1.4***	2.0***	1.4***	1.7**
RESEARCH LABS	0.6***	0.0	0.4***	1.3**
SCIENTIFIC LITERATURE	0.1*	0.1	0.3***	6.5***
LARGE FIRM	-7.0***	-3.1**	-0.7	16.8***
MEDIUM FIRM	-2.0***	-2.1***	-1.4**	2.0
DUMMY ENTREPRENEUR	11.0***	-0.9	2.2*	-1.9
COMPETITORS	-0.1	-0.5***	-0.2*	-4.1***
INNOVATION RACE	0.4	-0.1	0.9***	3.5**
BLOCKING PATENTS	-1.4***	-1.2***	0.5***	3.6***
LOG TOTAL COST	-0.1	1.1**	-0.1	-5.6***
<b>Controls</b>				
Log Area	0.4*	-0.7**	0.2	1.6*
Electrical Engineering	0.0	0.1	2.7***	0.3
Instruments	1.2	-1.9	-0.4**	12.8
Chemical-Pharmaceuticals	-0.3**	0.0	1.8	1.5***
Process Engineering	1.4*	-0.1	-0.2	-1.4
Country	Yes	Yes	Yes	Yes
Firm Controls	Yes	Yes	Yes	Yes
N.of observations	4672			
Log-likelihood	-4754.62			

\*\*\* Significant at 1% level, \*\* 5% level, \* 10% level  
 (\*) standard deviation increase to the mean for non-dummy independent variable; 0 to 1 change for dummy independent variables.

## Key findings

Characteristic of the Patent	Pros	Cons
Claims	<i>Licensing</i>	
Family	<i>Licensing</i>	<i>Unused patents</i>
Link to science	<i>Licensing</i>	<i>Unused patents (++)</i>
Large firms		<i>Less licensing</i> <i>Unused patents</i>
Entrepreneurship	<i>Licensing</i>	
Knowledge from competitors	<i>More internal use</i>	
Innovation race		<i>Unused patents</i>
Blocking patents		<i>Less licensing</i> <i>Unused patents</i>
High cost projects	<i>More internal use</i>	

## Is it worth increasing the share of small vs large firm patents?

- Unused patents = 35.9%
- From our estimation:
  - SF: unused patents = 21%;
  - LF: unused patents = 37%
- Experiment:
  - Increase share of SF patents by 1% (to 14.3%) while reducing share of LF by 1% (to 76.1%), with total number of patents fixed

## Is it worth increasing the share of small vs large firm patents?

- In 2003, 60k EPO patents granted
- 1% is then 600 patents. Give them to small firms and take them out from large firms
- W/ LF  $\Rightarrow$  222 of the 600 not used (37%)
- W/ SF  $\Rightarrow$  126 of the 600 not used (21%)
- About 100 more patents would be used with the small firms

## Is it worth increasing the share of small vs large firm patents?

- Average economic value of (used) patents from PatVal-EU = 500k euros
- 1% shift to SF patents  $\Rightarrow$  used patents increase by 100  $\Rightarrow$  50m euros
- Is it a lot? Less than 2‰ of the total annual value of patents granted ( $500k \cdot 60k = 30$  billion euros)

## Is it worth increasing the share of small vs large firm patents?

- Increasing share of SF patents is a good idea
- But enhancing the use of large firm patents may be even more effective (Rivette-Kline “Rembrandt in the Actic”, HBR 2000)
- ... this could also mean licensing of LF patents, or their use to build new industries (eg encryption software)

## Tentative policy implications

- Patents w/ broader scope do not discourage use, if anything they encourage technology markets
- Protection encourages licensing, but also no use. Have to find means to correct negative implications in favor of positive ones
- “Scientific” patents are probably not a good idea (not used)

## Tentative policy implications

- Increase share of SF vs LF patents, and especially patents that can give rise to new firms
- Increasing the use of LF patents is probably even more important
- Innovation race and blocking patents are a problem
- Patents from high cost research should be encouraged also because they are more likely to be used
- Spillover knowledge from competitors lead to greater use of patents

## Future research

- This is just the tip of an iceberg. There are wide opportunities for new and more systematic data collection in this area
- All the points made here need more careful assessment (eg compute values; assess net effects; more careful estimates; understand, elaborate and deepen policy implications)

## Future research

- Especially important is the collection of information complementary to that in the patent document, and that can be provided only by the inventors or applicants
- E.g.
  - Better and more systematic information on patent values
  - Careful survey designs (... eg addressing different individuals in the organizations according to question; selected samples according to specific problems)
  - Better and more systematic data on patent use, particularly licensing and technology markets