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Intellectual Property

EDITORIAL

Reports by Jean Tirole,
by Claude Henry, Michel Trommetter and Laurence Tubiana,
and by Bernard Caillaud

How should inventors and innovators be protected without creating excessive rents and without constraining the dissemination of new technologies and new products? This is the main question treated in the three reports. Economic theory provides useful guidelines, and the authors borrow from public economics and industrial organization theory.

One of the main interests of these reports is that they provide an up to date synthesis on several new issues, which are particularly important for the society. The authors also apply economic analysis to empirical cases, such as biotechnology (the patenting of genes), drugs and software.

Under the framework of the Doha negotiations, intellectual property is in the core of the North-South relations, through multiple aspects. Nevertheless the international dimension of intellectual property is not limited to the World Trade Organization. It is also an important issue in the European construction, for the progress towards a truly unified market, and for the implementation of a genuine European policy on intellectual property.

Christian de Boissieu
Executive Chairman of the CAE

The present systems for protecting intellectual property are no longer adapted to the new challenges raised by innovation in biotechnology, software or information technology. The authors of the three reports, one on the protection of intellectual property (Jean Tirole), one on the protection of innovation in the biotech sector (Claude Henry, Michel Trommetter and Laurence Tubiana), and one on intellectual property in the software industry (Bernard Caillaud), believe that there are major concerns about the way patents are allocated, in the United States, but also in Europe. Recent controversial decisions have led to privatize questionable innovations, or discoveries that are essential for fundamental research. They adopt the economists' point of view, and try to define the appropriate level of protection for intellectual property. This requires arbitrating between enough protection for providing incentives to innovate, and too much protection that would result in obstacles to competition and to the dissemination of knowledge. They recommend a reform in the way patents are provided. They argue that the State should act as a regulator when necessary, in order to prevent situations in which patents would limit research and dissemination of knowledge when it is useful for the society as a whole, in particular towards developing countries.

The report was presented to the plenary session held on May 23rd 2002, and in the presence of the French Minister of Economy, Finance and Industry on April 2nd 2003. This letter, published under the authority of the permanent staff of the CEA, summarises the main conclusions of the reports.

Recent questionable decisions on the protection of intellectual property

Jean Tirole's report entitled 'Protection of Intellectual Property: An Introduction and Some Food for Thought' shows the difficulties faced by legislators as a result of new challenges. Protecting intellectual property has always involved a fine balance between conflicting targets: creating a favourable environment for innovation and disseminating the latter once it has materialised. However, the boundary between fundamental and applied research has now become less clear-cut, thereby hindering the dissemination of knowledge downstream, a prerequisite for patents. The rapid growth in the number of patents issued poses management and control problems. Mistakes by patent offices, which have recently patented questionable 'inventions' in terms of obviousness or novelty (trivial technology, algorithms sometimes limited to somewhat unoriginal mathematical processes, etc.), are aggravated by the difficult problems presented by new technologies, particularly in the fields of biology and IT, and by the expanding range of what can be patented. International issues, particularly 'free-riding' policies in some countries and asymmetries in research capacities, have become more important. They also question the role of intellectual property in the redistribution of global wealth and its links with development aid.

The difficult balance between too little and too much protection

Jean Tirole discusses the rationale of intellectual property protection and the interaction between its various components,

particularly the patent, manufacturing secrets and copyright. Intellectual property protection aims to create incentives to produce the public good represented by knowledge. The strength of the incentive must be proportionate to the cost (either financially or in terms of opportunity), which will vary depending on the risk associated with research, the likelihood of failure and the social impact of the innovation. Intellectual property must not block the process of innovation when technology is a prerequisite for any research in the relevant field or for the commercial use of this new research.

To avoid bottlenecks, facilitate the establishment of a norm and avoid the risk of a copyright holder holding users 'to ransom', the regulator may intervene with a mandatory purchase licence, whereby the government demands appropriate compensation in exchange for access to protected innovation. However, their use poses considerable practical problems.

The role of the public regulator

Among the new challenges faced by the legislators and public authorities is the attitude to dividing up intellectual property into pools of patents or licences between companies. For example, we can see significant developments in pools of DVDs or video compression algorithms and cross licensing in semi-conductors and software. There are several advantages to pools, not least the fact that they limit the number of licence agreements for the user and lead to lower prices for additional licences. The European Commission will soon be required to rule on the approval criteria of such inter-business agreements. Depending on how they are used, they may be an extremely good way to share knowledge, particularly in new technology sectors, or may enable businesses to establish reciprocal agreements to slow the rate of innovation or reduce the dissemination of existing innovations. Regulatory safeguards must be put in place to prevent competition and the cartelisation of the sector, and the report suggests a number of relevant avenues to be explored.

A necessary reform of patents offices

Jean Tirole then turns to institutions, and patent offices in particular. Does the frequent criticism made of these offices simply reflect a temporary situation (lack of familiarity with new technologies), or a deep-rooted problem? The European system for this seems better than the US system, although not in every respect. The problem of judges' ability to analyse technical matters seems to have been more effectively tackled in the United States by the central judiciary. In Europe, patents are also very expensive for the businesses that apply and the incentives system is unsatisfactory. Debate between opposing parties should be encouraged when a patent is challenged, language restrictions for submissions reduced, and the membership of the review committee set up to settle disputes revised.

An effort in favour of developing countries

Two international issues are discussed in depth in the report, namely the coordination of international property protection between countries and the specific problem of developing countries. On the latter point, Jean Tirole focuses his analysis on medicine. Price cuts granted to third world countries (in the event of parallel import restrictions and agreements between countries, pharmaceutical companies and multilateral organisations) may be seen as part of a global social

contract in which rich countries agree to pay for medicine at higher prices, thus enabling poor countries to have access to these drugs when demand from rich countries is, in itself, enough to justify research and development. Lower prices are, however, dangerous when dealing with diseases representing mainly local demand in Southern hemisphere countries (malaria, tuberculosis, etc.). Regarding these drugs and vaccinations, asking for a contribution from the private sector guarantees that they will never be developed. For example, current progress in the search for a cure for Aids is unsuited to the specific strains of the virus raging in developing countries. Sadly, this does not come as any surprise: there is no incentive for the private sector to invest the colossal sums needed for the development of these vaccinations and drugs. The payment system suggested by several international organisations, involving the auction of a research budget based on several terms of conditions, an *ex post* evaluation and a joint payment by developing countries, is noteworthy. However, multilateral coordination on the supply of necessary funds is essential.

Intellectual property and live organisms

Jean Tirole concludes his report with a discussion on genetically modified organisms, with **Claude Henry, Michel Trommetter** and **Laurence Tubiana**. The aim of their report 'Innovations and

Intellectual Property Rights: What Is at Stake for Biotechnology' is to analyse how the definition of intellectual property rights and their implementation can have an impact on research and innovation in this sector, as well as economic growth and social well-being.

The theory of endogenous growth and the empirical works involved show that the following factors support innovation:

- competition for innovation itself;
- *ex ante* competition on the product market, competition that businesses look to avoid through innovation;
- the spread of knowledge built up with previous innovations;
- protection against *ex post* competition on the market for the product to which the innovation has contributed.

The fourth condition justifies the implementation of intellectual property rights; but if these are too strict or too far-reaching, they clash with the first three conditions.

Such conflicts frequently arise in biotechnology. Two examples in the Box, about Myriad Genetics and about Human Genome Sciences, provide a perfect illustration of possible questionable consequences of patents.

These two examples are far from isolated. They are even typical of the way in which patents are awarded to the biotechnology sector. From this point of view, the authors show the extent to which the system for protecting intellectual property in this sector

Some unwanted effects of intellectual property in biotechnology

The system for protecting intellectual property is 'sick' according to Claude Henry, Michel Trommetter and Laurence Tubiana. They illustrate this opinion with two examples taken in the biotech sector, where the effect of patents has some questionable consequences on the welfare of the society as a whole.

The US company Myriad Genetics owns the rights, under US patent law, to two genes –BRCA1 and BRCA2– that give an early warning of breast cancer; the patents also cover a screening test created by the same company. As a result, Myriad Genetics' patent has seen US hospital laboratories abandon their research and clinical trials that use these patented genes. The US patents held by Myriad Genetics cover all functions of BRCA1 and BRCA2, and all resulting applications, even though the majority were unknown at the time the patents were requested, and remain unknown today.

The second example relates to the fight against Aids. In 1995, a patent application was filed by Human Genome Sciences, a US company, on the CCR5 protein coding gene, without any specific purpose in terms of diagnosis or therapy. While the patent was still pending, US and Belgian government researchers established that CCR5 acted as a receptor for the penetration of HIV cells into the human body. Despite this discovery, the patent was granted to Human Genome Sciences and covers all functions of CCR5. It therefore gives the company the right to exploit a discovery in which it was not in any way involved. This right provides a significant share of the profits drawn from the marketing of new medicine used in the treatment of Aids, which have been developed on the basis of the discovery of the role of CCR5.

through the issue of patents has 'lost its bearings'.

Should genes be eligible for patents?

One of the major drawbacks of the current method of granting intellectual property rights on the living is the excessive extension of a number of patents, which go beyond the actual invention, and for discoveries with a very distant industrial use. Whereas once only inventions could be patented and not discoveries, it now seems that patent offices are treating everything as an invention. Opposing this change, and asserting that any invention is based on previous discoveries, the report's authors argue for a much stricter link between the extension of patents and the inventions covered.

Furthermore, the explosion in the number of patents has led to strategic policies to protect a maximum number of innovations. Obtaining patents becomes an end in itself to generate income by reselling licences. The explosion of transaction and litigation costs concerning intellectual property does not contribute to social well-being, nor does it encourage scientific progress; it may even create obstacles to future innovation. The report's authors clearly oppose the possibility of issuing extended patents. If, for the wrong reasons of precedent and uniformity, patent offices are unable to control the issue of these patents, the authors recommend that no more patents on genes are awarded.

Lastly, the allocation of patents, i.e. temporary rights to private property, on 'essential facilities' such as genes or proteins is unsatisfactory from an economic point of view. Gene facilities are essential for all subsequent research or innovation depending on their biological role in the metabolism. The authors recommend a stop to the patenting of 'essential facilities' derived from nature or, at the very least, there must be an obligatory licensing system. The aim would be to regulate access to essential knowledge, in such a way as that patent holders provide the information they have at hand to those who might be able to benefit from

in, at a reasonable price. This scenario implies regulating access to the essential infrastructures of public services networks.

There are now specific considerations when issuing intellectual property rights in developing countries. These countries must have guaranteed access to the biotechnological techniques and products of industrialised countries; but they must also be able to protect their natural resources and knowledge that could be used in biotechnological and pharmaceutical procedures that they have yet to master. On this point, the authors are highly critical of the World Trade Organisation's TRIPS agreement (Trade-Related Aspects of Intellectual Property rights). They view this agreement as the global expansion of a system that they consider to be 'diseased'.

Intellectual property and the software industry

In the third report 'Intellectual Property on Software', **Bernard Caillaud** describes the specific nature of the IT software sector, if only because of the low cost of copying, the public nature of the information contained in software and the slim difference between information and the technology behind it.

After examining the legal framework and its development, innovation strategies and assessing risk (duplication, imitation and neighbouring innovation), Bernard Caillaud adopts a favourable stance to the targeted patenting of a limited number of innovations, under strict allocation criteria. This suggests a move in the opposite direction to the European Patents Office, even though it is difficult to ascertain just how far any change in patent allocation should go. More specifically, protection of software innovation by copyright is needed to avoid pirating and the competitive marketing of copied software. Exceptions authorising copies for research, back-up and inter-operability are, however, permitted. Further protection seems necessary, at least for fundamental or pioneering innovations. The framework of protection by patent seems to be

suitable and the need to adopt a sui generis approach is doubtful.

Theoretical arguments suggest the need for rare (novelty and inventiveness criteria should be strictly upheld), far-reaching (the protection must cover developments and downstream applications), but relatively direct protection (it must not serve as an excessive lever to other markets, particularly in the case of interfaces).

Bernard Caillaud believes that protection through patents is compatible with the existence of freeware. This coexistence is more balanced if compliance with freeware licences is ensured and if the source codes for patented software are made public. The publication of source codes, particularly on interfaces, and the registration of patents in an easily accessible central database (at the World Intellectual Property Organisation) would facilitate procedures for assessing novelty, enabling users to evaluate the risk of conflict, and could facilitate the establishment of an active market for existing licences and patents.

The negotiation of operating licences, R&D agreements or joint ventures and cooperative agreements for sharing software patents must, according to Bernard Caillaud, be encouraged, under the surveillance of the competition authorities. Institutional changes must be made to control the jurisdiction and functioning of patent offices, and to implement appeals procedures drawing from the information provided by experts within the sector. Incentives to apply for patents should make it easier to select and examine these applications. Restrictions on the validity of patents, in particular with regard to their strategic use, should be strictly enforced. Support for small and medium businesses may be created to inform, facilitate the funding and upkeep of their patents, mutualise their litigation risk, share legal expertise and level the playing field with large businesses holding sizeable portfolios of patents. Bernard Caillaud does, however, believe that economic theory cannot provide more precise operating recommendations, for example in terms of the optimal duration of protection.

Comments

The reports are discussed by Daniel Cohen and Lionel Fontagné. **Daniel Cohen** shares the point of view that too much protection of intellectual property may have some negative effects for the society, and that regulatory institutions should be implemented, which would base their decisions on welfare criteria, as antitrust commissions do. He suggests a broader range of possibilities than a fixed twenty years long patent: a narrow coverage and a long life patent, or a broader coverage but a shorter life patent. In order to stimulate the coordination of research efforts, he suggests the creation of a 'fair use' status, like in the copyright law, which would enable academic research to avoid legal disputes every time the purpose of research is not the rivalry with existing property rights, but the progress in knowledge.

Lionel Fontagné is more skeptical about the practical validity of the public economist's point of view, i.e. of reasoning in terms of social welfare, that would lead to less protection on the 'upstream' innovation in order to encourage dissemination of knowledge. The reality of international competition implies, according to him, to think in terms of game theory. The world is such that, because there is no possible agreement on a common system of intellectual property, each subsystem of rules has some interest in excessive protection of the upstream innovation in order to protect downstream rents, even though this results in global inefficiency. He expresses some doubts about the practical validity of some of the conclusions of the reports. Any reduction of intellectual property in Europe would lead to a reallocation of some research to the United States. An 'excessive' protection of intellectual property, from the social welfare point of view, is perhaps made necessary by international competition.

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