IP protection, confidentiality and openness in science

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Two points

- "Two worlds" view of knowledge exchange
- Evidence on the impact of IP on scientific research

These slides available on my website afterwards

http://bronwynhall.com

General setting

Production of scientific knowledge, software, databases, share common features

- many actors contribute; production is cumulative
- some producers are also consumers
- Incentive problems due to indivisibility and inappropriability

Two different modes of production have emerged

“Two worlds” of invention

- “Republic of science” model
  - Incentives from returns to priority
  - Encourages early publication and dissemination
  - Use of others’ output at low cost - appropriate citation; reciprocity
- Private sector with strong IP
  - Incentives primarily financial
  - IPRs encourage publication, but only of codified knowledge; trade secrecy often used in addition
  - Use of others’ output requires payment or reciprocal cross-licensing (transactions costs)

Gambardella-Hall model

- Equilibrium
  - researchers do both, but public domain share is unstable without coordination
  - Coordination sometimes achieved via social pressure
- Defection occurs when
  - Number of participants grows large
  - Size of the reward increases
  - IP protection is available
- Numerous examples in early stage industry (collective invention) as well as in academia

Implications for software and databases

- More likely to be privatized because
  - Greater market demand (higher profit)
  - Scientific norms are weaker; reputation effects not as great
  - Require maintenance and user help, and these are not rewarded by priority
  - More non-producing consumers
- Public and private production can coexist (as in our model)
- As market grows, privatization more likely
  - individuals earn discrete profits from defecting, but have infinitesimal effect on value of public good

Evidence on IP impacts

- When university scientists patent upstream results, is there an impact on scientific research?
  - Walsh et al. 2000 – industry adapting
    - vast majority of respondents say that there are no cases where valuable research projects were stopped due to IP problems.
    - Firms take licenses, invent around patents, infringe, develop public databases, challenge patents in court

Evidence on IP impacts

- Murray&Stern 2007 – life science patent-paper pairs – citation to research in the paper declines 9-17% after patent grant
- Walsh et al 2007 – survey 507 academic biomedical researchers,
  - access to knowledge inputs largely unaffected by patents.
  - access to other researchers' cell lines, reagents, or unpublished information more problematic due to scientific competition, the cost of providing materials, a history of commercial activity on the part of the prospective supplier, and whether the material in question is itself a drug.

Evidence on IP impacts

- Thompson, Mowery, Ziedonis 2011 – look at ~500 UC patent-paper and MTA-paper pairs
  - find negative impact only in life sciences, which disappears when matched on pre-grant cites
  - small negative impact for MTAs with the private sector, and licenses on research tools

Conclusions

- Little impact broadly but
  - Maybe in life sciences
  - Definitely in MTAs
- As predicted by H&G,
  - In areas where rewards are large
  - When IP becomes available (subject matter broadening?)
  - On data-type inputs that are costly to provide