# 11 Study on Patent and Economy

*This study examined the economic significance and effects of the pro-patent policy that is currently being promoted and the desirable direction thereof.*

*Specifically, analysis was firstly conducted on changes in the economic effects of "broader protection" and licensing conditions which are thought to more promptly reflect the effects of the "pro-patent policy." Secondly, a mechanism by which patents influence economic activities was examined to promote experimental study of the "cycle of intellectual creation" modified by adding five points to requirements that have been pointed out so far. Moreover, this study examined the desirable intellectual property policy that balances the protection of preceding technology and the promotion of late technology in consideration of such questions as whether broad and exclusive patents should be granted to pioneer patents in order to develop applied technology through accumulating improved technology, or whether the grant of exclusive patents should be considered to hinder such development. This study also conducted questionnaire surveys to companies as well as evaluated the U.S. "pro-patent policy."*

## I Economic Effects of "Broader Protection" of Patent Rights: Viewpoint of Coordination among Inventors

In Japan, both the scope of protection of individual patent rights and fields of technology subject to patent are expanding. The introduction of an improved multiple claims system in 1987 and judicial rulings positively admitting the equivalent doctrine have contributed to expanding the scope of protection of individual patent rights. The trend of granting patents through the revisions of Examination Guidelines by the Japan Patent Office has indicated the expansion of the fields of technology subject to patent, as symbolized by biotechnology-related patents and business model patents. Nowadays, there is a movement for the government to try to strategically utilize intellectual property rights, and it can be said that the "pro-patent policy" of Japan aiming at stronger protection of patent rights is in progress.(*1)

### 1 Changes Regarding Patent Applications in the 1990s

Looking at the increase in the number of patent applications and that of patent registrations from 1990 onward to find out the overall recent trend of patent applications in Japan, the number of patent applications increased by 0.16% from 1989 to 1993, and by 2.81% from 1994 to 1998, while the number of patent registrations increased by 19.79% and 20.02% respectively, showing the recent trend of greater increase in the number of patent registrations in contrast to increase in the number of patent applications.(*2) Reflecting this trend, the rate of patent registration (number of patent registrations/number of patent applications) from 1990 to 1998 is 27.99% and far exceeded the rate from 1971 to 1990, 20.5%.(*3) In addition, the rate of requests for examination within one year of filing applications has been increasing from 5.5% (1990), to 8.1% (1994) and 10.8% (1998), showing that a movement occurred in the 1990s toward active acquisition of rights for inventions for which applications were filed.

In order to find out technical fields where such intention toward the acquisition of rights is relatively strong, changes in the share of each technical field to that of all technical fields were examined for the respective numbers of applications and registrations (Fig. 1). When the share of the number of applications decreases and the share of the number of registrations increases in a technical field, it can be understood that the intention toward the acquisition of rights is enhancing more in that particular field compared to the overall industry. From Fig. 1, it can be understood that such movement has occurred in International Patent Classification Sections G and H (Physics and Electricity), and there is relatively strong intention toward the acquisition of rights in the IT-related industry.

At the same time, competition in research and

(*1) Regarding the economic analysis of the U.S. "pro-patent policy", Adam B. Jaffe, *The U.S. Patent System in Transition: Policy Innovation and the Innovation Process*, 29 Research Policy, pp.531-557 (2000) is of great use. Regarding the policy trend of Japan and the meaning thereof, refer to Satoru Tanaka, "Pro-Patent Ka Deno Kyoso Seisaku (Competition Policy under Pro-Patent)," edited by Akira Goto and Akio Yamada, "IT Kakumei To Kyoso Seisaku (IT Revolution and Competition Policy)," p.143, Toyo Keizai Inc., 2001.

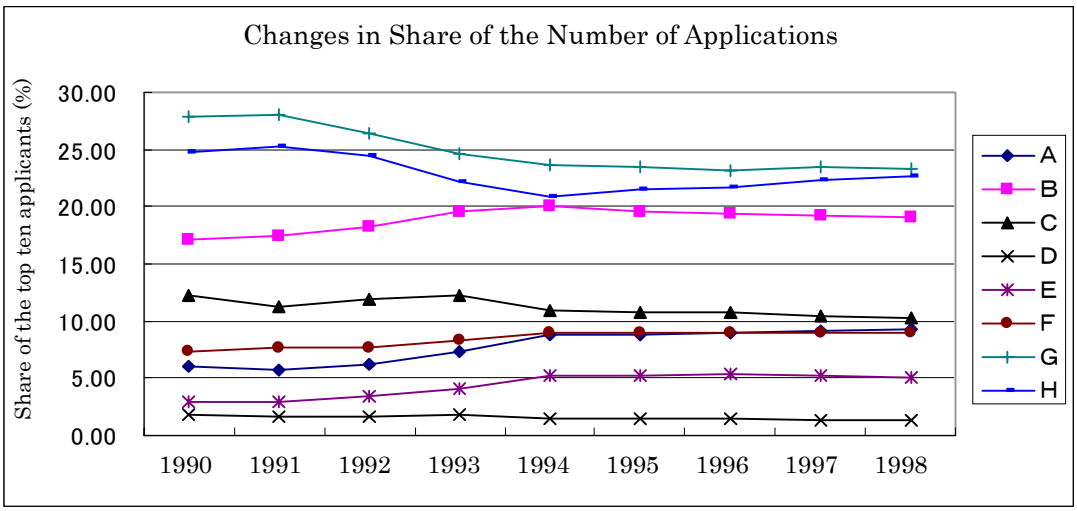
(*2) Calculated based on the "Tokkyo Gyosei Nenji Hokokusho (Annual Report on Patent Administration)" edited by the Japan Patent Office. Other figures in this section are calculated based on that report unless otherwise noted.

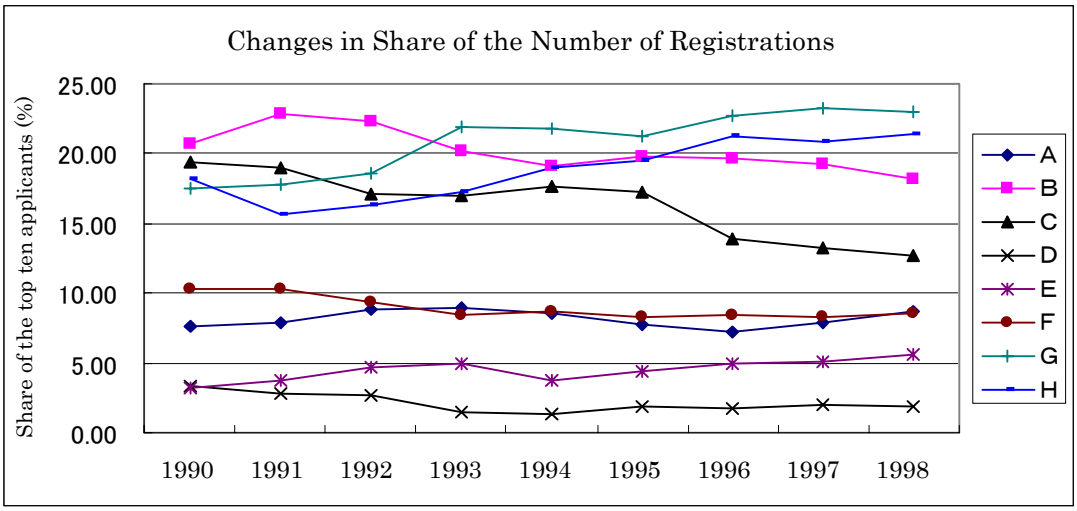
(*3) Refer to Yosuke Okada, "Tokkyo Seido No Hou To Keizaigaku (Law and Economics of Patent System)", Financial Review, No. 46, p.110-137, 1998.

development has been intensifying in the IT-related industry. In technical fields such as information storage and communication, which are related to the IT-related industry, the total share of the top 10 applicants has been consistently declining (Fig. 2), and the intensification of competition in research and development can be seen from patent information alone.(*4) It should be noted that the intensifying competition in research and development in such industries is also promoted by the expansion of the fields of technology subject to patent, which is a part of the "pro-patent policy." In fact, as symbolized by business model patents, there have often been cases where businesses and companies, which had nothing to do with patent in the past, appear as patentees.(*5) As a result of this, patentees are presumably diversifying in various industries, especially in the IT-related industry.

It is thought that the intensification of competition in research and development with changes in the trend of patent application from the 1990s onward (intention toward the acquisition of rights/diversification of patentees) has occurred as a result of the "broader protection."

Fig. 1 Share of the Number of Patent Applications and Share of the Number of Patent Registrations by Technical Field



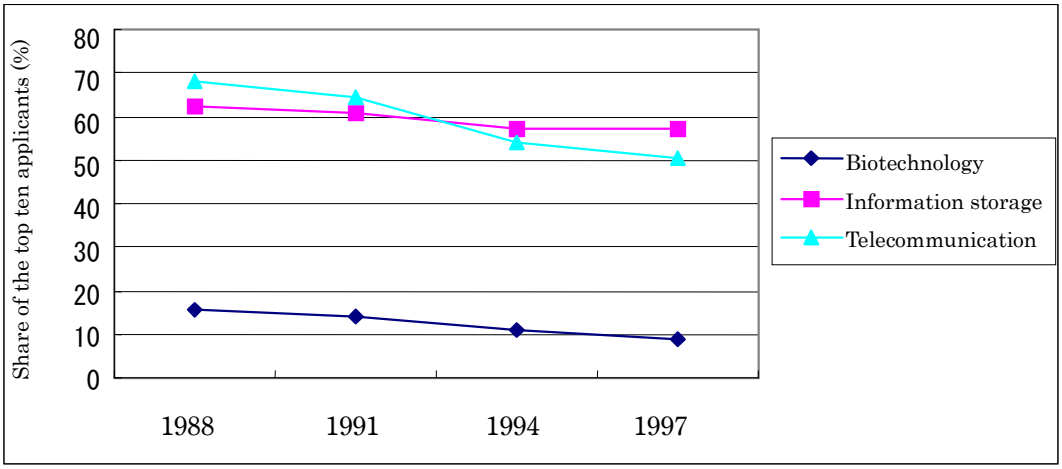




Note: Letters A to H indicate International Patent Classification sections.

(*4) This trend itself is observed in technical fields such as not only information storage and communication but also biotechnology (see Fig. 2).

(*5) According to the questionnaire survey conducted in this study, the rate of those who answered "broader protection (expansion of protection to new fields) played a role in increasing the number of patent applications" is prominently high among financial companies/think-tanks/TLOs, etc. (61.5%) compared to the overall number (overall average is 24.1%). This figure probably reflects the above-mentioned point. In an interview survey to electricity-related companies in this study, respondents answered "the emergence of new patentees due to the expansion of protection to new fields and the progress of intellectual property right administration were big changes in the environment surrounding patent in the 1990s."

Fig. 2 Changes in Share of the Top Applicants in Some Advanced Technical Fields




Note: According to the International Patent Classification, biotechnology is understood as C12, information storage as G11 and telecommunication as H04.

### 2 Diversification of Patentees and Economic Effects of "Broader Protection"

In general, if the scope of patent protection is determined narrowly, research and development incentive of inventors of improved technology will be enhanced while development incentive of inventors of basic technology will be hindered. When technical innovation is carried out in a cumulative way, the effect of crucially hindering development incentive for basic technology involves the risk of stopping the progress of the technical innovation. On the contrary, if the scope of patent protection is determined broadly, evelopment incentive for basic technology will be enhanced, leading to further technical development and thus having a positive effect on society.

There is also the possibility of "broader protection" having an adverse effect on society. First of all, competitions will, in fact, frequently occur in research and development alone in cumulative technical innovation that consists of basic technologies and improved technologies. In such case, "broader protection" may lead to decline in profits from improved technologies as well as research and development incentive. Secondly, current technical innovation is proceeding not only cumulatively but also with a systematic characteristic by which products are produced relying on multiple technologies. Thus, if there are different patentees for different technologies, each of the patentees does not consider the impact on other patentees, so the patentees come to have incentive to excessively exercise their patent rights, and the development of technical innovation is hindered by the promotion of excessive exercise of the rights ("Tragedy of Anticommons").(*6) It requires attention that such competition in research and development and the hindering effect of "broader protection" through "Tragedy of Anticommons" occur since "broader protection" brings about lack of coordination among patentees.

However, noting that such effect of hindering research and development incentive arises due to lack of coordination among inventors, a means to promote coordination among inventors in advance may contribute to maintaining inventors' research and development incentive. Specifically, as shown by Green and Scotchmer, inventors' research and development incentive is maintained by protecting patent rights broadly while ensuring advance coordination among inventors through advance licensing and joint research and development.(*7) Therefore, "broader protection" is beneficial to society in terms of technical innovation in which inventors can be sufficiently coordinated in advance through licensing, etc.

As revealed in the above discussion, a policy of strengthening the protection of patent rights may have both positive and negative effects on the economy. Therefore, it can be said that in examining the economic effects of Japanese "pro-patent policy," it is an urgent task to conduct careful experimental study through collection and utilization of more detailed data.

## Ⅱ "Pro-Patent Policy" and Trend of License Contracts

The analysis of changes in licensing conditions such as licensing price becomes a key to verify the effects of the "pro-patent policy" which has been carried out in Japan since the latter half of the 1990s. This is because it is considered that changes

(*6) Regarding the "Tragedy of Anticommons," refer to Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 Science, pp. 698-701 (1998).

(*7) Refer to Jerry R. Green & Suzanne Scotchmer, *On the Division of Profit in Sequential Innovation*, 26 Rand Journal of Economics, pp. 20-33 (1995). In this regard, Howard F. Chang, *Patent Scope, Antitrust Policy, and Cumulative Innovation*, 26 Rand Journal of Economics, pp. 34-57, (1995) also gives beneficial suggestion.

in intellectual property policy take time to have an effect on research and development, but have an effect on licensing negotiation more promptly. The effects of the "pro-patent policy" on licensing conditions are straightened out below from the theoretical viewpoint. It is examined by mainly utilizing aggregative data by industry, which was published by the National Institute of Science and Technology Policy as the annual report of "Analysis of Introduction of Foreign Technologies," whether the effect of the "pro-patent policy" can be found in changes in licensing conditions from 1995 onwards and what effects increasing licensing price has on the utilization of technologies and follow-up research and development.

## 1 "Pro-Patent Policy" and Trend of License Contracts

Granting patents to inventions in new fields such as software, expanding the scope of protection of inventions based on the equivalent doctrine, increase in compensation for damage and strengthening the legality of refusal to license have been conducted as the part of the "pro-patent policy." Such strengthening of intellectual property rights has, first of all, the effect of increasing the licensor's bargaining power to licensees in licensing negotiation. This effect arises because since intellectual property rights have been strengthened, if license contracts are not concluded, profits that licensors can acquire will increase while licensees' profits will decrease. Secondly, it also has the effect of restraining infringement by third parties (competing companies other than licensor and licensee as well as consumers). This effect increases profits which licensees will gain if licenses concerned are put into practice. These two effects act in the direction of increasing license fee.

## 2 Trend of Intellectual Property Rights Subject to Licensing

Verification is conducted below on the rate of technical licenses that were introduced from overseas by Japanese companies to which a patent license was attached (hereinafter referred to as "patent attachment rate") from the 1980s to the 1990s.

In Fig. 3 below, the patent attachment rate for license contracts in industrial fields where research and development is highly intensive (electric machinery, precision machinery and chemistry) is compared between the first half of the 1980s (1981-86) and the latter half of the 1990s (1995-98). For 8 out of 11 types of business, the patent attachment rate has been increasing. In terms of the electronic computer industry that centers on software contracts, the rate increased from 6.9% in the 1980s to 9.6%, and in the sector of medical supplies, the rate increased from 47.6% to 69.2%. As for the latter, the rate was 81% in fiscal 1998. As such, patents have been becoming more important in individual industries where research and development is highly intensive.

## 3 License Fee and Decisive Factor Thereof

License fee is the total of initial payment and running royalty (hereinafter referred to as royalty). The secular change thereof is seen below by using the following indicators: (1) rate of contracts that require initial payment among commutative contracts (hereinafter referred to as "initial rate") and (2) rate of contracts in which royalty is 8% or higher among royalty contracts (hereinafter referred to as "high royalty cases").

First of all, when looking at the entire manufacturing industry, the initial rate increased in the first half of the 1990s compared to the first half of the 1980s, but it slightly decreased after that, so there has been no change that reflects a trend. However, the rate of high royalty cases almost doubled from 14% in the first half of the 1980s to 27% in the latter half of the 1990s (Fig 4). Licenses with high rate of royalty have increased as such under the large influence of increase in the ratio of electronic computer-related patents (i.e. software patents). It is because the rate of licenses with high rate of royalty is high in the electronic computer- related field.

Fig. 3 Changes in Patent Attachment Rate in High-Tech Industries

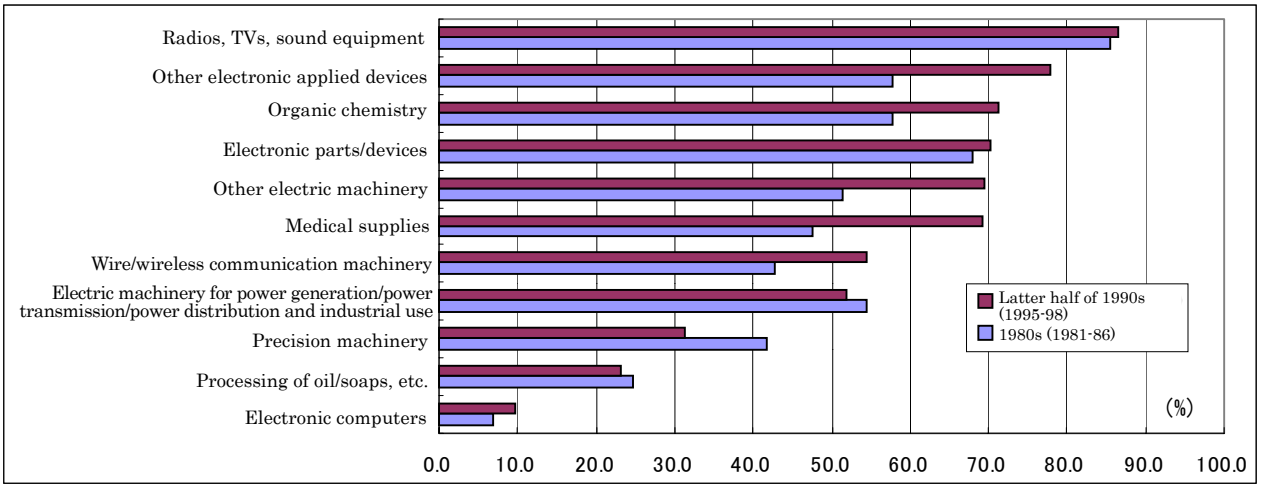


Fig. 4 Changes in Licensing Conditions (Manufacturing Industry)

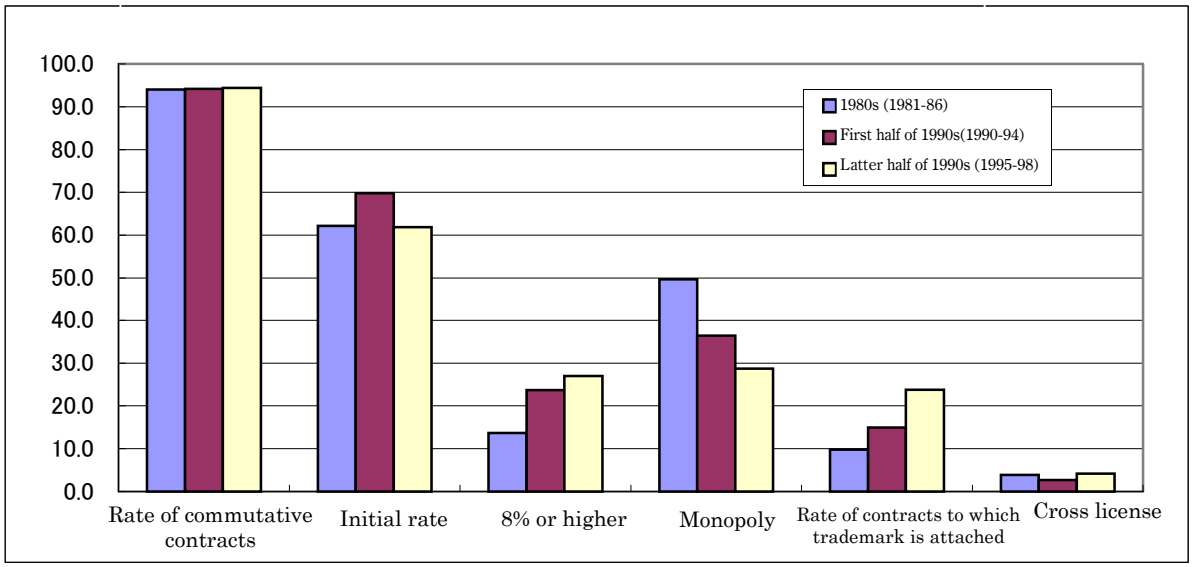



Fig. 5 Changes in Licensing Conditions (Medical Supplies)

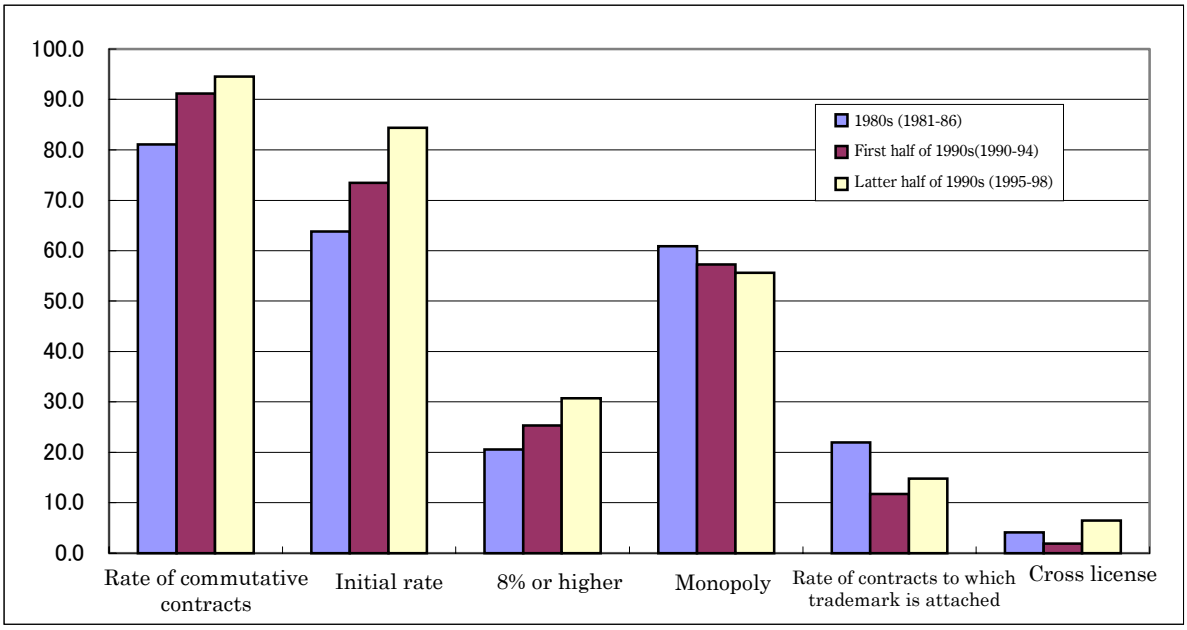
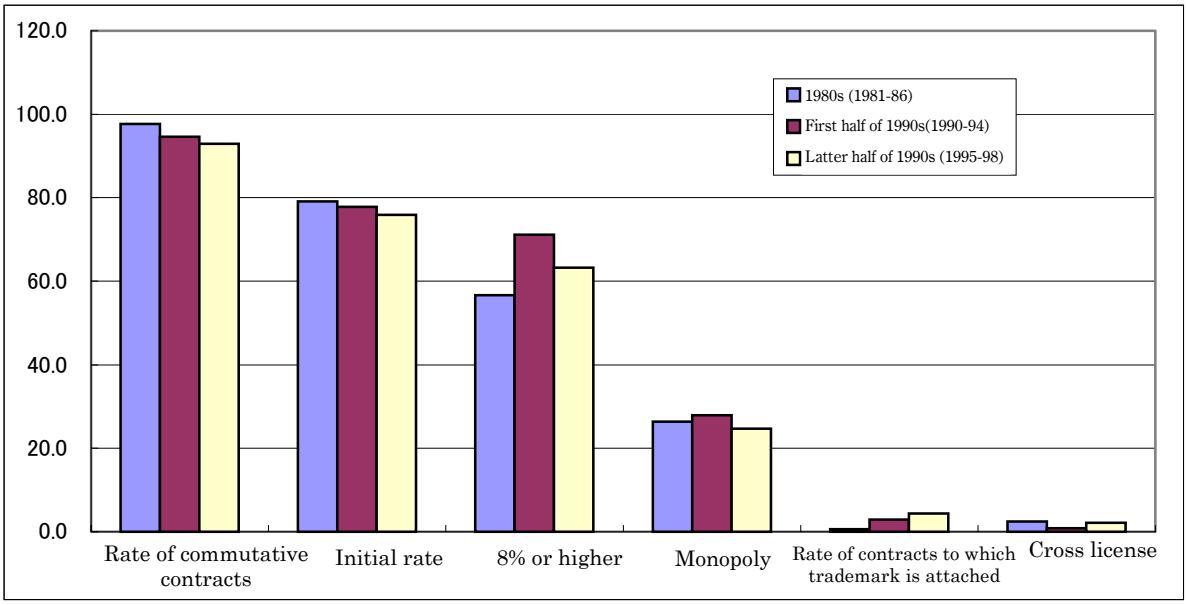



Fig. 6 Changes in Licensing Conditions (Electronic Computers)



Next, the medical supply industry, which is considered to have been most strongly influenced by patent-related policy changes, is examined. According to Fig. 5, both the initial rate and the rate of high royalty cases increased from the first half of the 1980s to the first half of the 1990s, and they further increased in the latter half of the 1990s.(*8) In particular, the rate of high royalty cases increased from 20.5% to 25.3% and then to 30.7%. Such increase in the rate of high royalty cases conforms to increase of royalty payment (including payment to both domestic and foreign companies) in sales of major pharmaceutical companies. On the other hand, the rate of monopolies decreased period by period, and the rate of contracts to which trademark is attached also decreased in the 1990s from the 1980s. Moreover, the rate of cross licenses increased in the 1990s (However, these changes are not statistically significant). Evaluating the whole, it can be said that licensing price increased in the latter half of the 1990s.

Lastly, the trend of contract conditions is examined for the electronic computer industry in which over 90% of licenses concluded in the 1990s were software licenses. According to Fig. 6, the initial rate slightly decreased in the 1990s. In the electronic computer industry, the rate of high royalty cases is remarkably higher than that in other industries. The rate increased in the 1990s more than in the 1980s, but was lower in the latter half of the 1990s than in the first half thereof. When looking at the data by year, the rate of high royalty cases has been declining every year since 1995. On the other hand, the rate of licenses to which trademark right is attached has been slightly increasing from the low level, but regarding the rate of monopolies and that of cross licenses, there has been no big change that reflects a trend. Therefore, it can be said that there has been no sign of increase in license fee despite the grant of patents to software.

### 4 Conclusion

As conclusions of the above analysis, the "pro-patent policy," such as granting patent to inventions in new fields, expanding the scope of protection of inventions by the equivalent doctrine and increase in compensation for damages, is firstly expected to increase the patent attachment rate in research and development-based industries. According to the trend of license contracts, which were reported based on contracts for technology introduction into Japan, the patent attachment rate of software license contracts has been rapidly increasing especially since 1996 when software became patentable. Secondly, the pro-patent policy is expected to bring about increase in license fee. In the latter half of the 1990s, license fee in new contracts rose considerably in the medical supply industry. However, the fields of technology subject to licensing expand at the same time, so total license fee may not necessarily increase. In the electronic computer field, despite that software patents have become included in license contracts, no shift to increase in license fee has been seen. Therefore, it can be said that the "pro-patent policy" has an effect on licenses in some industries but not much in other industries.

## Ⅲ Axes of Experimental Economic Analysis concerning Patent

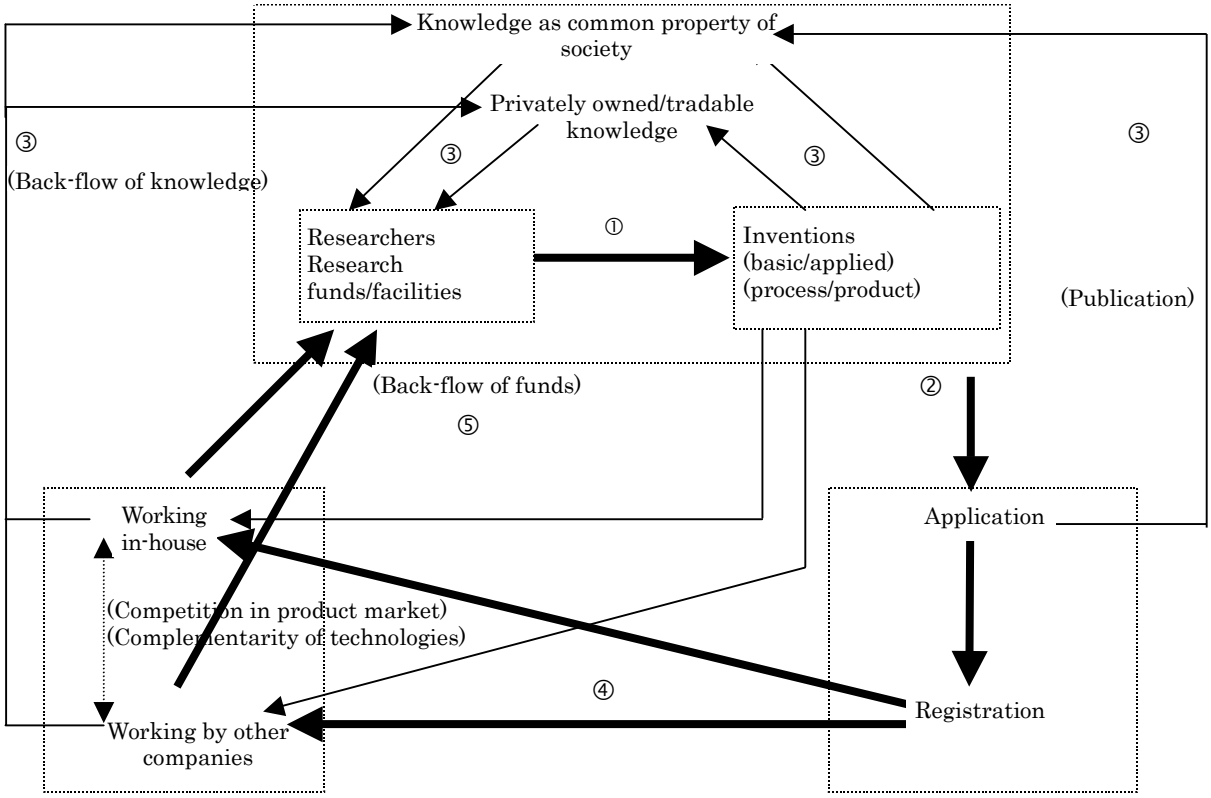
The economic analyses of patent which have been conducted so far are roughly divided into two types, ideal model-based analysis and data-based analysis. It is aimed here to give an overview of the experimental study approach that includes both types of analysis. In order to sort out accumulated studies which aim to experimentally understand a mechanism by which patents influence economic activities such as innovation, it is first of all necessary to sort out the "axes of issues and concerns" in the studies. Five axes of issues and concerns are examined below.

### 1 "Cycle of Intellectual Creation" Modified by Making Additions

The "cycle of intellectual creation" already published can be considered to be a model that was made by paying attention to mainly financial incentive and disregarding other elements. To put it another way around, inputs other than money are not taken into account in the model. It can be said that the verification of effects of elements other than money has been the subject of experimental study in the economics. The "cycle of intellectual creation" which was modified by making additions in consideration of elements other than money is shown as Fig. 7.

(*8) Such increase is also significant from the statistical viewpoint. For example, regarding the rate of high royalty cases in which royalty is 8% or higher, the average and the standard deviation (within parentheses) are 20.5% (1.49%) in the first half of the 1980s, 25.3% (1.55%) in the first half of the 1990s and 30.7% (2.22%) in the latter half of the 1990s, respectively. The rate increased by 5% from the first half of the 1980s to the first half of the 1990s as well as from the first half of the 1990s to the latter half of the 1990s, showing statistically significant changes.

Fig. 7 “Cycle of Intellectual Creation” Modified by Making Additions




In the “cycle of intellectual creation” modified by making additions, there are at least five issues and concerns as follows, and these are considered to be forming the fields of experimental study (excluding the issue of collaboration between universities or public research bodies and industry).

① Mechanism of research and development as such, relations between inputs into research and development and outcomes (inventions), ideal research and development organizations, incentive for researchers such as employee’s invention

② Whether or not to file a patent application for an invention

③ Distribution of knowledge, cumulative innovation, learning, joint research and development

④ Working in-house/licensing to other companies, complementary assets, competition in the product market, complementarity of technology, evaluation of value of intellectual property

⑤ Intellectual property administration costs, possibility of exercising rights or enforcing contracts, and costs therefor

To evaluate the system, it is necessary to understand not only financial incentive but also the mechanism of research and development itself as well as to figure out reasons for acquiring patents, the mechanism of the intellectual market and the market of technology utilization and related costs. Competitive relationship and costs for using the judicial system are closely related to such costs. It is necessary to not only understand but also quantitatively comprehend the actual conditions of mutual complementarity between technical developments (externality of research and development) and complementarity between mutual technology utilization, as well as factors that provide the difficulty of concluding contracts that enable gaining economic profits from such complementarity and the difficulty of excising rights. These seem to have been recently attracting great interest in both experimental and theoretical approaches.

### (1) Classical Concerns about Relations among Inputs in Research and Development, Other Prerequisites for Research and Development and Outcomes (in Relation to the Above ①)

If simplified, issue ① means the question of by what mechanisms and in what cases innovations occur more frequently. In order to think of this issue experimentally, it is necessary to define the outcomes of innovation as well as to consider how to measure the outcomes. Then, it is explored what inputs are necessary to achieve the outcomes of innovation and in what cases productivity in research is high. Patent has the function of giving financial support and monopoly power to researchers and developers ex-post. The effects thereof on research and development are estimated based on financial inputs and monopoly power.

Tracing the origin of such study leads to Schumpeter.(*9) Schumpeter raised a question concerning relations between the size of company and innovation. This is the question of whether innovations occur more frequently when a large

(*9) Joseph A Schumpeter, *Capitalism, Socialism, and Democracy*, 1942.

company exists (in other words, in imperfect competition in the short term) compared to when there is perfect competition among small companies. Moreover, the question of whether innovations occur more frequently when monopoly power in the market is stronger or when many companies are competing separately is also related to the effect arising from the grant of monopoly power by patents.

### (2) Intention toward the Acquisition of Patents (in Relation to ②)

Issue ② refers to study on difference in intention toward the acquisition of patents by industry, country or time. There is a series of world famous studies concerning difference in intention toward the acquisition of patents by industry, such as the Yale Survey.(*10) The Yale Survey is a study that researched reasons for acquiring patents and the effectiveness of patents as means to monopolize technologies by industry through questionnaire surveys. Additional experimental studies thereof have been conducted both in Japan and in Europe. Due to achievements from these studies, it has become a common view that the meaning of patent is different for each industry.

In addition to differences by industry, it has recently attracted great interest that the action of acquiring patents changes temporally. The number of patent applications and acquired patents enormously increased in the U.S. in the 1990s, and it is a typical question whether the numbers increased for the reason that the pro-patent policy induced the action of acquiring patents or for other reasons.

### (3) Externality of Research and Development, Intellectual Market (in Relation to ③)

Research and development does not occur independently, but occurs when inventions accumulate over prior knowledge. This fact has come to be recognized by the word "cumulative innovation." The patent system is originally a social means to externalize and share knowledge, so the externality of research and development has substantial meaning for the patent system. In other words, patent is not only a financial incentive to research and development but also a means for knowledge management in the whole society. Prior patents on the bibliographic column of the U.S. patents, academic studies and citations such as reference lists containing foreign patents become means for measuring externality, though they are imperfect. Prior knowledge is one of the important inputs for innovations, so it is necessary to figure out the functions thereof in the distribution of knowledge in the patent system from multiphasic viewpoints.

### (4) Intention toward Licensing, Technology Exchange Market (in Relation to ④)

Since income from patent licensing becomes an incentive to research and development, it must be taken into consideration in evaluating the patent system. This issue is complicated since patentees can obtain economic merits by monopoly even if they do not obtain income from licensing. If no transaction costs are necessary, patentees must be able to obtain equal profits from in-house working and from licensing. However, in fact, transaction costs change due to various factors, so profits from licensing and those from patents cannot be considered as the same a priori. It is, therefore, essentially important to understand the actual conditions such as when licenses are granted and what are decisive factors in determining licensing and effects of licenses.

### (5) Corporate Legal Tasks behind License Contracts, Role of the Judicial System and Costs (in Relation to ⑤)

It has been pointed out comparatively recently that judicial costs in a broad sense, such as costs for suits, are very important in terms of the efficiency of the patent system. This point has been attracting attention as a new study field. In the U.S., costs for patent-related suits amounted to $1 billion for one year (1991), and it has been pointed out that the costs are not negligible in comparison with costs for basic study, $3.7 billion.(*11) If great amount of costs were required to enforce a right alone or to monitor workings and use a right as such as security, it would become important to find out the functions of the costs.

To become able to conduct experimental economic analysis more precisely is advancement in economics, but it has another meaning. It is beneficial to the entire implementation of the patent system that each company and individual utilizing the patent system can accurately calculate merits and demerits at a low cost when making strategic judgements from their own standpoints. In this sense, it is necessary regardless of study purposes of economics to lower costs for utilizing patent information. In order to analyze patents by company, it is necessary to count a company's patent assets. However, costs therefor are still high. It is desired that it become possible in the future to conduct counting in which subsidiaries are included and

(*10) R. C. Levin et al. *Appropriating the Returns from Industrial Research and Development*, 3 Brookings Papers on Economic Activity, pp. 783-820 (1987); Wesley M. Cohen, Richard R. Nelson & John P. Walsh, *Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or Not)*, NBER Working Paper w7552 (2000); Akira Goto and Akiya Nagata, "Innovation No Senyu Kanousei To Gijutsu Kikai: Survey Data Ni Yoru Nichibei Hikaku Kenkyu (Possibility of Exclusive Possession of Innovations and Technical Opportunities: Japan-US Comparative Study by Survey Data)," NISTEP Report 48 (National Institute of Science and Technology Policy, 1997); Anthony Arundel & Isabelle Kabla, *What percentage of innovations are patented? Empirical estimates for European firms*, 27 Research Policy, pp. 127-41 (1998).

(*11) Josh Lerner, *Patenting in the Shadow of Competitors*, 38 Journal of Law and Economics, pp. 463-495 (1995).

analysis by combining with other data.

## Ⅳ Balance between Protection of Preceding Technology and Promotion of Late Technology – Adjustment Measures by Intellectual Property Law and Competition Law –

Pioneer inventions that develop a new industry must be granted a broad exclusive right meeting their value through patents. At the same time, excessively broad exclusive rights of pioneer patents hinder the development of applied technologies through cumulating improved technologies. The government needs to implement measures that balance the protection of preceding technology and the promotion of late technology. Examined here are ideal intellectual property policies that balance the protection of preceding technology and the promotion of late technology as well as the method of implementing the balancing measure through application of the competition law (Antimonopoly Law/Antitrust Law) to licenses for intellectual property rights.

### 1 Balance between Protection of Preceding Technology and Promotion of Late Technology -- Reservation of Theory of "Strong and Broad Intellectual Property Right"

The U.S. has been strengthening the statutory protection of intellectual property rights since the latter half of the 1970s. The term of copyrights was extended to 70 years and the protection of computer software by copyright was clearly stated. Business method patent was established by the State Street Bank decision,(*12) and the Court of Appeals for the Federal Circuit (CAFC) has been contributing to the strengthening of intellectual property rights by consistently making decisions that strengthen the exclusive right for intellectual property.

However, there is a concern that the excessive protection of intellectual property rather diminishes innovation. In the U.S., theories that broad rights should be granted to prior basic inventions were prevailing in the past, but theories that rights of prior inventions should be narrowed to promote late inventions have become conspicuous from the 1990s onward. In order to balance the protection of prior inventions and the promotion of late inventions, it is necessary to put a brake on the expansion of exclusive scope of patent rights based on the equivalent doctrine. The Hilton-Davis decision(*13) in the U.S. in 1995 put forward a view that limits the Graver Tank standard, by stating that the effects of prior patents do not extend to late inventions that are substantially different from descriptions in the specification of the prior patents. This is based on a view that to design inventions so as not to infringe on prior patents is an essential factor of competition. In the U.S., the reverse doctrine of equivalents was established by judicial precedents as a concept that adjusts the expansion of exclusive scope of patent rights based on the equivalent doctrine from the other end. The "reverse doctrine of equivalents" (or the doctrine of "limited equivalents"(*14)) is a view that even if a late technology is considered to infringe on a prior patent according to descriptions in its patent specification, if it made a remarkable leap from the principle indicated in the prior patent, it is not considered to infringe on the prior patent.(*15) This viewpoint should also be adopted in Japan.

Moreover, a measure that protects computer programs (software) as copyright started in the U.S. and came to Japan. Due to this, like Microsoft's Windows, creators lock away standard works and one company monopolizes improvements of the works and thus, basic software or platform software becomes de facto standard, so that a monopoly position of the standard software is perpetuated. In this regard, however, some kind of corrective measures are necessary such as limiting the copyright of the original copyright holder to the part similar to the source code of the original software and for other source codes, granting copyrights to only those who improved the software concerned if the improvement is recognized as creative. Through this, the right of the original copyright holder does not extend to the improved part, and when the creator of the original software utilizes the improved part, he/she needs to obtain a license from those who improved the software. Therefore, the copyright holder of improved software acquires bargaining power against the copyright holder of the prior software.

### 2 Application of Competition Law to Limitations under License and Refusal to License

Regarding adjustment between the rights of prior inventors and the rights of late inventors, not

(*12) State Street Bank & Trust Co. v. Signature Fin. Group, Inc., 149 F. 3d 1368 (Fed. Cir. 1998), cert. denied, 119 S. Ct. 851 (1999).

(*13) Hilton-Davis Chemical Co., Inc. v. Warcer-Jackson Co., Inc., 62 F. 3d 1512 (Fed. Cir. 1995).

(*14) Terminology in Shigetoshi Matsumoto, "Tokkyo Hatsumei No Hogo Hani [Shimban] (Scope of Protection of Patented Inventions [New Edition])," p. 390, (Yuhikaku, 2000).

(*15) For example, SRI International v. Matsushita Elec. Corp. of America, 775 F. 2d 1107 (Fed. Cir. 1985) ----- Robert P. Merges & Richard R. Nelson, *Market structure and technical advance: the role of patent scope decisions* in Thomas M. Jorde & David J. Teece (eds.), Antitrust, Innovation and Competitiveness, p. 197 (Oxford University Press, 1992).

only measures under the intellectual property law but also measures by implementing the competition law (Antitrust Law/Antimonopoly Law) are important.

In many cases, late companies cannot engage in research and development without obtaining licenses for patent (or copyright) from prior inventors. In granting a license, prior inventors generally impose various limitations on the licensee's way of utilizing the subject technology. The licensee's research and development is constrained by these limitations, so the cumulative improvement of technology is hindered. Therefore, public policy to confine limitations under a license is required.

It is not the intellectual property law but the competition law (Antitrust Law/Antimonopoly Law) that has charge of the public policy, since limitations under a license are not exclusive rights which are guaranteed to inventors under the intellectual property law but they arise in contracts between a licensor and a licensee. Limitations under a contract violate the competition law if they fall under unreasonable restraint of competition. The competition authorities and the courts need to establish standards for certifying the violation of the competition law by considering limitations under a license as unreasonable.

The Japanese Fair Trade Commission has never applied the Antimonopoly Law to refusal to license. There are also few cases actually disputed. On the other hand, the competition authorities and the courts in the U.S. have rendered a great number of orders and decisions in relation to the issue of refusal to license. Decisions that are informative when applying the competition law to limitations under a license or refusal to license in Japan have been rendered such as the Data General decision(*16) in 1994, the Kodak appeal decision(*17) in 1997 and the Xerox appeal decision(*18) in 2000.

### 3 Conclusion

Intellectual property rights will come to play a more important role in developing the Japanese economy than in the past. Japan had caught up with Europe and the U.S. in times long past, and Asian emerging countries have been catching up with Japan in the heavy and chemical industries and the machinery industries, at which Japan has excelled. It is necessary for Japanese companies to develop advanced high-tech industries such as the information industry and biotechnology. Such new industries called "new economy" are developed through innovations. In order to achieve development, corporate and individual efforts for innovations must be protected by intellectual property rights (patents, copyrights and trade secrets). However, not all innovations are pioneer inventions, and many innovations are created through accumulation of improved technologies. Therefore, intellectual property policy that balances the protection of pioneer inventions and improved inventions is necessary. It is necessary that the government and the courts implement the Patent Law including the equivalent doctrine and measures under the Copyright Law from this viewpoint.

In advanced high-tech industries called "new economy," it is normal that a company cannot conduct research and development or manufacturing by its own intellectual property rights alone and must obtain licenses for other companies' intellectual property rights. Not the intellectual property law but the competition law (Antimonopoly Law/Antitrust Law) has charge of regulating license contracts. Therefore, the Antimonopoly Law, along with the intellectual property law, will come to play a more important role in the Japanese economy in the future. In relation to limitations under a license and refusal to license for intellectual property rights, the Fair Trade Commission should instruct appropriate improvement measures by judging the effect of restraining competition and rationality as business comprehensively. However, it is necessary in principle to implement this by not regulatory rules but flexible administrative guidance.

## Ⅴ Conducting of Questionnaire Survey

### 1 Survey Targets and Rate of Respondents

In this study, a questionnaire survey was conducted to groups such as the Japan Intellectual Property Association, small and medium venture companies, banks, nonlife insurance companies, life insurance companies, securities companies, think-tanks and TLOs from December 2001 to January 2002.

373 out of 1,398 target companies responded, and the rate of respondents was 26.68%. Details are as follows.

A. Member companies of the Japan Intellectual Property Association: 793 target companies, 284 responding companies

B. Small and medium venture companies(*19) : 536 target companies, 76 responding companies

C. Financial companies, think-tanks, TLOs, etc.(*20): 69 target companies, 13 responding companies

(*16) Data General Corp. v. Grumman Systems Support Corp., 36 F. 3d 1147 (1st Cir. 1994).

(*17) Image Tech. Servs. v. Eastman Kodak Co., 125 F3d 1195 (9th Cir. 1997).

(*18) CSU, L.L.C. v. Xerox Corp., 203 F. 3d 1322 (Fed. Cir. 2000).

(*19) Companies with capital of less than ¥1 billion other than the Japan Intellectual Property Association, banking businesses, nonlife insurance businesses, life insurance businesses, securities businesses, think-tanks, TLOs, etc.

(*20) Some companies were extracted from banking businesses, nonlife insurance businesses, live insurance businesses, securities businesses, think-tanks, TLOs, etc.

## 2 Analysis of Questionnaire Survey Results

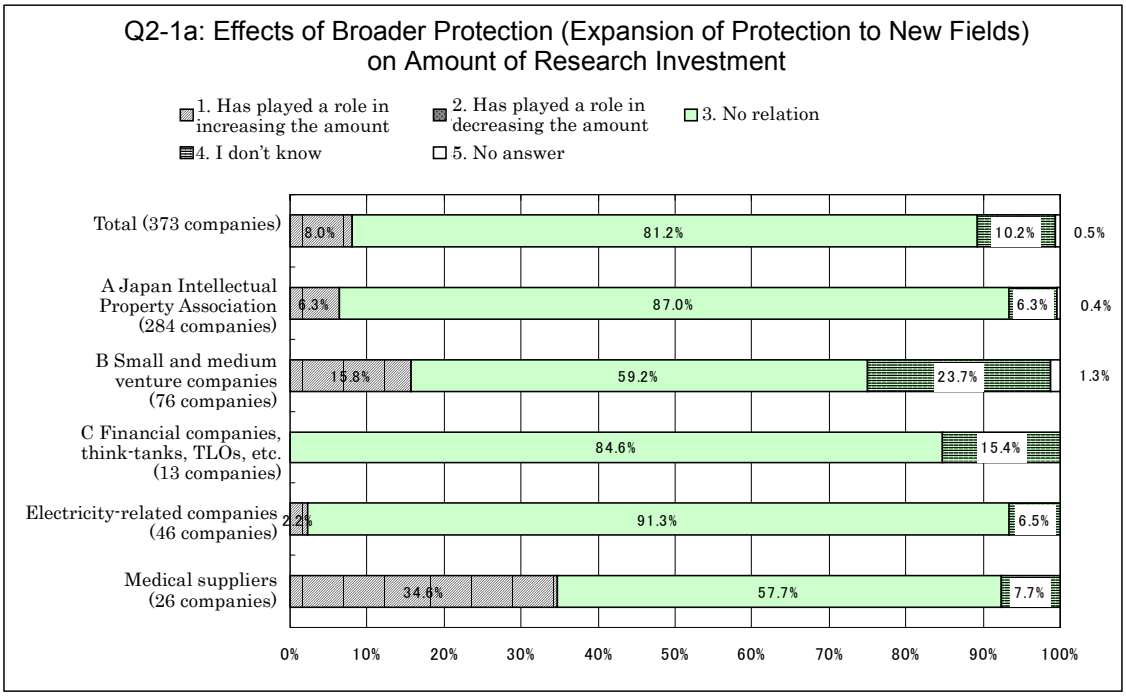
The questionnaire survey results were analyzed by classifying responding companies into five groups: ① A. Japan Intellectual Property Association, ② B. small and medium venture companies, ③ C. financial companies, think-tanks, TLOs, etc., ④ electricity-related companies and ⑤ medical suppliers.

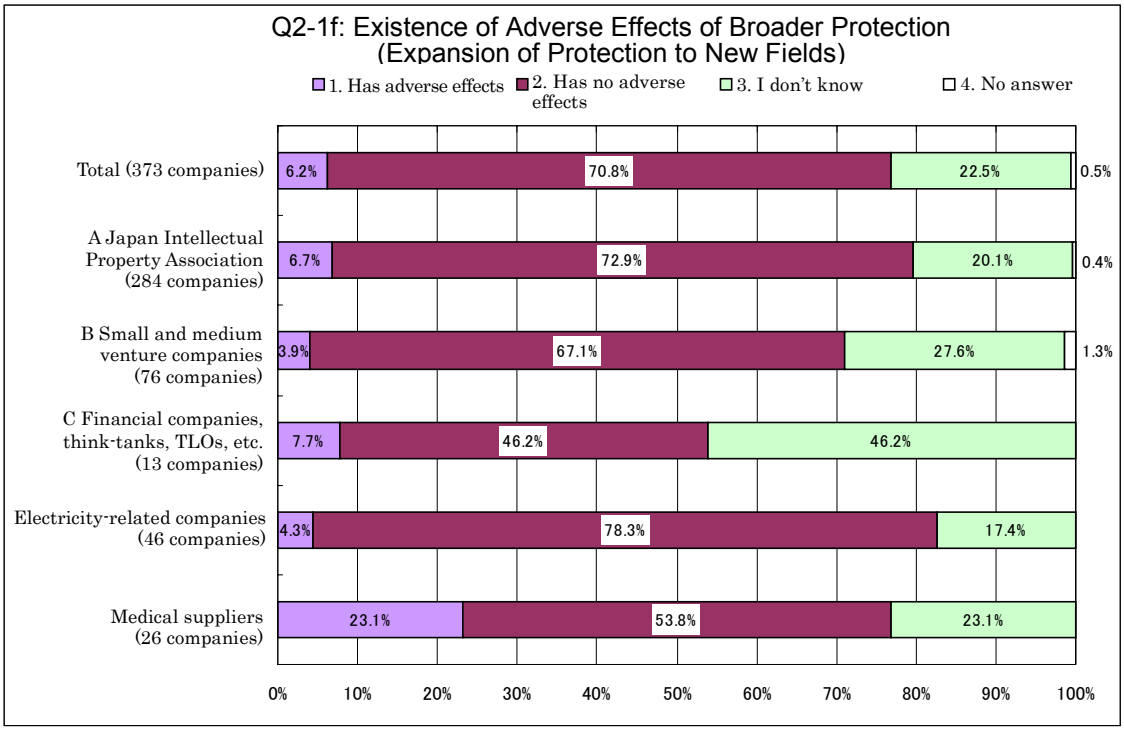
### (1) Effects on the Amount of Research Investment (Q2-1a)

A large majority of respondents answered that "broader protection" has "no relation" to the amount of their research investment. However, in terms of medical suppliers, 34.6% answered that broader protection "has played a role in increasing" the amount of research investment, and the rate was relatively high compared to others.

### (2) Existence of Adverse Effects (Q2-1f)

When asked about the existence of adverse effects of "broader protection," a large majority of companies answered that "broader protection" "has no adverse effects." However, in terms of medical suppliers, 23.1% answered that it "has adverse effects," and the rate was relatively high compared to others.



### (3) Conditions of Utilization of Patents (Q2-4)

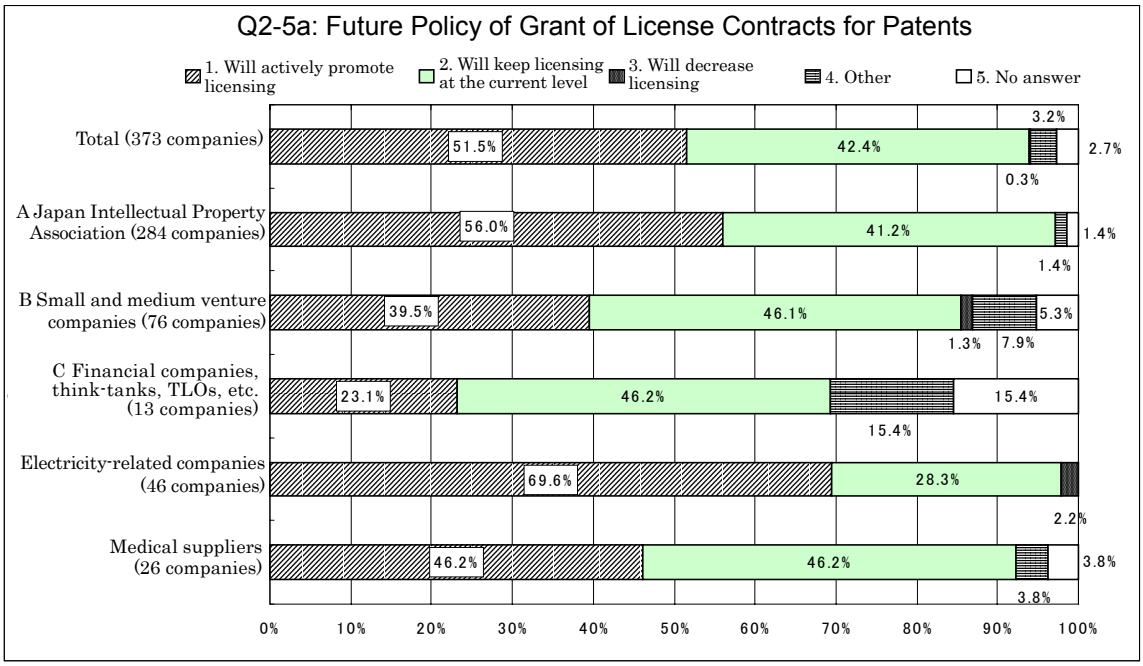
The average of all companies concerning descriptions about conditions of utilization of patents is as follows. The rate of patents owned by companies which are worked in-house (c) is 44.3%, while the rate of patents owned by companies of which working license has been granted to other companies (d) is 12.2%. The rate of non-working patents among patents owned by companies (e) is 57.5%, i.e. more than 50% of patents owned by companies are non-working.

### (4) Future Licensing Policy (Q2-5a)

Regarding the future licensing policy, 51.5% of all responding companies answered that they "will actively promote licensing." 69.6% of electricity-related companies answered that they "will actively promote licensing." On the whole, very few companies answered that they "will decrease licensing."

Q2-4: Conditions of Utilization of Patents in Your Company Total

| Item | Average number of patents/rate | Number of responding companies |
|---|---|---|
| a. Number of domestic patents owned | 1038.6 | 346 |
| Of which, rate of patents for which right has been acquired overseas | 24.6 | 290 |
| b. Number of patents owned for which right has been acquired only overseas | 431.6 | 277 |
| c. Rate of patents owned which are worked in-house | 44.3 | 322 |
| d. Rate of patents owned of which working license has been granted to other companies | 12.2 | 292 |
| Of which, rate of domestic companies | 55.1 | 239 |
| Of which, rate of foreign companies | 32.2 | 222 |
| Of which, rate of working licenses granted by cross licensing | 28.4 | 216 |
| Of which, rate of working licenses with charge | 55.4 | 225 |
| e. Rate of patents owned which are non-working | 57.5 | 299 |
| Of which, rate of open patents | 47.7 | 239 |
| f. Number of patents of which working license has been obtained from another company | 113.7 | 281 |
| Of which, rate of domestic companies | 74.4 | 218 |
| Of which, rate of foreign companies | 46.1 | 211 |
| Of which, rate of working licenses obtained by cross licensing | 50.4 | 198 |
| Of which, rate of working licenses with charge | 72.3 | 210 |
| g. Number of patents sold to others within fiscal 2000 | 25.1 | 293 |
| h. Number of patents purchased from others within fiscal 2000 | 21.1 | 291 |
| within fiscal 2000 | | |




### (5) Costs Required for Filing Applications and Maintaining Rights (Q2-7)

Comparing costs for domestic applications and foreign applications, the average costs for domestic applications are ¥140.6 million while the average costs for foreign applications are ¥228.7 million, and costs for foreign applications are higher. When comparing the breakdown of costs, translation fees and annual fees for patent are especially high for foreign applications. At any rate, in fiscal 2000, the average number of foreign applications was about 70% of the average number of domestic applications, so it can be said that costs for foreign applications are higher.

Q2-7 Costs required for filing applications and maintaining rights in fiscal 2000 (unit: ¥1 million) Total

| Cost item | Average costs in fiscal 2000 | Number of responding companies |
|---|---|---|
| Search costs (including foreign searches) | 23.9 | 244 |
| Total costs for domestic applications | 140.6 | 261 |
| Of which, costs for filing applications/ intermediate processing | 48.6 | 200 |
| Of which, annual fees for patents | 27.8 | 198 |
| Of which, costs for patent attorneys | 50.3 | 181 |
| Total costs for foreign applications | 228.7 | 240 |
| Of which, costs for filing applications/ intermediate processing | 79.0 | 157 |
| Of which, costs for translations | 20.4 | 132 |
| Of which, annual fees for patents | 41.3 | 158 |
| Of which, costs for patent attorneys | 52.1 | 128 |
| Compensations for inventions for inventors | 16.4 | 225 |
| Costs for dealing with right infringements/suits | 43.6 | 193 |
| Of which, costs for patent attorneys | 14.7 | 147 |

### (6) Number of Domestic Patent Applications in Fiscal 2000 (Q2-9a)

As for the average number of domestic patent applications in fiscal 2000, the number of applications filed by electricity-related companies, 1,042.5, is especially large.

Q2-9a: Number of domestic patent applications in fiscal 2000

| | Average number of patent applications | Number of responding companies |
|---|---|---|
| Total | 413.6 | 359 |
| A Japan Intellectual Property Association | 512.9 | 277 |
| B Small and medium venture companies | 3.0 | 72 |
| C Financial companies, think-tanks, TLOs, etc. | 25.7 | 10 |
| Electricity-related companies | 1042.5 | 46 |
| Medical suppliers | 77.3 | 25 |

### (7) Number of Patent Applications Filed Overseas in Fiscal 2000 (Q2-10a)

As for the average number of patent applications filed overseas in fiscal 2000, the number of those filed with the U.S. is highest. About two to three times as many applications as the number of applications filed with other countries were filed with the U.S.

Q2-10a: Number of patent applications filed overseas in fiscal 2000 Total

| | Average number of applications | Number of responding companies |
|---|---|---|
| International applications by the Patent Cooperation Treaty (PCT) | 27.2 | 226 |
| U.S. | 79.2 | 218 |
| EPO | 32.5 | 184 |
| U.K. | 28.3 | 147 |
| Germany | 33.8 | 158 |
| France | 33.4 | 148 |
| China (including Hong Kong) | 21.1 | 183 |
| Korea | 28.7 | 186 |
| Other | 43.1 | 170 |

### (8) Questionnaire Survey as a Whole

On the whole, the majority of respondents answered "no relation" or "I don't know" concerning effects on the amount of company's research and development investment, qualitative effects, effects on the number of patent applications, effects on budget for patent applications, and effects on exercise of rights by the "broader protection" and "stronger protection" of patents. It is inferred from this result that many companies believe that "broader protection" and "stronger protection" rarely has direct effects on their basic patent policies.

However, in fact, there is no doubt that patent applications are increasing.(*21) In addition, some medical suppliers, etc. answered that the "broader protection" and "stronger protection" "has played a role in increasing" the amount of research investment, in terms of effects on the amount of research and development investment, qualitative effects, effects on the number of patent applications, effects on budget for patent applications, effects on the exercise of rights, etc. Results also indicate that a considerable number of companies are thinking of actively promoting license contracts. It can probably be said that "broader protection" and "stronger protection" had some kind of effect on companies' patent policies in some way, though not directly. A point to be noted in this questionnaire is that the majority of companies at least answered that "broader protection" and "stronger protection" has no adverse effects.

Therefore, it can be probably said as a whole that to admit "broader protection" and "stronger protection" of patent applications, which will increase in the future, directly leads to the activation of license contracts between companies, and thus, may activate the economy. As long as the majority of companies at least answered that the promotion of "broader protection" and "stronger protection" has no adverse effects, it is determined that there is also no reason for denying pro-patent policy in Japan.

## VI "Statistical Surveys on Intellectual Property Activities"

In a plan that aims to appropriately strengthen the protection of intellectual property rights (promotion of the pro-patent policy) and establish the cycle of intellectual creation in line with the "Action Plan for Reform and Creation of the Economic Structure" (Cabinet decision in May 1997) as well as the "Plan for the Creation of New Markets and New Jobs" which was published by the Ministry of Economy, Trade and Industry in May 2001, it is cited as one of the challenges to strengthen the intellectual property protection policy from the viewpoint of increasing Japan's industrial technical capabilities. In developing these measures, it has become extremely important to understand the actual conditions of utilization of intellectual properties such as patents by companies, etc., and it is required to conduct "statistical surveys on intellectual property activities" as a means therefor. Consequently, a subcommittee was set up to conduct examination thereon.

Specifically, the subcommittee reached the conclusion that it is most effective to prepare

(*21) The "Tokkyo Gyosei Nenji Hokokusho (Annual Report on Patent Administration) 2001" also mentions the fact that patent applications are increasing.

"questionnaires" and conduct "statistical surveys on intellectual property activities," so it prepared a specific "questionnaire for survey on intellectual property activities (draft)" that focuses on the three viewpoints, the "conditions of utilization of the intellectual property system," the "conditions of transaction of intellectual property rights" and the "conditions of activities of the intellectual property sector," and examined survey targets.

## Ⅶ Evaluation of the U.S. Pro-patent Policy

For the U.S., it has already been about 20 years since the start of the pro-patent policy, and policies and phenomena that were brought about by the pro-patent policy have become clear. Such examples are the establishment of the CAFC, the expansion of patent protection to new fields such as biotechnology and business methods, the expansion of application of the equivalent doctrine, etc., changes in examination standards and the Bayh-Dole Act. However, in terms of effects on innovations and moreover, on the economy in the U.S., it is difficult to look at effects caused by the pro-patent policy alone apart from other various factors. Therefore, the effects of the pro-patent policy are still unclear. The U.S. pro-patent policy is evaluated as follows.

Not all recent patent-related policies and courts' decisions are those which increase profits from inventions (for example, publication of unexamined applications).

The pro-patent policy appears most clearly in the CAFC and the Bayh-Dole Act. It is, however, not clear how much they increased patent premium, except for the grant of patents to inventions in new fields, and they probably have not brought about much increase.

The pro-patent policy appears to have increased the number of patents. It is, however, difficult to look at the effects of the pro-patent policy separately from other factors such as technical opportunities and the prediction of demand.

It is also necessary to pay attention to the negative effects of the pro-patent policy on technical progress. The grant of patents to fundamental, upstream inventions makes it difficult to make cumulative technical progress. In the field of biotechnology, patents have been playing a role as a factor that promotes new entries, but in other fields, they may be a factor that plays a hindering role. Defensive patents and increasing judicial costs also have negative effects on innovations.

In conclusion, there has been no clear evaluation of the pro-patent policy even in the U.S. where the pro-patent policy was implemented earlier and studies on the effects thereof have relatively been proceeding.

## Ⅷ Summary

This study examined the effects of the Japanese "pro-patent policy" on the entire economy. It was, however, difficult to find a clear answer since (1) it has been only four years since the start of the policy, so the effects thereof have not clearly appeared, (2) statistics related to intellectual property are lacking, so there are very few means to verify the effects and (3) both theoretically and experimentally, there are few accumulated studies that should be referred to. However, even in such circumstances, the following outcomes and issues for the future were achieved.

### 1 Outcomes

#### (1) "Pro-patent policy" and Trend of Licenses

Concerning the effects of the "pro-patent policy" on the trend of licenses, this study could clarify a relationship between the pro-patent policy and the trend of licenses to a certain extent. It is desired that this outcome be fully utilized for the verification of effects of the "pro-patent policy" based on license contracts and for the planning of effective policies, in the future.

#### (2) Construction of a Model for Experimental Study

This study had a view of theoretical analysis that becomes the basis for promoting study on the "pro-patent policy." It is desired that this outcome be fully utilized for experimental studies in the future.

#### (3) Preparation of "Questionnaire for Survey on Intellectual Property Activities (Draft)"

This study also made up a "questionnaire for survey on intellectual property activities (draft)" to prepare statistics that will become another basis for studies in the future. It is strongly desired that this be fully utilized for the verification of the "pro-patent policy" and studies on relations between the patent system and the economy in the future.

### 2 Future Issues

#### (1) Positive and Negative Effects

The "pro-patent policy" has both positive and negative effects on the economy. It is necessary to promote examination to find out a system design that extends the positive effects and restrains the negative effects by strictly considering both effects.

#### (2) Balance with the Antimonopoly Law

In order to promote technical progress and competition, which are inseparable for economic development, it is necessary to promote examination on desirable relations between the intellectual property law and the Antimonopoly Law.

(Senior Researcher: Toru Takano)