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**THE ROLE OF THE PATENT SYSTEM IN
PROMOTING R&D AND STIMULATING
TRANSFER OF TECHNOLOGY:
*The Perspective of a Research Institution***

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- What is behind the surge in academic patenting?
- Does patenting affect the quality and quantity of universities' scientific output?
- Does the patent system limit the freedom to perform academic research?

Surge in Patenting

“Reward the creator of a useful thing, and society will gain more useful things.”

“Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefore.”

Surge in Patenting

The boom in patenting (academic) originates from technological revolutions. This has been reinforced by Bayh-Dole Act-like regulations.

Furthermore, many national & regional authorities have sponsored the creation of TTO local universities, aiming at maximizing knowledge spillovers from universities to industries.

Licensing of university patents are one of the most widespread forms of such TT, due to their legal clarity.

Surge in Patenting

- ❖ **Distinction between the private and the public domain of knowledge has blurred.**
- ❖ **IPR , formerly restricted to privately funded research, today protects publicly funded research results.**
- ❖ **Public scientific activity is moving slowly but surely in the same direction as the private one.**

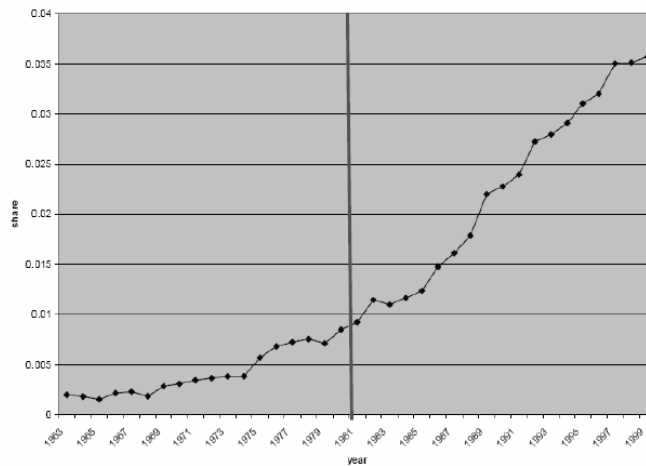
Surge in Patenting

Governments have approved laws facilitating the private appropriation of knowledge, previously considered in the public domain.

The Bayh Dole Act in the US, and similar laws in other developed countries, have authorized universities and other public research institutions to patent and license what is used to be in the public domain.

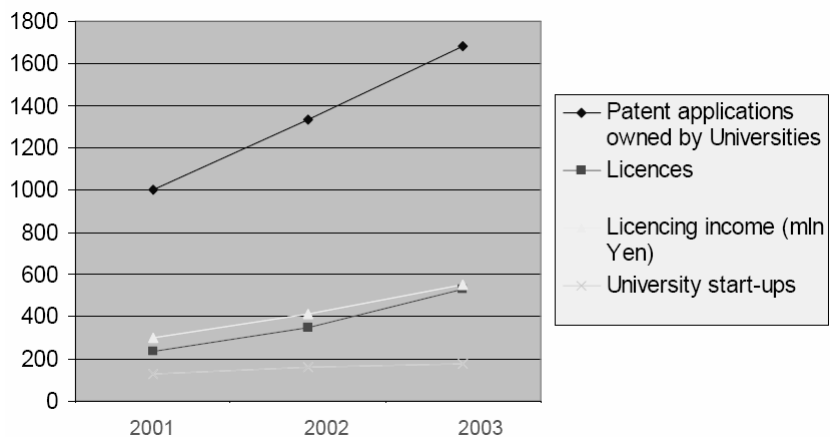
Patents granted to Research Institutions

The Bayh-Dole Act in the United States: US research university patenting before & after passage of Bayh-Dole Act in 1980



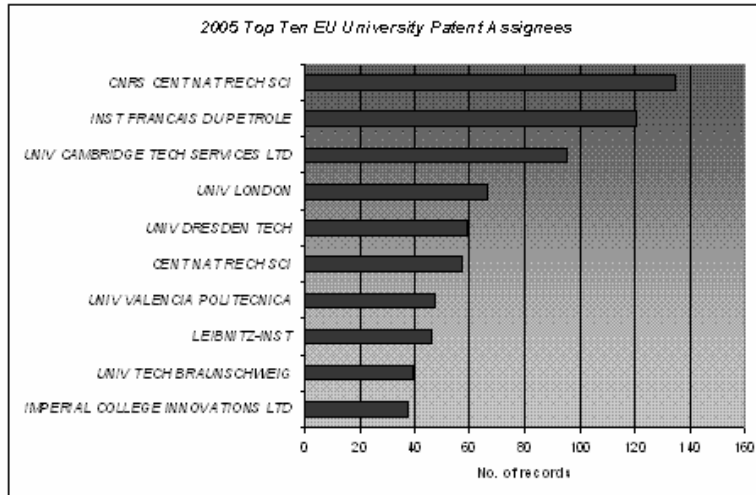
Percentage of US Patents Granted to Research Universities

Patents granted to Research Institutions



Effects of Japanese Bayh-Dole Act passed in 1999

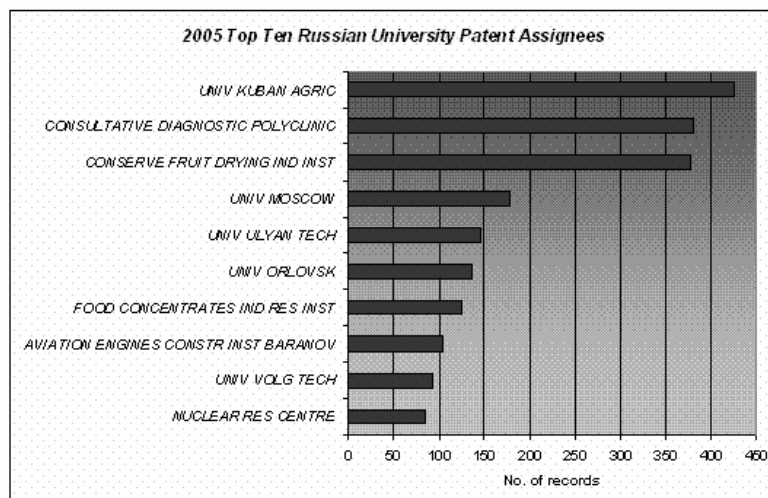
Patents granted to Research Institutions



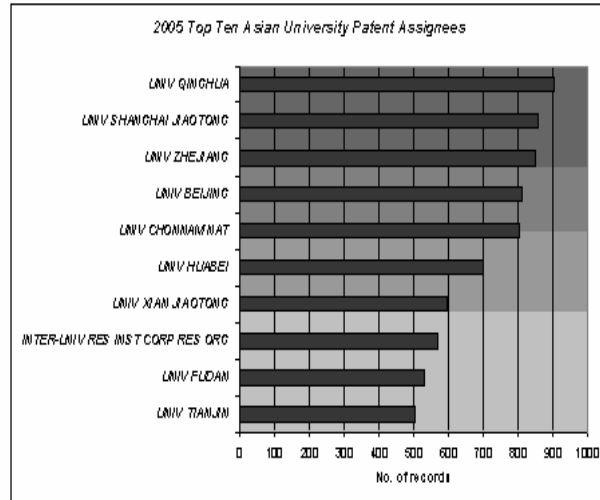
Records

Total number of inventions for ten European academic institutions in 2005

Patents granted to Research Institutions



Patents granted to Research Institutions



Inventions Total number of inventions for ten Asian academic institutions in 2005

Surge in Patenting

	<i>Number of inventions by academic institutions worldwide</i>	<i>Total number of worldwide inventions</i>	<i>% of academic inventions to total</i>
2000	18,414	660,328	2.79%
2001	21,175	710,241	2.98%
2002	23,843	768,159	3.10%
2003	30,547	769,363	3.97%
2004	32,057	800,350	4.01%
2005	42,368	842,744	5.03%

Total numbers of inventions recorded in *Derwent World Patents Index* for academic institutions, compared to the global total, from 2000 to 2005.

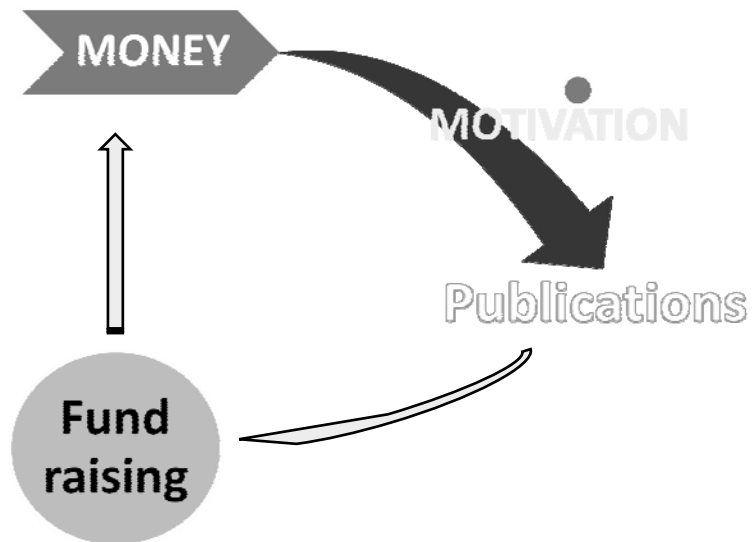
Patenting and Scientific Quality Output

- ❖ Fulfilling the patenting criteria requires the non-disclosure of the invention as long as a patent application has not been filed, especially in countries – such as most EU member states – offering no grace period.
- ❖ The increasing private funding of academic research frequently induces restrictions on the disclosure and timing of publication of the outcomes

Delays in diffusing and sharing data and results with other researchers are often attributed to requests by commercial partners.

The effect of increased secrecy might slow the pace of research by making it impossible to verify results and by increasing duplicate research activities.

Money and publications



Patenting and Academic Freedom

- Increasing privatization of knowledge and;
- The corresponding shrinkage of the public domain.

Academic Freedom?

Historically, IPR focused on the protection of research outputs rather than inputs.

At present, there is a strong tendency to shift the focus of IPR protection to the inputs themselves.

IPR protection covers products and processes in all sectors including pharmaceuticals, food industry and agriculture as well as restrictions on copyright exceptions.

Academic Freedom?

- ❖ Protection of secondary databases;**
- ❖ Patenting of research tools (scientific knowledge that used to be in the public domain);**
- ❖ Rules on data exclusivity;**
- ❖ Material transfer agreements (MTAs);**

Academic Freedom? Some views

- ❖ **Patents may now impose significant constraints and costs upon foundational research.**
- ❖ **Patentability of a broad range of the inputs that researchers need to do their work may give rise to “the tragedy of anti-commons” that may make the acquisition of licenses and other rights too complicated to permit the pursuit of what otherwise should be socially and scientifically worthwhile research.**

Academic Freedom? Some views

- ❖ **Prospect of realizing financial gain from upstream research may discourage researchers from sharing information & research materials with one another, thereby hindering research efficiency and complementarities.**
- ❖ **Prospective financial gains from patenting may induce researchers to choose research subjects on the basis of commercial potential rather than social & scientific merit.**

- ❖ **Research institutions find themselves confronted with the so-called “patent thickets and royalty stacking”.**
- ❖ **The patent thicket is a major problem because useful innovations in many technology fields require multiple inventive steps and technologies.**

Examples of thickets and anticommons

Monsanto’s patent on the process of transforming plants through the use of *Agrobacterium tumefaciens* is claimed so broadly that it could exclude all plant transformation processes that use any engineered bacteria to transfer foreign DNA into plant genomes.

Monsanto’s patent on the neomycin phosphotransferase (*nptII*) gene, one of the most commonly used selectable markers, which confers antibiotic resistance in transformed plant material.

Examples of thickets and anticommons

Golden Rice project. The provitamin A–enhanced rice was developed for humanitarian purposes to combat blindness & malnutrition in developing nations. Developing the rice required access to over 40 US patented technologies.

The genes *BRCA1* & *BRCA2* have recently been associated with hereditary breast cancer. A diagnostic procedure for identifying the genes was licensed exclusively to Myriad Genetics, which went so far as to block testing by a University of Pennsylvania researcher.

The fast-paced software and semiconductor industries also face similar difficulties.

Patent – Public Research Institutions

Patents on early fundamental discoveries (especially scientific building blocks) may discourage or limit their use and hence slow the pace of research in that field. The most widely quoted example is the Cohen-Boyer patent on recombinant DNA.

Allowing genetic information to be patented, researchers will no longer have free access to the information and materials necessary to perform biological research. This issue of access to research tools relates to ability of a patent holder to exclude others from using the material.

A single patent holder having a proprietary position on a large number of nucleic acids, may be in a position to “hold hostage” future R&D efforts”.

Freedom at Risk?

According to National Academies of Science, intellectual property rights do not impede research:

Only 1% of the random sample of 398 academic respondents reported suffering a project delay of more than a month due to patents on knowledge inputs necessary for their research, and *none of them had stopped a research project due to the existence of patents.*

John P. Walsh, Charlene Cho, and Wesley Cohen, "Patents, Material Transfers and Access to Research Inputs in Biomedical Research," September 20, 2005, 37, available at [<http://tigger.uic.edu/~jwalsh/WalshChoChoenFinal050922.pdf>].

Freedom at Risk?

Academic patenting has only limited effects on the direction, pace and quality of research.

Scientific anti-commons show very little effects on academic researchers so far, limited to a few countries with weak or no research exemption regulations.

Benefits of academic patenting on research exceed their potential negative effects.

Nicolas van Zeebroeck et al. Journal of Intellectual Capital
Vol. 9 No. 2, 2008 pp. 246-263

The Role Academic institutions

On average, U.S. universities receive licensing royalties equivalent to only 2%–4% of their research budgets.

The Role Academic institutions

As patent holders, universities can exercise control over how a product is priced in LIC. Yale and Bristol Meyers Squib reduced the price of Stavudine (d4T) in South Africa by more than 95 % by agreeing not to enforce the patent there.

Public research institutions in most developing countries are not yet directly concerned by the issues discussed above

The role of National Patent Offices in TT

**Making the expertise of
National & Regional Patent
Offices available for fostering
the technology transfer from
university to industry**

The role of TTO

**A Technology Transfer Office (TTO) in each of the Universities will
strive to:**

- ❖ Raise awareness about the patent system in public research institutions**
- ❖ Promote the institution of IP curricula**
- ❖ Encourage the exploitation of IPRs in the transfer of technology from universities to industry**

The role of National Patent Offices in technology transfer

- ❖ **Develop IP management capacity in publicly funded research organisations**
- ❖ **Promote commercialisation of research results**
- ❖ **Use academic research results as information source for enterprises**

A WAY FORWARD

Many university scientists tend to ignore patents. In today's climate, where technologies are at the crux of science, it is difficult to see how professors could successfully perform any meaningful research without infringing patents.

Broad claims on early discoveries that are fundamental to emerging fields of knowledge are particularly worrisome in light of the great value, demonstrated time and again in history of science and technology, of having many independent minds at work trying to advance a field. Public science has flourished by permitting scientists to challenge and build upon the work of rivals.