

## INTELLECTUAL PROPERTY

### Patently absurd?

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**Patents that protect not only inventions but also ways of distributing and selling them are causing an uproar. But are more traditional patents—granted for inventions that are novel, non-obvious and useful—any better at promoting innovation?**

A PATENT is the way of rewarding somebody for coming up with a worthy commercial idea. But putting a price on a good idea is a near-impossible task. Different countries have different schemes, although world bodies—such as the World Intellectual Property Organisation—have recently been trying to harmonise the patchwork of legal issues created by countries' different patent regimes. Since America is the innovation centre of the world and the place where new ways of protecting intellectual property first appear, developments there are watched keenly by entrepreneurs and policymakers everywhere.

The American constitution gives the government power to issue patents "to promote the progress of science and the useful arts". This remains a laudable goal. Recently, however, the Patent and Trademark Office (PTO) in Washington, DC, has received nothing but criticism for its efforts. In 1998, the agency landed itself in the soup when, at the behest of the courts, it began to issue patents for "business methods". Since then, it has been possible to protect not only gadgets and gizmos, but also the means for selling or distributing them. Among the most egregious examples were Amazon's patent on the "one-click" ordering system, Priceline's patent on "reverse auctions" on the web, and E-Data's patent on selling "material in a download fashion via the Internet".

This is no laughing matter. Prominent experts, such as Lawrence Lessig of Stanford Law School and Tim O'Reilly, a software publisher and champion of the open-source movement, fume that one-click purchasing or online auctions are trivial implementations of existing technology, not genuinely novel methods or concepts, which are what patents are meant to defend. Fencing off such obvious ideas, they argue, will throttle the growth of the Internet.

The continuing controversy over patents for business methods centres on how to ensure that the American patent office awards only "good" patents—that is, patents for ideas that meet the three original legal requirements of being truly novel, non-obvious and useful. However, important as it is, this question has obscured a more pressing debate on whether even "good" patents do what they are meant to do—reward invention and, thereby, encourage innovation.

Innovation does not happen by accident. It takes long hours and a great deal of investment—often many millions of dollars. By conferring a monopoly to exploit a particular technology for a fixed period of time (increased recently in America from 17 to 20 years to bring it into line with Europe), patents create incentives for investors to put money into risky new ideas. But monopolies create problems of their own. Firms or individuals holding patents must register and defend them, risking potentially crippling lawsuits. Those without patents must license them, or engage in inefficient and anti-competitive alliances.

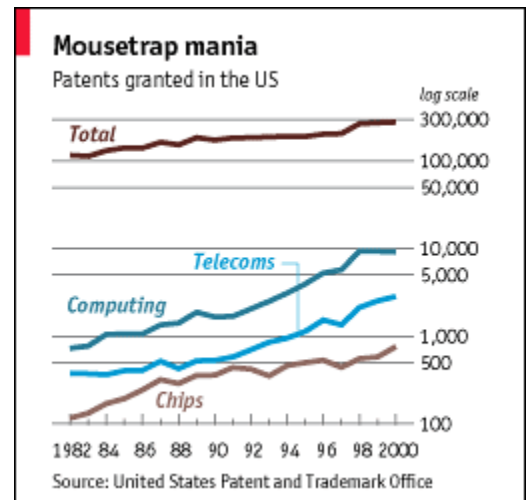
Economists have tussled for decades over ways to balance these costs and benefits. That debate is now taking a fresh turn. Growing numbers of economists are unearthing evidence that America's patent regime is out of step with precisely those values it was designed to promote. Some believe that, in certain industries, strengthening intellectual-property protection accomplishes nothing positive. Others think that it may actually do some harm. If these economists are correct, patent-holders themselves may soon start clamouring for weaker, and not stronger, protection.

#### Thickets and commons

"Everything under the sun made by man is patentable," asserted the American Supreme Court in a landmark decision in 1980 that left inventors scrambling to stake out their places in the sun. Between 1982 and 1992, the number of patents issued each year in America doubled from 55,000 to almost 110,000. "We are the patent office, not the rejection office," said Bruce Lehman, the PTO's commissioner at the time. Computers led the patent surge, with the number of related patents tripling between 1982 and 1992. Semiconductor patents increased fivefold over the same period (see chart).

As a result, Carl Shapiro, an economist at the Haas School of Business at the University of California, Berkeley, says that computing, semiconductor and information-technology firms now encounter a “thicket” of patents that constrain their inventiveness. This phenomenon has been dubbed the “Tragedy of the Anti-Commons”—in contrast to the classic “Tragedy of the Commons” that described how free resources such as fresh air and clean water could be over-used and destroyed by selfish agents. Here, the opposite occurs: when lots of property owners have to grant permission before a resource can be used, the result is that the resource tends to be chronically under-used. “In the case of patents,” says Mr Shapiro, “innovation is stifled.”

Do firms become more innovative when they increase their patenting activity? Studies of the most patent-conscious business of all—the semiconductor industry—suggest they do not. Rosemarie Ziedonis at Wharton Business School in Pennsylvania and Bronwyn Hall at Haas found that investment in R&D (a reasonable proxy for innovation) did not substantially increase during the industry’s most feverish period of patenting. Instead, semiconductor firms simply squeezed more patents out of each dollar they spent on R&D. From 1982 to 1992, the chip makers doubled their output of patents from 0.3 to 0.6 for every million dollars of R&D. That was at a time when the patent yield in other industries had barely budged.



Had the chip makers really become more innovative? Or had they simply spent more of their R&D money on applied development and less on blue-sky research? More to the point, had they just started harvesting patents from their laboratories more systematically? The companies claimed not to have shifted their research strategies to be concentrating on more practical things. For their part, the Wharton and Haas economists found no evidence to suggest that the firms had become more innovative as patent rights became stronger.

Tellingly, the consensus among employees who were questioned by the researchers was that the average “quality” of their firms’ patents had declined. Though patent quality is a difficult notion to measure, the number of times a patent is cited in the technical literature is the nearest thing to a yardstick. And it is a fact that citations made per semiconductor patent declined during the 1980s. On balance, semiconductor patents seemed to have become less useful.

The chip makers’ biggest response to increased patent protection came in changes to the way they managed their patenting processes. For a start, they hired intellectual-property lawyers and introduced incentives for engineers to write patent applications—in a bid to increase the “output” from their R&D.

This affected the nature of the patents themselves. Interviewees told the two business school economists that, rather than patenting to win exclusive rights to a valuable new technology, patents were filed more for strategic purposes. In doing this, the companies sought to build up their portfolios of newly-won patents so that they could use them defensively as bargaining chips to ward off infringement suits, or offensively as a means of blocking competitors’ products.

No surprise, then, that an increase in patent protection leads to an increase in patenting activity. What is surprising is that—as the evidence collected by Ms Ziedonis and Ms Hall suggests—increasing patent protection does not necessarily imply a rise in innovation. Indeed, the rush to acquire patent portfolios could slow down the generation of new ideas. Such “portfolio wars”, as Ms Ziedonis and Ms Hall point out in the spring 2001 issue of the *Rand Journal of Economics*, could lock firms into a zero- or even negative-sum game. “In the end, none of them would succeed in increasing their returns to innovation,” the authors warn.

Why did the semiconductor industry enter a portfolio war? The computer, electronic, semiconductor and information-technology industries are prone to such races because they depend on “complex” technologies, says Wesley Cohen, an economist at Carnegie Mellon University. In industries that use complex technology, the value of any particular patent depends critically on the ability to use related technologies. Since it is rare that any one company will hold all the patents involved, rival firms in complex industries depend on each other to get innovations to the market.

For instance, a new adder register for a microprocessor cannot function without the chip’s timing circuit or memory bus. Intel may be extremely inventive, but it does not own the patents on all the components needed to make such an enormously complicated device as a Pentium 4 processor. Innovation at this level can be stifled if the developer cannot secure permission to use other key components.

In contrast, the “discrete” technologies used in the pharmaceutical, chemical and medical-equipment industries rely more on “stand-alone” patents. A new drug, for instance, does not depend on other patented drugs to do its job. In these industries, says Mr Cohen, the role of patents is not for bargaining purposes, but simply to secure greater returns from investment in research.

### **Skirting the thicket**

Because of the strategic nature of their patenting, companies in complex industries run financial risks when they develop new products. Inventions made by semiconductor firms such as Intel and Motorola may unwittingly infringe dozens of patents owned by other companies. The offending manufacturer would then have to pay licensing fees to many of its competitors. Worse, it could be sued for patent infringement, even if the technology in question had been bought from some other firm. More disastrous still, it might go into mass production, only to find itself having to halt everything—at great cost—when a patent emerged that covered some aspect of the item being produced. For firms that have invested heavily in specialised plant and equipment to make a new product, “hold-up” (as patent lawyers call it) is more than just an inconvenience.

With so many problems, semiconductor, computing and telecoms companies have had strong incentives to find ways of trading intellectual property safely. Many firms have collaborated on carving out “litigation-free zones” within the patent thicket. By allowing manufacturers to avoid costly litigation, such arrangements benefit the producers significantly. Whether they do the same for consumers is another matter.

Firms such as Intel, IBM, Motorola and Sun Microsystems frequently use cross-licensing agreements to swap intellectual property with each other. The problem is that large organisations like these already enjoy powerful patent rights from their existing portfolios, whereas smaller firms and newcomers do not. By raising the bar for entry, cross-licensing can reduce competition. Moreover, powerful companies may coerce smaller ones with desirable technology into entering cross-licensing agreements by brandishing threats of hold-up or litigation.

A similar concern formed the substance of the case brought by America’s Federal Trade Commission (FTC) against Intel. The proceedings were settled in early 1999 when Intel consented to provide its competitors with technical information about its products, but the FTC’s broader worry was ignored. The European Union’s competition authorities in Brussels are now investigating further complaints against Intel for alleged anti-competitive practices.

### **Pooling patents**

Another popular way of skirting the possibility of patent infringement is for two or more companies to pool their patents in a given field and to license them as a package, for a fixed fee, to each other and to third parties. Such “patent pools” come in handy when industries need to set technical standards or protocols for a new type of technology.

Because patent pools lead to co-operation among “horizontal competitors”, antitrust authorities understandably view them with suspicion. In 1998, when America’s Department of Justice approved a pool of DVD (digital video disc) patents shared by Philips, Sony and Pioneer, the department insisted that the pool contain only those patents deemed essential to the technical standard. The European Union has also made discouraging noises about the negative effects of patent pools on competition.

As a last resort, firms with conflicting patents can attempt to merge or pay one another to leave the field. Neither of these techniques necessarily advances competition. Indeed, such moves may well hinder it. “We cannot presume that private deals are in the public interest,” says Dr Shapiro. But they may not be in the interest of firms either. While private settlements may help companies avoid litigation with one another, they can increase the chances of being sued by antitrust authorities.

Other strategies that bypass the patent system altogether may cause less damage to competition. Good old-fashioned secrecy may work just as well for generating returns from intellectual property. Firms try to ensure secrecy by binding employees with contractual non-compete clauses or non-disclosure agreements. Secretiveness sometimes verges on the paranoid. Scientists and engineers at Xerox’s Palo Alto Research Centre (PARC), for instance, were discouraged from searching an online database of patents maintained by IBM. Xerox feared that if IBM tracked the pattern of inquiries made by its engineers at PARC, the computer giant could build a fairly accurate profile of the kind of research under way in the Palo Alto laboratories.

The importance of secrecy was borne out by a survey done recently by Carnegie Mellon’s Mr Cohen with Richard Nelson of Columbia University and John Walsh at the University of Illinois. The team surveyed R&D managers at some 1,500 laboratories in 66 different industries. Overall, the managers rated secrecy and lead-time (ie, “first-mover

advantage”) as the most important mechanisms for appropriating returns on innovative products. For process innovations, secrecy led rankings, too.

In discrete industries, such as pharmaceuticals and medical equipment, managers regarded patents as the main way of protecting new products. For more complex industries, such as semiconductors and telecoms, managers felt only half as confident about patents. In a separate study, Mr Cohen has found evidence to suggest that the discrete industries’ heightened perception of patent protection has encouraged them to be more innovative than is the case with the complex industries.

If patenting does not spur innovation in complex industries such as semiconductors, computers and telecoms, what does? Much of the return on R&D that they see appears to be wrapped up in the competitive advantage gained from having products with fairly long lead-times. Also, governments invariably provide hidden subsidies to firms in the form of R&D tax credits. And in many countries, the complex industries invariably get some form of special treatment—whether through government-sponsored collaborative research projects (think Sematech, Esprit, Third-Generation) or through non-tariff barriers and other ways of protecting national champions, defence contractors and so-called strategic industries.

In an ideal world, the American PTO would have the authority to distinguish between areas where strong patents promoted innovation and those where they hindered it. But there is no simple way of doing this. More realistically, policymakers need to examine how firms use property rights once they have them.

One thing is clear: the stronger patents are made, the greater the incentive to avoid them. And avoidance leads to anti-competitive practices. The alternative—secrecy coupled with first-mover advantage—may impede the informal flow of information as well as the formal trading of know-how between firms. That, also, is hardly a recipe for promoting innovation. On the other hand, cross-licensing appears to stimulate R&D—and, by inference, the pace of innovation.

Gauging the relative merits of these countervailing claims will take years. According to Joshua Lerner, an economist at Harvard Business School, “one of the big lessons that comes out of the economic literature on patents is that ‘one size fits all’ doesn’t make sense.” The implication is that—given the conflicting needs of different industries, different companies and different peoples around the world—the patenting authorities need to find a greater variety of tools for protecting intellectual property than they have at present.