University patenting and possible measures to increase patenting

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Knowledge transfer from university

- Universities are primarily set up to institutionalise training of students

- Type of training evolves with the nature of protection for labour (unions and social insurance)

- Liberal Market versus Collective Market economies

- Generalist versus specialist training, flexible versus inflexible labour markets

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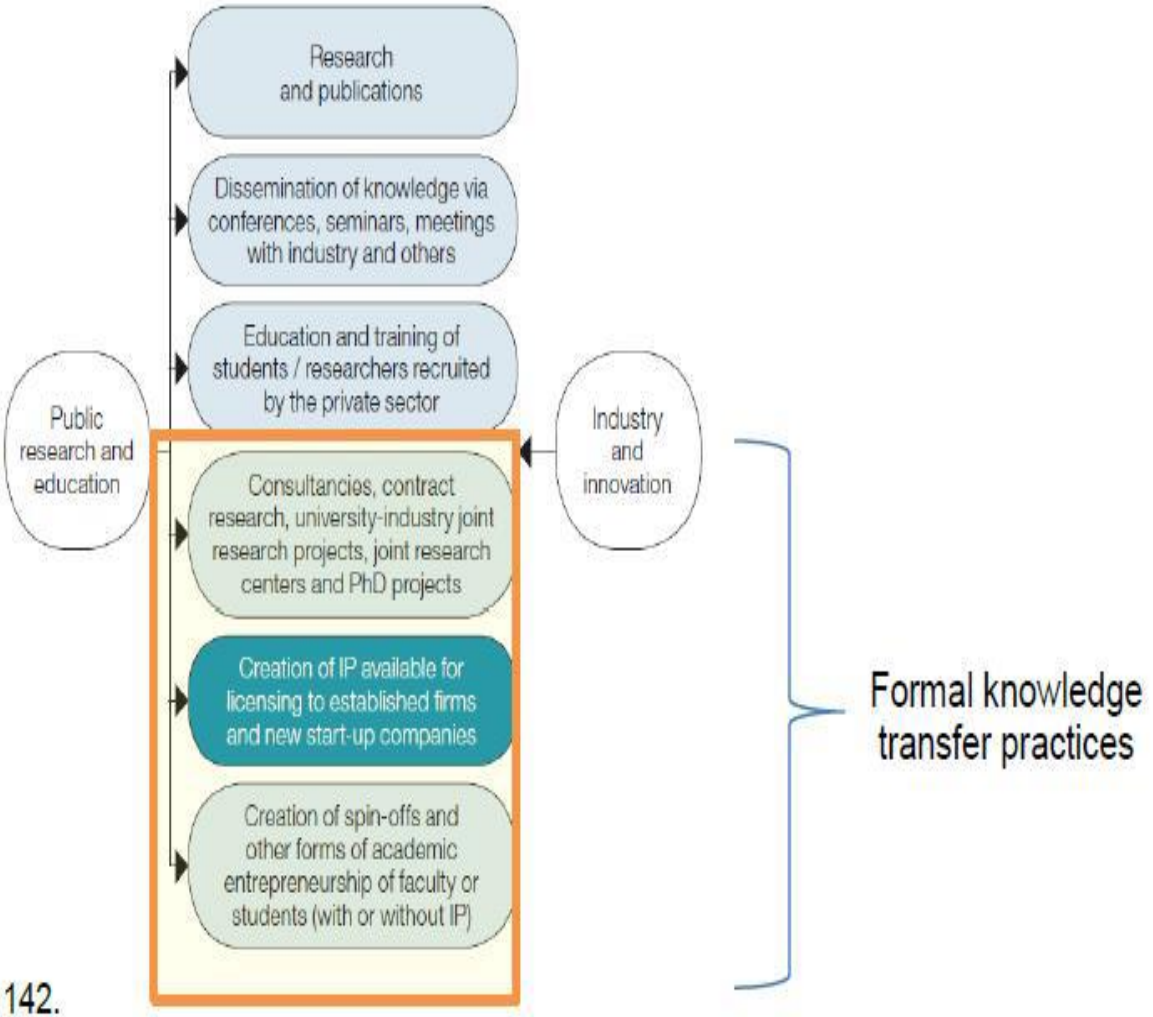
Figure 1. The multiple vectors of knowledge transfer from universities and PROs to industry



Source: WIPO (2011), p. 142.

Why is patenting privileged?

- Based on the linear model of technology (technology push)
- Basic science versus applied research
- Patents capture basic research and advances
- Allow a downstream market to develop in applications

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Cost of patenting an issue?

- Yes, for SMEs, but due to costs of litigation and enforcement
- Problem with university patents is low uptake and not cost (e= 0.16, 0.04)
- University TTO also face problems of assigning value to patented inventions, to promote uptake

Why patenting should not be privileged?

- Patenting is the least important knowledge transfer activity
- More knowledge transfer happens through consultancy and informal contracts (composition effects)
- Related to the roles of tacit and codified knowledge

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Knowledge transfer channels of UK universities

	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09*	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
FTE staff employed in commercialization offices	1,508	1,518	1,612	1,829	1,910	2,001	2975	2,209	2,269	3395	3720	3936
A) Patent applications	1,308	1,648	1,536	1,913	1,898	2,097	1,994	2,256	2,274	1,936	2,076	2,156
B) Patents granted	463	711	577	647	590	653	820	757	826	951	969	953
C) Formal spin-offs established	167	148	187	226	219	191	207	236	170	131	130	129
D) Formal spin-offs still active after 3 years	688	661	746	844	923	982	806	825	818	793	802	836
E) IP income (£million)	43	63	63	61	68	124 §	56	69	79	61	95	102
F) Other knowledge transfer income (million GBP)**	1,508	1,518	1,612	1,829	1,910	2,001	2,975	2,209	2,269	3,395	3,720	3,936

Success in knowledge transfer

- Although technology push is important — and so is the science base of universities
- Demand pull also matters-- absorptive capability of national firms
- But the relative gap between university knowledge and the knowledge of firms most important (Arundel and Wunsch-Vincent 2017)

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Cross country analysis: firms

	Technologically leading firms with IP mediated links with public science	Technologically lagging firms with contractual links with public science
China	Yes, growing number of firms	Yes, major users of public science
Brazil	Yes, but few links with universities except for a few sectors (petrochem, aircraft, agriculture)	Low, limited capabilities of Brazilian firms
South Africa	Yes, a few firms	Policy priority, not yet successful
UK	Yes, many firms	Served by regional universities in the past – present?
Korea	Few links, R&D conducted in-house in large firms	Policy priority for SMEs

	Leading edge research	Culture of consultancy	Culture of entrepreneurship
China	Yes, core of 107 research intensive universities with strong policy support	Yes, consultancy services major source of revenue	History of establishing university-owned businesses
Brazil	Patenting has increased, but serves only a small share of Brazilian firms.	Low participation in R&D agreements in 2014. Informal consulting could be common.	Yes in the Southeast
South Africa	Yes, small number of public universities	Yes, well established	Weak
UK	Yes, 25 leading universities	Yes, by regional universities as well as teaching universities	Yes
Korea	Some leading universities	Strong on collaborative R&D due to gov't support	Low no. of start-ups per university

Framework conditions

	Academic interest	Legal framework	KTO skills	Firm interest
China	High – rapid increase in patents		Many very young.	SMEs main contractors
Brazil	Unknown	Good, but very recent: updated in 2016	Poor, difficult legal framework	Poor
South Africa	Too focused on own research?	Highly developed	Variable, better in PROs than Universities	Some strong user groups
UK	High	Good	Good	High
Korea	High –rapid increase in patents	Good, since 2000	Poor, lack experience	Target SMEs lack funds for licensing

Re-examine the US success

- Unique System of innovation

Nelson and Rosenberg (1994), Research Policy

- Novel legislation – Bayh Dole Act

Mowery and Sampat (2005), Jrnl of Technology Transfer

- “Star” scientists and scientific leaders

Zucker and Darby (2007) NBER working papers

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Re-examine the US success

- Search for “star scientists” part of the ERC agenda
- Issue of individual incentives hidden in search for stars
- Individuals can and do search for applications of their research
- Emerging economies more sensitive to issue of individual incentives

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Conclusions

- ✓ Patenting is a very small part of university activities
- ✓ Very variable across countries and technology fields
- ✓ Encouraging patenting and uptake requires more input on valuation and potential applications
- ✓ Inventors and firms with advanced capabilities can help with this and these inputs need to be catalysed.

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