

PATENTING IN THE UK: WHO DOES WHAT AND DOES IT MATTER

Mark Rogers (mark.rogers@hmc.ox.ac.uk)

Harris Manchester College, Oxford University
and

Economics and Strategy Group, Aston University

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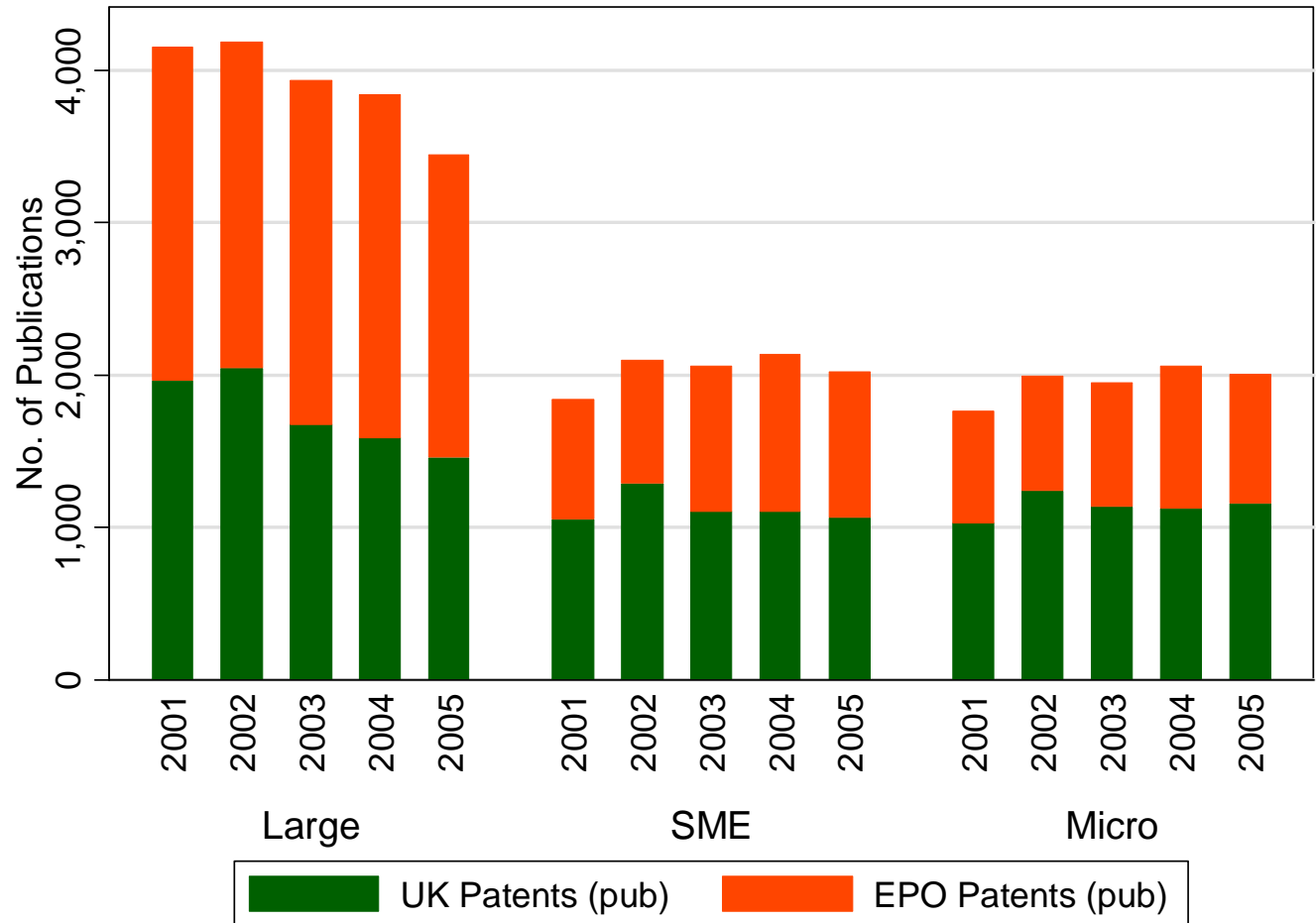


Outline of talk

- Patenting trends by UK firms
- University patenting, licensing and spin-off activities
- What do we know about the relationship between patenting and small firm performance?
 - ▣ Innovation and the Survival of New Firms Across British Regions (with Christian Helmers, 2008)
 - ▣ Does Patenting Help High-Tech Start-Ups? (with Helmers, 2009)

Patents (publications) by UK firms

Report 1,
Figure 2 *



* See <http://users.ox.ac.uk/~manc0346/research.html>

Number of patenting firms

Report 1
Figure 6



Patent activity of UK universities

	2002-03	2003-04	2004-05	2005-06	2006-07
Number of disclosures	2,710	3,029	3,027	3,268	3,746
Number of new patent applications filed in year	1,222	1,308	1,648	1,536	1,913
Number of patents granted in year	377	463	711	577	647
Cumulative portfolio of active* patents	3,938	5,707	7,701	9,080	10,624

Active= “any filed or granted patents”

Source: Higher Education Funding Council of England. Data includes some Scottish, Welsh and Northern Island universities

Licence and spin off activity of UK universities

	2002-03	2003-04	2004-05	2005-06	2006-07
Number of licenses	759	2,154	2,099	2,699	3,286
License income (£ mill)	26.6	30.9	36.1	41.6	40.3
Number of spin-offs	271	211	204	245	288

- University patenting & licensing activity increasing
- But, absolute license fees small, and costs are around one third of fees

Joint patenting with universities

Firm size	Joint application with university (% of publications)	
	UK patents	EPO patents
Large	0.5	1.0
SME	0.7	0.7
SME (Foreign owned)	0.6	0.5
SME (Domestic)	0.7	0.8
Micro	3.2	5.3
All firms	1.7	2.5

Report 1, Figure 10. 2001 to 2005 averages

Small firms and patenting

- University-firm relationships growing, but small
- Overall, very few small firms use patents
- Potential benefits
 - ▣ Eliminate competition, generate licensing revenue, build negotiating power (patent pools), 'signal' to banks and financiers
- Potential costs
 - ▣ Disclosure may encourage competitors, cost (financial, time, enforcement)
- Interested in whether positive or negative 'patent effect' overall

Assessing the effect of patents

- Need large database (2 million UK registered firms)
- Match data on UK and EPO patents to these
- Does patenting influence performance?
- Can look at survival rates
 - ▣ All firms have data on survival
- Can also look at growth rates
 - ▣ Asset data available for around 80% firms
 - ▣ 'growth in assets' variable constrained to those firms that survived over period
- Profitability ? Long lag time

Survival of new firms

- Helmers and Rogers (2008, draft on website)
- Complete cohort of 162,455 firms incorporated in UK in 2001 (predominantly micro)
- Survival between 2001 and 2005
- Use data on intellectual property (IP) (patents & trade marks) during the sample period
- Also differences across regions, including house prices and unemployment
- IP active = any time during period plus directors in 1999/2000

Patenting associated with survival

- Find that being a patentee reduces chances of exit (by 55% relative to non-patentee)
- Also include a variable for number of patents
 - ▣ Addition of one UK patent reduces exit (40%)
 - ▣ Addition of one EPO patent reduces exit (41%)
- Also interested in regional aspect
 - ▣ Above results control for regional impact on survival (and range of other variables)
 - ▣ Impact of patenting varies across regions
- Identification issue: patentees may be better managed with better ideas?

Does Patenting Help High-Tech Start-Ups?

- Helmers and Rogers (2009) tackle identification issue
- Face three problems:
 - 1) Heterogeneity** of firms/projects, which may conflate firm/project characteristic with patent 'effect'. Sample is start-up, high tech firms; early patent decision.
 - 2) Simultaneity.** Better performing firms likely to use more patents. Post-patent performance.
 - 3) Survivor bias.** If patenting affects survival, then data sample is biased. Heckman

'high tech' industries

Description	SIC-3
Manufacture of Chemicals and Chemical Products	24
Manufacture of Machinery and Equipment	29
Manufacture of Office Machinery and Computers	300
Manufacture of Electrical Machinery and Apparatus	31
Manufacture of Radio, Television and Communication Equipment	32
Manufacture of Medical, Precision and Optical Instruments	33
Manufacture of Motor Vehicles, Trailers and Semi-Trailers	34
Manufacture of Railway and Tramway Locomotives	352
Manufacture of Aircraft and Spacecraft	353
Software Consultancy and Supply	722
R&D on Natural Science and Engineering	731

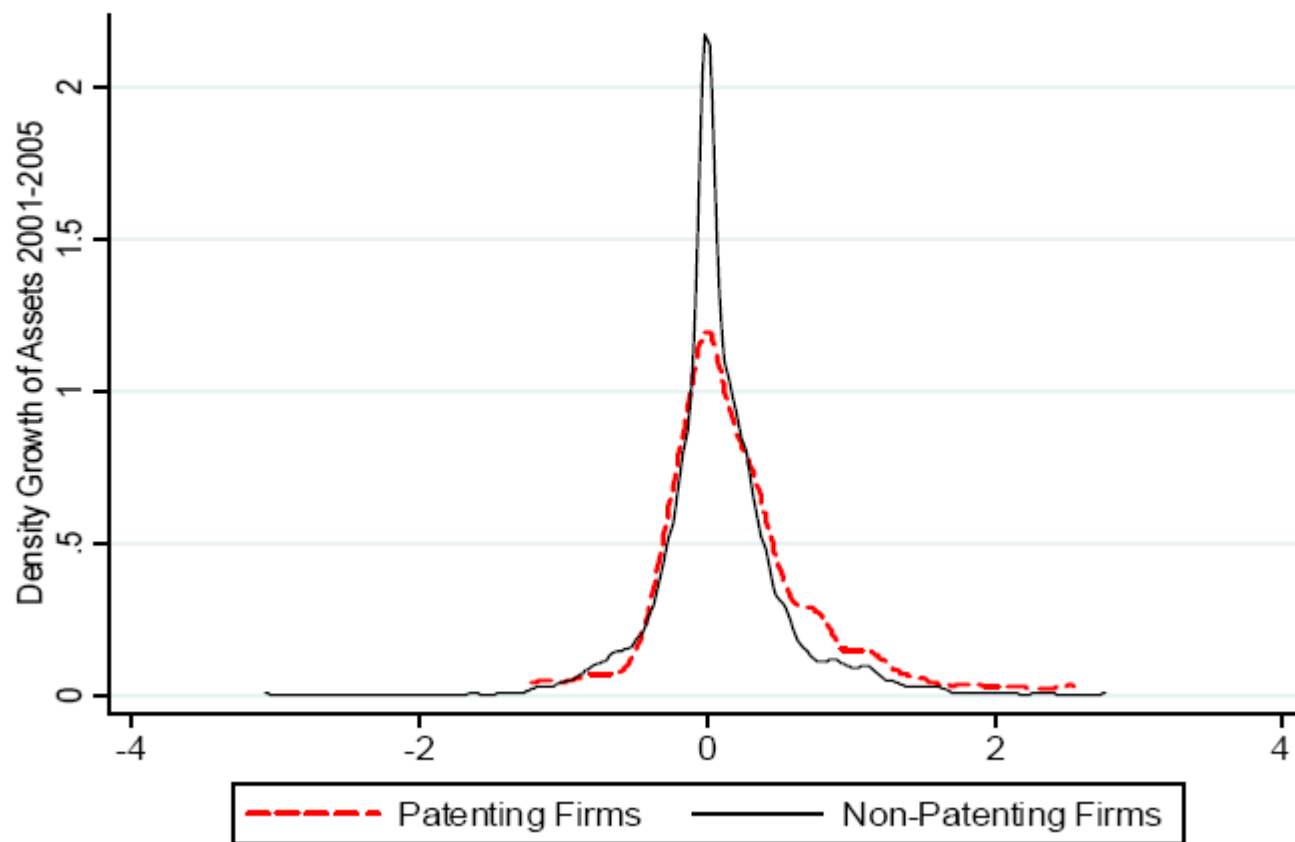
Drop 722 and 731 as
robustness check

Results

- Again find strong positive association between patenting and survival
- Also analyse 'growth of assets 2001 to 2005'
 - ▣ OLS model
 - ▣ Heckman correction model
 - ▣ On going work on non-parametric models
- Helmers and Rogers (2009) find
 - ▣ Patentee has between 0.5% and 12.5% higher average annual growth rate in 5 years after patenting for OLS
 - ▣ Between 9% and 20% for Heckman

Distribution of growth rates

Figure 2: Density Distributions of Patenting vs. Non-Patenting Firms



Conclusion

- For UK firms, the data indicate that patents are not a widely used method of commercialisation
- Universities are increasing their use of patenting and licensing
- There are many possible reasons why UK firms may not use patents
- Empirical analysis set out to study overall impact for complete population of UK firms
 - ▣ Patenting does increase survival (but identification issues)
 - ▣ Identification of patent effect indicates increased

The OFLIP database

- Oxford Firm Level Intellectual Property (OFLIP) data
- Provide first ever overview of IP activity by all registered firms in UK – not just SMEs
- Enables us to track outcomes of IP active firms, both successes and failures
- Use IP as indicator of ‘high growth potential’ firms
- Understanding how small firms develop now is critical to understanding the large firms of future

Overview of database

- Map IP activity of all British registered firms using FAME (Bureau van Dijk) data
- FAME (UK registered firms, from 2000)
 - Approx. 2.1 million active companies (all sizes)
 - 0.9 million 'inactive' (dissolved, liquidated, non-trading, receivership)
- Match current and previous firm names to IP applicant
 - Consolidated IP under each group
- Consider UK patents, UK trade marks, EPO patents, Community trade marks (hope to extend to USPTO)
- Currently, have 2000 to 2005 IP data, and 2000 to 2006 financial data

Publications on data to date

- “An analysis of the characteristics of SMEs that use intellectual property” (Oct 2007) (with Christian Helmers and Christine Greenhalgh)
- “An analysis of the association between the use of intellectual property by UK SMEs and subsequent performance” (Oct 2007) (with Christian Helmers and Christine Greenhalgh)
- “Use of international intellectual property by UK SMEs and UKTI Passport firms” (March 2008) (with Christian Helmers)
- “Innovation and the Survival of New Firms Across British Regions” (with Christian Helmers) (Oxford Uni. Economics WP 419)
- “Does Patenting Help High-Tech Start-Ups?” (with Christian Helmers) IPRIA WP ??

Start-up patent data

- A 'patent' represents a published patent, but it is allocated to application year.
- Firms can be set up to exploit the IP of entrepreneur or scientist
- Observing this is difficult, but we match names of directors to patent applications in 1999-2001 and add these to patents in the firm's name.
- Directors (of 7,638) had 36 UK patents and 47 EPO patents
- Overall, 303 patentees: 70% UK, 58% EPO and 28% both