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Innovation and Intellectual Property – Issues for Debate

By *Christine A. Greenhalgh*

In both the national and the international arenas it is not obvious that heavier reliance on intellectual property is optimal for economic success. Innovation is taking place at a faster rate than ever before across all types of goods and services and the United States leads in many fields of technology within the world economy. Firms are seeking protection for their inventions and for their new product brands by acquiring various types of intellectual property (IP), such as patents, trademarks and copyright. Although these systems of intellectual property have been set up to reward inventors and creators, many people are asking whether they serve to encourage or inhibit innovation.

So is the IP system oiling the wheels of innovation and supporting the competitiveness of the economy? Or is it creating a costly and pervasive “glue” within the economy, absorbing large amounts of time of creative and talented individuals and reducing firms’ ability to enter new fields of enterprise and compete with incumbent firms?

IP rights offer monopoly rights that in most contexts are seen as bad news for the efficient functioning of markets. These rights enable successful innovators to charge high prices to their customers and to restrict the use of their invention by potential competitors. This has a “scissors” effect of reducing

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About The Author

Christine Greenhalgh is a Visiting Scholar at SIEPR during the spring quarter, visiting from Oxford University, where she is a faculty member of the Department of Economics, a Fellow of St. Peter’s College, and Economics Research Director of the Oxford Intellectual Property Research Centre (www.oiprc.ox.ac.uk). After graduating from the London School of Economics, Christine received her PhD from Princeton University. She has published more than 40 articles and edited a number of books, recently becoming the leading series editor for *New Horizons in Intellectual Property*, a set of titles published by Edward Elgar. She currently undertakes research and lectures in the field of the economics of innovation, intellectual property and technological change. For several years she has been involved in documenting the extent of patents and trademarks held by U.K. firms and estimating the value of this intellectual property. Her most recent study has focused on trademarks with emphasis on service sector firms, which have been neglected in the existing literature despite their major importance in economic output and employment. In earlier work she investigated the changing structure of industrial output and employment and systems of vocational training for workers in this changing environment.



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the market demand below what it could be at lower prices and of slowing the rate at which imitation can occur. Nevertheless, without any prospect of reward from IP ownership, inventors might reduce their R&D and slow their rate of invention.

Policymakers contemplating changes to the law governing any aspect of patents, trademarks or copyright need to assess who gains, who loses and what is the likely impact on the rate of innovation. Also they have to assess whether the types of IP ownership that are permitted under the law can be enforced and at what cost in terms of lawyers' fees and the diversion of senior management time to the protection of these intangible assets.

The agency that awards two of the major IP rights is the U.S. Patent and Trademark Office (USPTO). The court dealing with disputes over their enforcement is the Court of Appeals for the Federal Circuit (CAFC). These organizations have to implement the law relating to IP in a wide range of rapidly evolving technical and scientific fields, including such complex areas as biotechnology and computer

software. Hence, they need the expertise to make decisions about the validity of the IP right being requested or being defended in a case where the IP owner claims its rights have been infringed.

The rapid expansion of IP assets in the leading innovating countries is illustrated in Figure 1 and Figure 2, which show the trends in patent and trademark applications by domestic residents (firms or individuals) in the top three innovating countries since 1970. As the numbers of U.S. and Japanese applications are much larger than those in Europe, being in the order of

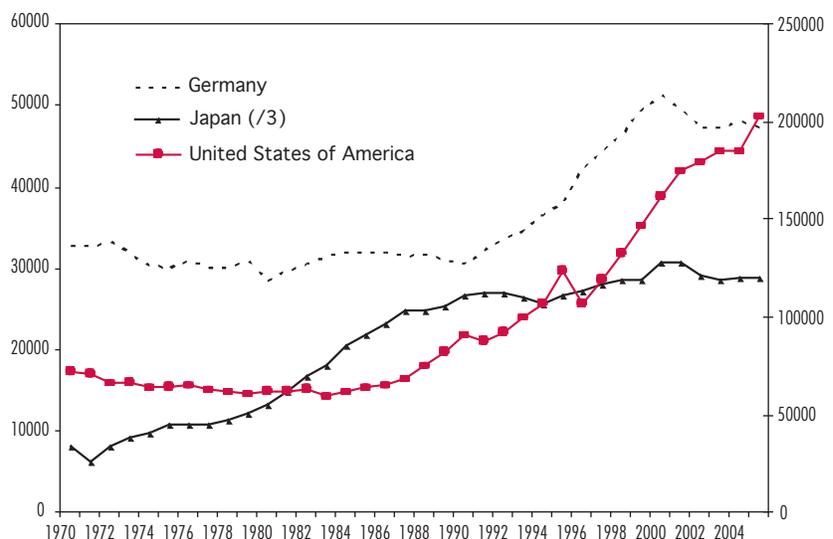
three to four times the levels in other high-activity countries, their values are shown on the *right-hand axis* in each figure. In addition, in Figure 1, Japanese patent applications have been scaled down by a factor of three, since each Japanese patent is commonly thought to represent around one third of a U.S. patent (i.e., the Japanese system breaks down an invention into more discrete stages).

Figure 1 shows that patent applications began to rise in Japan and the United States in the 1980s, but this growth was not seen until later in Germany. Whereas Japan's patenting levels

FIGURE 1

Patent applications by domestic residents in leading economies

(Note: US and Japan/3 measured on right-hand scale; Germany on left-hand scale)



flattened out in the 1990s, U.S. patenting activity accelerated in the 1990s. Germany was the only major country in Europe to show significant growth in patents during the 1990s, as the U.K. and France had flat profiles from 1970 until now.

Figure 2 shows trademark applications, which reflect the registering of new brands of products in both manufacturing and services. Overall, these series are more volatile than those for patents. Most countries showed strong growth in the 1990s, with a sudden correction in 2000, which was a point of retrenchment after what was

termed the “dot.com” boom of the late 1990s. Japan was the exception, showing much earlier strength but declining during the depression of its economy.

This increase in the IP assets of firms in different countries comes at a cost as the investment cost of R&D represents a significant call on national income. The absolute level of R&D spending in the United States has historically been more than twice that in any other individual country, with Japan taking second place in the country rankings and Germany coming in third. In the period since the mid-1990s,

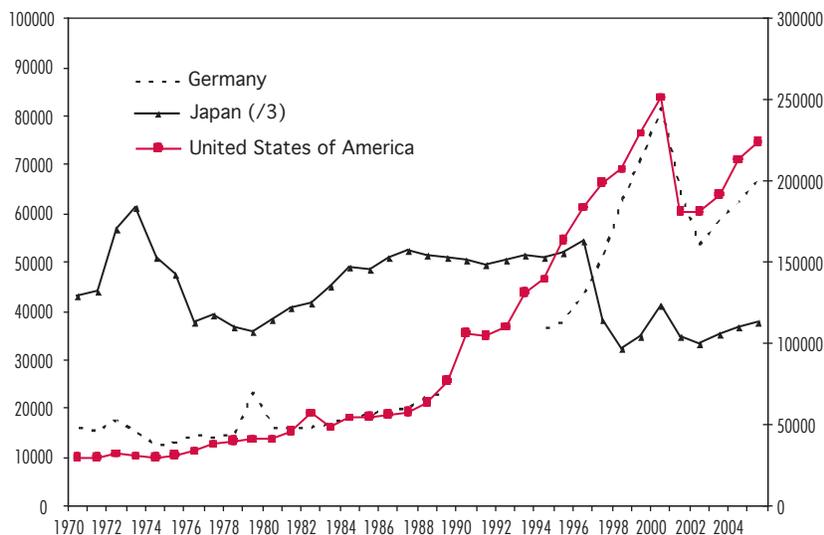
the United States has drawn further ahead, as its annual rate of real R&D spending grew by 38 percent between 1994 and 2000 in real terms. When compared with the combined forces of the EU15, U.S. R&D spending is now 50 percent higher than the total for Europe and it has drawn away from Japan to reach a level of 2.5 times Japanese R&D.

These spending levels are driven by variation in the absolute size of economies and by differences in shares of GDP devoted to R&D. Within the G7 countries, the share of GDP devoted to R&D is highest in Japan at more than 3 percent, followed by the United States with 2.75 percent. The average for the EU15 countries is close to 2 percent, with Germany playing a leading role in Europe at 2.5 percent. These differences have existed for many years and the European Union, feeling the need to catch up, has adopted a target of reaching an R&D intensity of 3 percent by 2010. At present few countries within Europe are within sight of this target, although two small countries, Sweden and Finland, already exceed it with ratios of 4.3 percent and 3.5 percent respectively.

FIGURE 2

Trademark applications by domestic residents in leading economies

(Note: US and Japan measured on right-hand scale; Germany on left-hand scale)



Being a world leader in technology has positive consequences for economic growth in the United States but also generates spillover benefits for follower countries, which can grow by adopting the new technologies and hence catch up. Similarly for firms, being at the technology and design frontiers bolsters their competitiveness, retaining market share, but again their R&D generates spillover benefits for imitators. Both on the international stage and domestically at the firm level the temptation is thus to try to gain maximum private ownership via IP assets. There is certainly a rich literature for many countries detailing the value of IP rights to firms: Both patents and trademarks are shown to increase the stock market value of firms, reflecting their increased current and future profitability (see Greenhalgh and Rogers, 2007).

The United States has been a major player in the design and implementation of the Trade Related Intellectual Property Rights (TRIPS) agreement, which requires developing countries to adopt systems of IP protection as a condition of membership

of the World Trade Organization (WTO). More active enforcement of IP rights within developing countries such as China seems like a good idea to reduce copying and imitation and thus retain profitability in the United States. However, as pointed out recently by Maskus (2006), once the protection of inventors' rights is strengthened abroad, U.S. firms can take advantage of the lower costs of employing skilled workers in these countries without fear of losing control of their proprietary knowledge. This increases the probability that firms will transfer technology and R&D to international locations such as China and India.

Within the United States there has been continual widening of the reach of IP law, due to a number of key cases setting precedents for IP rights in new areas of technology. These include patents for genetically modified animals (the Harvard OncoMouse, 1988), patents for computer software (a decision of CAFC in *Re Alappat*, 1994) and for business methods (*State Street Bank*, 1988), all quoted in David (2006). This has led to an escalation of patent applications

in these new fields, where it is difficult for the engineering-trained examiners of the USPTO to adjudicate the degree of novelty of the invention. It is worth noting that Europe has not followed the United States in allowing patents in all these areas. Some senior economists in the United States have been outspoken in their criticism of the U.S. patent system (Jaffe and Lerner, 2004).

Yet Lemley (2001) has argued that even if it is true that the USPTO does a poor job in weeding out bad patents, this is cost-effective in economic terms. Social resources should not be directed to paying for a more protracted examination of all patent applications, as the majority are of no value and will neither be litigated nor licensed. On this view there is no great harm done by the award of a lot of poorly examined patents, as the validity of the few valuable patents will be tested in court, as these are more likely to be subject to challenge by would-be competitors.

Maskus (2006) has argued to the contrary that diluted standards of patent examination cause much

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harm, as this situation leads to a culture of patents as vehicles for the extraction of payments from legitimate competitors. He describes examples of what have become known as “patent thickets.” Here the development of complex technologies, embodying many patented technological inputs owned by different companies, may be inhibited by the complexities of negotiating with all the parties. Another cause of difficulty arises when a patent for a so-called “platform technology,” necessary for many related lines of research, is owned by a single firm that wishes to inhibit competitors and so refuses to issue a license for use of this technique.

Widening patents to new fields such as business methods has not been universally supported even within the United States. The fear is that this will add to the problem of patent thickets. For example, the American Bar Association has recently set up a task force to investigate the implications of patents for tax strategy methods. As of February 2007, some 50 patents had been issued for tax-related advice, leaving many lawyers unclear as to whether

they too should be patenting their advice to clients, or whether they were in danger of violating an existing patent. It seems that even the lawyers may come to regret the extension of IP law if it ties their hands!

The economists’ view (Maskus, 2006), and increasingly that of lawyers (see Frischmann and Lemley, 2007), is that the United States should restore a “live and let live” approach to knowledge spillovers and rein back the awarding of patents, reserving these for truly novel innovations that are costly in R&D. Some recent U.S. Supreme Court decisions (both April 30, 2007) suggest a change of heart, reducing the likelihood of patent infringements by its decision in a software case (*Microsoft v. AT&T*, 05-1056) and confirming a lower court ruling that a patent was invalid due to lack of novelty in an engineering case (*KSR v. Teleflex*, 04-1350). These decisions shift the balance of power back toward technology users and also define a higher quality hurdle for the initial award of a patent. Perhaps the justices have got the message that stronger IP does not always make for a better business climate?

Further Reading

David, Paul (2006), “Reflections on the Patent System and IPR Protection in the Past, Present and Future,” SIEPR Discussion Paper 05-15.

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Lemley, Mark A., (2001), “Rational Ignorance at the Patent Office,” *Northwestern University Law Review*, 95(4), 1495-1532.

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Taube Family Foudation

SIEPR Policy Briefs are underwritten by a generous grant from the Taube Family Foundation.