Environmental change, patents, and development

Bronwyn H. Hall
University of California at Berkeley and
University of Maastricht

Based on joint work with Christian Helmers, U Carlos III Madrid and LSE

Environmental change, patents, and development

- Title in the program: *Innovative intellectual property strategies for pooling knowledge and technologies in addressing global challenges*
- Talk gives a couple of examples of these strategies and discuss what we learn from them
- Our broader research program focuses on the role of patents and other IP in fostering or discouraging innovation directed towards the environment, sustainability, and climate change mitigation, with a special emphasis on developing countries.

Papers (all joint with Helmers)

- The role of patent protection in (clean/green) technology transfer, *Santa Clara High Technology Law Journal* 26 (2010): 487-532.
- The impact of joining the regional European Patent Convention system, July 2012
- Innovation in clean/green technology: Can patent commons help? NBER Working Paper No. 16920 (March 2011); UNU-MERIT Working Paper No. 2011-025.
- work with WIPO and INAPI (Chilean IP Office) on patenting in Chile

Hall-Helmers 2010 background

- Double externality
  - Green technology policy needs diffusion as well as innovation
- Green technology is highly varied, draws from many scientific and engineering disciplines
  - Much is complex (e.g., electric & hybrid cars)
  - Some is low tech; highly substitutable (e.g., clean stoves)
  - Some requires standard-setting (e.g., smart grid)
- Patents may raise transanctions cost and slow diffusion

Green/clean technology in developing countries

- Premise: climate change mitigation depends on worldwide adoption of clean technologies
- What is the role of IP protection in encouraging or discouraging tech transfer to developing economies?
  - first, we survey the evidence
- Do new methods of sharing IP help this process?
  - then discuss 2 attempts to offer access to patented technology

Two questions for research

- Does stronger patent protection encourage technology transfer?
  - How does it affect the behavior of foreign firms? - Stronger IP protection in the host country should encourage (or at least not discourage) transfer of technology.
- Does stronger patent protection encourage technology development?
  - How does it affect the behavior of domestic firms? - Stronger IP could encourage their innovative activities, but can also discourage imitation and inhibit learning and catchup.

Some other useful surveys

- Branstetter, Lee G. 2004. Do Stronger Patents Induce More Local Innovation? *Journal of International Economic Law 7*(2), pp. 359-70.
- Maskus, Keith E. 2004. Encouraging International Technology Transfer, Geneva, Switzerland: ICTSD and UNCTAD Issue Paper No. 7.
- ICTSD and UNCTAD. 2003. Intellectual Property Rights, Implications for Development Policy Discussion Paper, Geneva, Switzerland: ICTSD and UNCTAD.

1. Tech transfer

- For middle income countries that already have innovative capacity or capable of imitation
  - Both tech licensing and FDI respond to stronger IP regimes
  - Quality of technology transferred rises, and there is a shift toward licensing (markets for technology)
- Very low income countries see little response
- IPRs are not very highly ranked by firms as an influence on tech transfer, except for R&D facilities and very advanced technologies.

2. Patents & tech development

- Stronger patents encourage patenting in general, especially by firms and countries on the frontier
- Difficult to find clear evidence of positive impacts of stronger patents on innovation, except in chemical-related sectors
  - Many other factors matter, so the experiments are often not clear
    - we don't see enough variation in patent systems, and it takes time for firms to adjust
  - It is rare to have an independent measure of innovation (other than patents), so R&D effort used as proxy
- Historically, IP systems have developed in parallel with the innovative part of the economy

An unanswered question

- Is the marginal scientist or engineer in a developing country better employed
  - examining patents?

    OR
  - doing R&D?
  - commercializing new technology?
  - advising firms on adoption of new technologies?

Two “experiments”

- Eco Patent Commons – created by IBM & others at the WBCSD
- GreenXchange – created by Nike & others

GreenXchange

- Created January 2010 by Nike with ~400 patents
  - Other participants are a very mixed group: Yahoo!, Best Buy, Creative Commons, IDEO, Mountain Equipment Co., nGenera, Outdoor Industry Association, salesforce.com, 2degrees
- Only 19 additional patents added (Best Buy and UC Berkeley)
- 3 types of license:
  - standard – a royalty-free license (like EcoPC)
  - standard plus – a license with restrictions/payment
  - research non-exempt – allows improvement and patenting for nonommercial use (designed for universities)
- BUT, in practice (on the website today) only 2 standard, 5 standard plus, 456 research licenses offered on website

Some lessons from GreenXchange

Source: Ghafele and O'Brien (ICTSD Policy Brief #13)

- traditional IP model very strong and hard to overcome
- many firms want access to people behind the patent rather than just the patent – importance of tacit knowledge
- limited resources – website is essentially useless for anyone who is interested in knowing what is available

The eco-patents commons

- Created January 2008 by IBM at World Business Council For Sustainable Development (WBCSD)
- First green patent commons
- Firms can pledge patents related to green technology (defined by IPC subclasses, but flexible)
  - 11 firms have done so (from the “triad”), about 120 patents
- Available to third parties for climate-change related activities with auto royalty-free license
  - ownership remains with firm
  - not a donation, and not tax deductable
  - defensive termination right

A small puzzle about the EcoPC

- Why a patent commons?
- Why not use defensive publication?
  - Keeping these patents in force requires paying fees (which the firms apparently do)
  - Royalty-free license to all comers with no contracting means they don't even know who uses the technology
  - Is defensive termination that valuable?

Some critical views

[I]t is clear that the donating company did not find the patent to have compelling com-petitive advantage for them, or they would not have donated it to begin with, so why would any other company necessarily find value in the donated patent?

Nancy Cronin, Greenbizz 2008

Why would a patent owner contribute a patent, continue to sustain the maintenance costs, yet have the patent commonly available to all having under-taken to not enforce the patent?

Duncan Bucknell, Think IP Strategy - 2008

IBM view

[P]ledging patents for free use by others [...] can be a win for innovators in other parts of the world, who might look at these ideas and further them and use them as the basis of additional solutions. And it can be a win for those who pledge because it could open up opportunities to collaborate with people that you might not otherwise have collaborated with.

(Wayne Balta, Vice President of Environmental Affairs, IBM)

Our study

- Analyze 94 unique priority/publn authority combinations (total of 238 equivalents) listed on the Ecopatent Commons website.
  - What do firms contribute?
  - Why do firms contribute?
  - Can we learn something about patents and the diffusion of climate-change mitigating technologies?

Data

- Unit of analysis: patent
- 121 patents contributed to the EcoPC by the 11 firms, listed on WBCSD website
- October 2011 edition of EPO's PATSTAT:
  1. EcoPC: 94 unique priority/publication authority with priority years between 1989 and 2005 plus their equivalents (238 total)
  2. Control (1) sample: all patent applications worldwide by the 12 EcoPC firms (683,155 equivalents)
  3. Control (2) sample: all patent applications worldwide in same IPC class (113,812 equivalents)
  4. Random subset of control(2) matched on IPC, priority year and authority to the EcoPC patents, to enable manual data collection (473 equivalents)

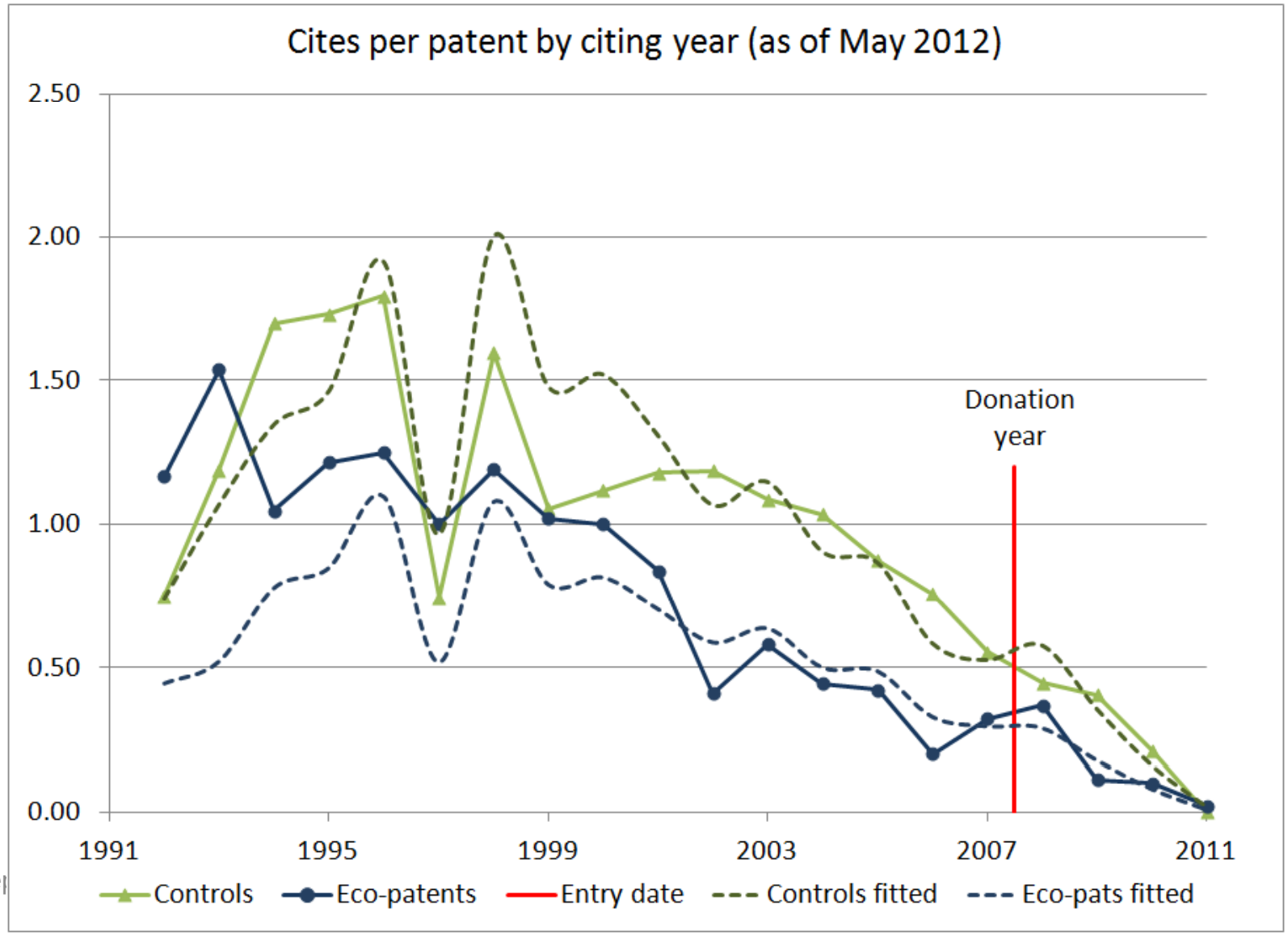
Summary of findings

- Green patents by OECD definition more likely to be pledged
- Pledged patents tend to be narrower
- Pledged patents appear to be less valuable than the typical patent in the class
- Pledged patents indistinguishable from the other patents in a firm's portfolio, except
  - they are more green
  - much less likely to match the IPC pattern of the firm, suggesting that they are not central to firm strategy
- Pledged patents just as likely to be kept in force

Diffusion?

- Cannot tell whether inventions protected by pledged patents are used
- Look at diffusion by analysing whether patents are cited before and after donation
  - compared to subset of control(2) patents
- Conclusion: these patents are cited *less* before donation (and also after).
- Who cites them?
  - more likely to be individuals or non-profits/ universities (than cite the controls)
  - mostly developed country institutions & authorities

EcoPC cites decline earlier than those for the controls



Further comments on the commons

- Technologies mostly related to environmental cleanup, mitigation of pollution, improvement in engine efficiency
- Some issues with setup – 12 patent numbers (10%) wrong on website
- One quarter of EcoPC patent applications have expired, been rejected, or withdrawn
- One quarter are not yet granted
- …..BUT legal status distribution for controls is similar with even fewer in force

Summary findings

- What do firms contribute?
  - Relatively narrow green patents
  - Far from firm's core technology
  - ……maybe less valuable
  - No longer useful?
- Do these patents contribute to the diffusion of environmental technologies?
  - Not clear – wait for longer cite history
  - Hard to tell if there is actual use of inventions
  - no difference between cites & controls in the origin of the citations (publication authorities)

Overall conclusion

- So far, these “commons” or “exchanges” have not yielded much.
- Relatively few patents are actually donated.
- Patents are often not that useful by themselves.
  - those that really have a valuable exclusionary effect will not be donated
  - others might have useful information but the information is often incomplete
- Hard to see the use if users do not at least have to register.