

If ‘Intellectual Property Rights’ is the Answer - What is the Question?

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Abstract:

This paper critically reviews the controversies surrounding the rationales of intellectual property rights (IPRs). Focus is on moral rationales, economic incentive rationales, increased competition and ‘market protection of entrepreneurial talent’ rationales, and the economic rationales of organising science, technology and creativity. An important conclusion is that economists ought to step back from their philosophies and theoretical logics on this topic, and instead draw their attention towards empirical research. Otherwise we cannot achieve a finer understanding of the social and economic effects of IPRs, and this understanding is urgently needed for policy fostering the knowledge driven techno-economic paradigm facing the new century.

Key words: Intellectual property rights (IPRs), IPR rationales, IPR policy.

JEL: Will be provided

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1. Introduction

Entering a new economy or techno-economic paradigm in which knowledge assets rather than physical assets are the primary sources to wealth generation and growth, we have experienced an increased tightening of the intellectual property right system in terms of integrating new areas of protection (even beyond science based principles including business methods patents) and increased exclusive rights (e.g. increased period of protection up to 20 years; and allowance of submarine patent in the US (Mowery 2002).

However, policy makers involved in the formation of IPR legislation and competition policy, as well as the socio-legal and economic literature on IPRs, have largely ignored any controversial discussions surrounding the rationales for IPR regimes (i.e. rising the questions why we have them and what we want from them). Machlup and Penrose (1950) already argued in the mid twentieth century how IPRs has become a part of juridical thinking (law) and that most other disciplines (economics, politics, engineering) have not been interested and only made passing references to the subject of patent protection and patent exploitation. They also argued how after the 1870s, when the legislatures on the patent controversy was settled (and the opinions and beliefs on the social benefits of patents in particular became the point of departure if not authority), the agenda of professional meetings within economics rarely included debates on the patent system. Economists turned to other questions, and the patent controversy disappeared from the economic literature.

Now, about hundred and thirty years after the end of the nineteenth century patent controversy, the political scene and legislation in Europe have finally decided to turn their special attention to the economic effect of patent protection including its purpose, functioning and scope (EU 2002). This was mainly inflicted in the course of the controversies regarding patenting of genetic codes, patenting of software, and patenting of computer implemented inventions including non-science based business methods. This interest, which has evolved with the emergence of the new knowledge driven techno-economic paradigm, has further increased as a consequence of globalisation processes, globalisation policies and harmonisation of such.

Basically, we need to understand the relationship between intellectual property rights (IPRs) on the one hand, and the social and economic effects of such on the other hand. An aim should also be to understand the dynamic effects of the exploitation of IPRs on the general profile of corporate power, and the accountability of that power. Only when we understand those relationships, will we be able to recognize how IPR systems are not neutral, and able to design appropriate IPR regimes and IPR policies for the new economic era.

1.2. Aim of paper

As a first account to this research agenda, the aim of this paper is to critically review the economic principles or beliefs behind the rationales of the IPRs at the macro level. The paper will critically review the moral rationales (section 2), the economic incentive rationales (section 3), the increased competition and 'market protection of entrepreneurial talent' rationales (section 4), and the economic rationales of organising science, technology and creativity (section 5). Section 6 will conclude and

draw attention to how beliefs in IPRs differ considerably regarding precise intent, scope and effect, and the problems this may cause in policy design.

1.3. The IPR context

The exploitation of knowledge embodied in product and process innovations, new ideas, or related to intangible assets and symbolic material, is in most mature economies protected through the use of intellectual property rights (IPRs). IPRs came about as a natural evolution from property rights on land, capital and labour. Intellectual property rights are important because they present the legal mechanism for protecting (or enhance monopoly control over) many corporate assets.

IPR protection designed to protect the inventor from exploitation of his or her knowledge embodied in, mainly industrial, product and process inventions are mainly patents. However, trade-secrets and copyrights are also occasionally used for such purpose. This paper focuses on the rationales for protecting ideas embodied in such product and process innovations. Protection of ideas embodied in symbolic material (protected mainly by copyrights and trademarks) and protection of creative effort (important part of copyright law for data base building) will not be discussed.

2. Moral rationales

2.1. Human rights:

With respect to moral rationales of IPRs, an argument is that the law should provide remedies against those who appropriate ideas of others. A person who has devoted time and effort to create something has a right to claim that thing his or her own (see 2.1.1), and also has a right to obtain some reward for all their work (see 2.1.2).

The views on the ‘natural rights rationale’ stated below is inspired by the arguments reviewed by Machlup and Penrose (1950) on the nineteenth century debates, and the views of Plant (1934).

2.1.1. The ‘natural right’ to claim the intellectual property

Ideas are protected under the principle of ‘natural law’, in the sense that somebody’s idea is a ‘natural right’. This connotation signals some kind of ‘property’ and is to be seen in contrast to ‘positive law’ where the society gives one some kind of ‘privilege’. Thus, under this patent law rationale, a person has the natural property right on his or her own idea and society is *morally obligated* to recognize and protect this property right. This can be compared to the man’s natural right to the fruits of this labour. Basically, under natural law it is society’s *duty* to protect the inventor, and (as discussed in section 2.1.2) to secure the inventor a fair share of the reward when exploiting the inventor’s knowledge and ideas.

Hence, by using the name ‘intellectual property right’ the justification has some kind of respectable connotation ‘property’, in stead of the more unpleasant thing ‘monopoly privilege’. Machlup and Penrose (1950) emphasised how the term

‘intellectual property right’ (as opposed to ‘intellectual monopoly privilege’) was a very deliberate choice on the part of politicians working for the adoption of a patent law in the nineteenth century. This period was for liberty and equality and against privileges and monopolies of any sort. Patent law on inventions based upon a ‘monopoly privilege’ would be rejected, but as a ‘natural’ property right’, the patent law would be accepted. ‘What’s in a name’ is apparently important.

J.-B.-A.-M. Jobard, who the greatest advocates of the natural rights idea, published according to Machlup and Penrose (1950, p.9) no less than 48 books (between 1829 and 1852) on the same subject. He argued that everyone has a permanent and inalienable natural right to the sole disposal of him or herself and his or her work. He invented the term ‘monautopoly’ (meaning monopoly of oneself).

Controversy:

The theory on natural rights is generally accepted on literary and artistic work as this have perfectly decided character of individuality (or personality), and therefore regarded as distinct work. However, many denied it in relation to technological innovations. The basic argument is that technological inventions are mostly a social creation of collective, cumulative and interrelated work to which we all contribute (c.f. distributed innovation processes), and therefore, no one man should be able to claims property.

Furthermore, it is emphasised that patents on technological innovations is unfair, and actually against the natural rights, as it often prevents the inventors to use, or appropriate from, their own ideas they collectively have been part of creating, as someone else has been granted the intellectual property right. That is, many people work simultaneous on the solution of technical problems posed by consumer demand and the current state of the art, and the person who first arrives at the solution deprives all the other to use their own independent ideas.

However, A.E.F.Schaffle (in Machlup and Penrose 1950 p.12) challenged the ‘natural right’ idea by emphasising that there in principle is nothing ‘natural’ about a right on an idea, because once the idea is shared any exclusive control is gone. Intellectual property is about the ‘control of a market’ for things employing ideas, and this has nothing to do with the natural property right argument. The basic argument is that, due to the specific nature of an idea there is not natural property on this, and intellectual property right imposed by government is an artificial right protecting production and trade of things embodying the idea.

2.1.2. The natural right to compensation and reward

As explained above, under ‘natural law’ it is not only society’s *duty* to protect the inventor, but also to secure the inventor a fair share of the reward when exploiting the inventor’s knowledge and ideas. In this context, the inventor’s effort ought to be both compensated and rewarded. The idea is that it would be immoral if the law lets everybody free to use the work of an inventor without his or her consent and without compensation or equivalent in return. The rationale is basically that justice requires that society secure its people reward for their services in proportion to what they cost (the compensation) and how useful they are to society (the reward). The system

believers here believe that the most appropriate way to secure inventors is by issuing patents.

Controversy:

When it comes to reward inventions it has been argued that it is a problem that the IPR system is general and compensate and rewards equally all novel technological ideas. Although many inventions are the result of great effort, it is argued that there are also many accidental inventions and insignificant artifices which does not deserve compensation and reward. Some even argue that patent should only be allowed on inventions which are particular expensive and which could not easily have been make by others.

‘The theory of innovator’s head-start profit’ also developed as an argument against patent rationales for industrial inventions (Machlup and Penrose 1950, p.18). The argument was that there was no need for government to reward inventions in the first place. If an inventor is really ahead other inventions, then the time interval before catching up and imitation have happened (which is difficult as it requires learning) should already secure the inventor with profits and rent for his or her contribution. However, book-publishing where imitation is easy should be protected under ‘the theory of innovator’s head-start profit’ principle. The essential issue is the rate by which new ideas spread (i.e. the rate of imitation and catching up). The higher the speed, the more protection is needed to ensure reward. The lower the speed (e.g. due to learning requirements or ‘increasing return to scale and adoption’-dynamics), the catching seems difficult, so less or no IP protection is in principle needed to ensure reward.

However, the social origin of inventions has been the strongest argument against reward to individual inventors. The argument here is that, as all useful inventions depend less on any individual but build upon many peoples’ contribution to the progress of society (see 2.1.1), and that the next novelty on the road can be hit by a range of inventors, we should not reward him or her who might be lucky enough to be the first to hit the novel technological solution. Basically, the argument goes that due to the randomness of the system regarding who hits the technological solution first and who contributed what, it is almost impossible that the reward goes to him or her who deserved it as it. To this he added that the patent system on average causes more losses than profits even to inventors, as inventors now have to pay for using their ideas as other people have patented them. This problem that inventors pay to use your own ideas in the IPR system (assuming that all inventions are of social origin and that only one gets rewarded), could of course be solved by rewarding inventors with cash prices rather than temporary monopolies (Davis 2002). This reward system would however not solve the problem of the social origin of inventions where everyone deserves a fair share of their effort, as it is impossibility to calculate the effort-share that has been conducted at an individual basis. Basically, the patent system is viewed as inflicting great injury upon others, and that it is impossible to compensate or pay rewards in proportion to effort conducted and the service provide to society.

3. Economic incentive rationales

3.1. The social benefits from patents

The rationales of the IPR system here is based upon ‘political expediency’, rather than a human right argument. It is believed that, by establishing intellectual property right on ideas, this will create a variety of different ‘economic incentives’ in the behaviour of inventors. Basically, the efficiency of incentive system is that it drives people to do things they would not have done otherwise, and that each of these incentives will result in some benefit to society as a whole. The endorsement of the social benefits of intellectual property rights on technological inventions is the one that generally have become accepted (Cheung 1986).

3.1.1. Incentives to invent, creativity and innovate, as well as motivating the direction of such:

The basic proposal by a collection of classical economists is that as IPRs provide ‘the prospect of reward’, this in turn encourages creative and technological advance by providing increased incentives to invent, and invest in and further develop new ideas (J.Bentham 1795, J.B.Say 1803, J.S.Mill 1848 and J.B.Clark 1907 arguments presented in Cheung 1986). It has in fact been argued that the striving towards temporary monopolies in industry is the most effective stimulus of technological progress, so the grand of temporary monopolies to inventors are necessity in society and that without patents the invention inducement would be weakened.

As reviewed by Machlup and Penrose (1950), the patent induced incentives to invent rationale rests on the assertions that

- (i) Not enough inventions will be made unless effective incentives. Assumption here is that neither invention or exploitation of inventions will take place unless inventors and capitalists hopes that successful ventures will yield profits which make it worth their while to make their efforts and risk their money.
- (ii) Patents are the cheapest and most effective way for society to hold out these incentives.

Along similar lines, it has been argued that even if the patent system is not the solely most essential ingredient to make people innovate, it helps when it comes to motivating the direction of the innovation. That is, only the inventions with most commercial opportunities are explored for profit purposes, so in that sense it promotes ‘useful inventions’ (i.e. those people want). Basically, it was emphasised that patent privileges offer prizes to creative minds, in the sense that it arouses the mental powers and gives them a direction.

Controversy:

Whereas it is agreeable that the aims of industrial progress is desirable and that inventions is a necessary condition for industrial progress, there is less agreement between assertions that (i) not enough inventions will be made unless effective incentives, and (ii) patents are the cheapest and most effective way for society to hold out these incentives.

Challenging invention incentive assumption (i above):

Most significant, Taussig (1915) and Pigou (1920) argued in Cheung (1986) that patent rights are superfluous and unnecessary. Basic argument is that inventions happen without patents as it is inborn from childhood and often accidental. Therefore, the patent system, as an incentive mechanism, will not increase inventive activity. However, Plant (1934) argued that inventions are generally not accidental. Scientists can hope for lucky accidents, but to invent the unthinkable and complex scientists must specialise.

Arrow (1962) argued that although property rights in ideas are clearly useful when it comes to stimulate inventive activity, they are nonetheless inferior to direct government investment in inventive activities. His argument is that even under patent law basic research is bound to be under-rewarded, so the incentive argument does not work. (This shall be seen in sharp contrast to Plant (1934) who argues that the patent system is inefficient because it over-rewards the inventor, resulting in a variety of individual and social costs. See section below on “Challenging assumption of only trivial social costs of the IPR system”). Arrow basically argues three reasons why patents under-reward the inventor and therefore do not stimulate inventive activity. This includes that of ‘uncertainty’, ‘indivisibility’ and ‘appropriability’.

Firstly, producing an invention is associated with a great deal of ‘uncertainty’. Arrow (1962) argues that for any given set of input in commodity production the firm knows the output or it is pretty certain about the risk factors, so it can choose the input so as to maximise profits. However, innovation production is inherent uncertain in the sense that the inventor cannot even calculate the risk as in many other risk-bearing or spreading activities. Basically, invention is more uncertain than the weather, as you with modern technology at least can predict in the short run, even if you cannot control it. With inventions you cannot even predict (or calculate the probability or risk) in the short run, nor can you control the outcome. In that sense it is worse than the lottery. Hence, for the risk-averse, Arrow argues that the patent system will not create optimal inventive effort, but under-investment, in comparison to government investment in inventive activities.

Secondly, there is the problem that ideas or information by definition are indivisible commodities. The basic argument is that although Arrow (1962) agrees that the only way to trade or share ideas or information is by protecting it by a property right, he still argues that such an intellectual property rights is inefficient because the inventor is losing control of its use. Once the idea is shared or sold there is no need for the user of the idea to come back for more. That is, the use of the idea is infinite and it never faces decreasing returns to scale or are used up, so the nature of sharing or trading ideas on the market is very different from other intermediates or commodities. Use of ideas does not depend on the rate of production as with other intermediates, such as e.g. oil. In that sense, even if the seller retains some intellectual property rights, he or she still infinitely loses control of the idea for all-time exploration and exploitation purposes.

Also, in a completely different type of indivisibility argument, Plant (1934) emphasised that although inventions are socially constructed from a bundle of cumulated past and current ideas, the patent is granted on the ground of the full invention. That is, marginal patents do not exist, but the person who hits the right note

at the right time gets the full monopoly reward on the particular invention, and the rest participating in the social activity of inventing are left out. It could also be speculated that this lottery version of the patent system might lead to under-investment in inventive activity for the risk adverse. It is interesting to see here, how Arrow focuses on how the IPR system under-reward the one who has been granted the patent right, while Plant focus on how the IPR system over-reward the patentee.

Both indivisibility problems regarding the nature of ideas (Arrow), or the nature of the social origin of idea (Plant), is kind of an ‘appropriability’ problem This is the third setback of the IPR system Arrow (1962) explicitly mentions.

Other appropriability problems include that the owner of the idea may not be able to exploit it as effectively as others, and due to uncertainly this risk is unknown, there is no point for the risk adverse in disclosing the idea on the market. Furthermore, not all inventive effort is easy to appropriate from, even if protected by an intellectual property. E.g. in a society with positive externalities society also benefit from inventive activity, and as all benefit does not go exclusivity to the inventor, the inventor may feel under-rewarded. Also, a patent does not prevent anyone from thinking about the patented idea, and through pure inspiration produce a different competitive product not embodying or rewarding the original idea. According to Arrow those phenomena have negative implications on the incentive rationale of patents. In this context, it might even be argued that many inventors might prefer to keep secret many of their inventions, as once the ideas is told anyone else can benefit.

Appropriability problems for the inventor also includes the problems of transaction costs in marketing and licensing of ideas, intellectual property rights enforcement, portfolio managing of ideas, etc. Such costs should not be under estimated when investigating problems of incentives. Another cost argument is that, as inventions along trajectories are cumulative, path dependent and complex, in the sense that each invention rely on other past or current inventions, the patent system increases the costs for most subscribers to the system. That is, although development rights are free of royalties, the subsequent production and trade rights embodying the ideas are not free, and as there is not point of developing ideas if you cannot use them or control their use, the development and production rights are intertwined in reality. Thus, the technological interrelatedness of inventions might result in under-investment in inventive activity if ideas are protected by an intellectual property.

Finally, it should be noted that in reality most inventors are employed by a manufacturer or capitalist, or they find themselves in a bargaining situation where they have no option but to sell their patents or copyrights for pittance. These bargaining situations or conflicts regarding appropriability goes against the reward system idea, both in terms of the human rights issues discussed in section 2 and in term of the idea of creating special incentives to invent. However, as Machlup and Penrose (1950 page 25) argued “If the inventors could not hope to reap the fruits of their work, ... another theory could be substituted for the weakened theory of the patent as an incentive to invent: a theory of the patent as an incentive to venture capital for the financing of the development and pioneer exploitation of inventions.” Basically, it is less risky to finance the implementation of an idea into products for markets if the idea is covered by an intellectual property. The function of the patent as a stimulus to the inventor’s financier should be given more emphasis.

Challenging assumption of only trivial social costs of the IPR system (ii above):

The innovation incentives argument is based upon that the IPR systems costs nothing or only impose trivial costs. In that sense society gets something for about nothing. However, a range of other thinkers (including Plant 1934) argue that heavy social costs are unavoidable. That is, even you achieve certain ends, there also are certain costs which are not insignificant. Social costs include several subject matters, as follows

The opportunity cost of investment in arbitrary technological trajectories: Diversion of activity caused by the patent reward system can also be into less productive channels. The diversion could be from inventing in one field of research into another less productive pursuits, just because patent protection can more easily be obtained or to a higher extent be enjoyed. Plant (1934) argues that the patent system provides specific favourable conditions for certain types of inventions and thereby diverge the activities in society into arbitrary solutions. Thus, technological trajectories will become arbitrary. Hence, although Plant agrees with the invention rationale that patents to a certain extent stimulate inventive activity, he still argues that on balance it is inefficient and causes harm to society.

Administration and enforcement costs: Bureaucracy concerning administrating and enforcing the IPR system is a very common cost. This e.g. includes costs of court personnel, lawyers, agents, other engaged in prosecuting patent applications and litigations, royalty management, etc.

The monopoly or anti-competition costs of 'blocking patents': The extension of the monopoly power over individual firms often goes way beyond the scope of an individual patent. The issue of strategic patent blocking becomes relevant here (see section 4.1.1 for discussion of blocking patents). Such strong monopoly conditions tend to reduce competition and hence social welfare.

Opportunity costs in depriving others in using the most efficient process: However beneficial the patent may be for the inventor who receives the privilege, the community cannot be benefited by it if protected by a patent, and this in turn deprives society of the benefits that would flow from the more widespread use of these ideas. Thus, temporary prevention of the use of the most efficient processes by most other producers can be considered as a social cost.

Opportunity costs in depriving inventors what they had had before (assuming invention is a social process): Assuming that invention is a social or collective and process, the opponents of the patent system argues that a patent deprives other of what they had before (i.e. the opportunity to use the same idea that the patentee now has). This in turn also deprives society of the benefits that would flow from the more widespread use of these ideas.

The cost of patent races: The patent system can be compared to a lottery in the sense that; as most inventive activity is a social process to which most subscribe to, and those who win (hit the right notes a the right time) get the ultimately advance of the monopoly, while the rest are precluded to use their ideas, this might also be one of the

reasons for patent races (rather than sensible patenting strategies). Such patent races are very resource consuming.

3.1.2. Incentive to more efficient use and allocation of resources

The IPR rationale here translate as follows. In a society in which all property rights on land have been abolished so that a farmer owns neither the land that he has sowed nor the crop, the farmer has no legal remedy against other who reaps it. Hence, in such circumstances, the society will shift to other methods of subsistence (such as hunting) as it involves less preparatory investment. In the same way, in a world without patents, inventive activity would be biased towards inventions that could be held secret, as well as biased towards activities that involve minimum preparatory investment.

While an implication here is that the investor and inventor is not encouraged to conduct their activities as they will not be able to cover costs of investment or expect any reward, the main rationale stated here is that legal protection of property rights creates incentives to use resources more efficiently through investment in planning and development of resources.

Controversy:

Whereas property rights on land under property law is useful as it creates more efficient use of scarce resources, property rights on ideas are of very different nature. Plant (1934) argued that IPRs are not the consequence of scarce resources as in the property rights on land case, but they are the deliberate creation of statute that creates scarcity. In that sense intellectual property law cannot be compared with land property law. Plant goes on to comment on the social costs of making ideas scarce which he believe causes more non-optimal or inefficient use of resources. (see section 3.1.1)

Arrow (1962) argues that the patent system results in under-allocation of resources to invention. He argued that under monopolistic situations (even if temporary monopoly) the incentive to innovate will be lower than under competitive conditions. However, even under competitive conditions allocation of resources to invention will still be less than what is socially desirable due to uncertainly, indivisibility and some appropriability problems (see section 3.1.1). Although, monopoly situations will increase appropriability possibilities, Arrow argued that this is offset by the disincentives created by the inventor's pre-invention monopoly profits. For solution to this allocation problem, Arrow argued for government involvement and government expenditures, and he even suggested thinking about alternative methods of compensation and reward systems. Problem is just how much to allocate to inventive activity, as uncertainly will always be there, and how to encourage efficient use of ideas.

A very standard static efficiency argument reviewed by Chung (1986) against the IPR system is that it increases the price for the consumer and therefore reduces optimal allocation of resources and thus welfare. That is, under normal neo-classical theory the marginal cost of production is equivalent of the price of production ($MC = P$). However, as the manufacturer also has to pay royalties 'R' to the inventor of the product which he or she produces, the price of the good exceeds marginal costs (MC

+ R = P). This would at first hand seem inefficient and decrease social welfare. However, the system believers argue that 'R' necessarily reflects the costs of having a property right system enforcing more efficient allocation of resources (just as the costs of having a fence between two farmers separating their animals). But, the answer from the system disbelievers here would naturally be that the social cost often goes far beyond 'R' which is listed in this static efficiency argument. A full list of social costs of the system was discussed in section 3.1.1.

4. Increased competition and 'market protection of entrepreneurial talent' rationales

4.1. Industrial development from patents

The rationale of enhanced competition and the 'market protection of entrepreneurial talent' rationale can also be regarded as 'political expediency'. Here it is believed that, by establishing intellectual property right on ideas, this will create industrial development and social welfare through enhanced competition.

4.1.1 The innovation enhanced competition and 'nature of ideas' argument

The fact that knowledge can be consumed jointly, and can be reproduced very cheaply means that it has some of the qualities of a public good (usually referred to as the 'expandable' or 'non-rival' aspect of a public good). But, unlike a public good, it is possible for the creator of an idea to exclude others from using it for production and trade purposes by use of IPRs. This rival aspect of ideas embodied in production of goods and services is believed to stimulate innovation-based competition by providing incentives to innovate in using scarce resources more efficient or invent the new new thing. Thus, IPRs here is believed to stimulate a creative dynamic environment as well as strengthen and broaden continuous innovators.

Controversy:

The arguments here rest on the assertion that IPRs is the best way to stimulate competition. Obviously it is debatable whether society experiences more competition by creating temporary monopolies. The whole argument of corporate strategies surrounding IPRs and strategic 'blocking patents' becomes relevant here.

Whereas Arrow (1962) argued that patent grants lack sufficient blocking power for the inventor who cannot even fully appropriate from his or her idea; other (e.g. Plant 1934) argued that patent monopolies provide so extreme privileges and appropriation opportunities to the inventor against other producers and even the consumers, and as a consequence is distort competition.

Merges and Nelson (1990) are among those who believe that inventive rivalry is good for inventive progress, but that too strong IPR protection distort such due to patent blocking slowing down the patent scope and cummulation. They illustrate how history has shown that strengthening IPRs will not increase invention. Arguing that IPRs does

help to reach certain ends, they also puzzle with the idea of compulsory licensing to enhance more inventive rivalry.

When discussing ‘patent blocking’ (meaning the right to exclude and the rights the patentee have if someone tries to improve upon his ideas.), we need to consult very closely what the patent protect and what it does not protect. Development rights (i.e. the right to use the idea to develop another idea) are not directly protected or enforceable. However, production and trade rights (i.e. the right to use the idea to produce and trade a commodity) is protected through a patent.

However, it could be argued that the development rights are indirectly protected by the production and trade rights, as there is no point in developing an idea if you cannot use it for commercial exploitation purpose. Thus, Chung (1986, p.13) argued that the exclusive rights to produce and trade a product also imply exclusive rights to improve a patented idea. “In short, the rule for improvement would seem to read: You may tinker with my patent any way you please, but plan to pay me when you produce any commodity over which I have some claim; moreover, to avoid my possible excessive demands, it may be wise for you to obtain a license for me in advance”. Hence, a patent does imply some exclusive rights on development to the extent that the improvement is dominated by the original invention. Hence, patent blocking here is argued to enhance the appropriability from basic research and thereby destroy competition. This is also why ‘pure ideas’ (i.e. law of nature (physics laws), theoretical principles (e.g. some mathematics), and species) are not eligible for patent protection. Patenting such pure ideas would block innovation and competition and thereby also block progress for industrial development and social welfare.

However, blocking power aimed to diminish competition is often reached by corporate strategic behaviour surrounding patenting. Blocking actions are channelled through patent assignments (i.e. outright transaction or transfer/sale of rights) or cross licensing and patent pooling (i.e. each participants contribute some to the development trajectory on a royalty free bases). Such blocking actions are also often used to produce immunity from litigation because of the high (and increasing) costs of infringement suits. Thus, the value of patents essentially depends on its blocking power. Therefore, when making investment decisions, firms lay out their patent portfolios when deciding which products to commercialise and which technological trajectories to participate in. The sources of corporate competitiveness here is essential about positioning, but signalling is also important in this game.

4.1.2. The ‘market protection of entrepreneurial talent’ for industrial development rationale

It is proposed that efficient IPR protection allows profit-oriented firms to enter (or develop) an industry or market. This rationale of IPRs has also been compared to that of tariff protection. Just as with tariffs, a monopoly patent protects market entry and allows a firm to price higher than the marginal cost of production. The idea here is that a temporarily production and trade privilege will allow a firm or industry to develop and mature, while it is protected against new market entry. Kitch (1977) argued how it allows breathing room for the inventor to invest in development without fear that another firm will prohibit him or her or steal the idea. Furthermore, the temporarily trade privilege in the form of a patent should, just as a tariff, help a

firm or an industry to cover the fixed costs of inventing and producing a new product. This IPR rationale rests on that such temporarily production and trade privilege is the best ground for entrepreneurial talent to enter markets and cause industrial development and progress.

Controversy:

Comparing patent protection with tariff protection and comparing patent monopolies with monopoly privileges in general tend to help patent opponents and weaken patent defenders. Machlup and Penrose (1950) explained that, against patent protection during the final shaping of the patent system in the nineteenth century was the free trade argument. Basically, those for tariffs were for patents (as it was argued that they were important to let a firm or industry develop a market) and those against tariffs and supported free unprotected trade were also generally against patents.

However, J. Benthan (1943) (one of the largest advocates for patent protection) argued that the exclusive privilege given to inventors has nothing in common with general monopolies which are so justly decried. In similar lines, Adam Smith (1776) (in Cheung 1986) argued that although monopolies in trade deranged the more or less natural distribution of stock in society and therefore hurtful to society; - a temporary monopoly granted to an inventor of a new machine could be justified as a means of rewarding risk and expense and thereby encourage new ventures.

Nevertheless, the IPR rationale here rests on the assertions that IPR is the best way to protect of entrepreneurial talent for market creation. However, philosophers, who emphasised the social origin of inventions, found the patent system as a rationale for industrial development totally obscure, as its reward system was unfair and random (see section 2.1.1 above). They saw the system mainly as a blocking mechanism for inventors to exploit their entrepreneurial talent.

5. Economic rationale of organising science, technology and creativity

5.1. Market creation and increased information spill-over:

It is generally agreed that in order to secure a general stream of inventions and innovations it is important that new ideas become generally known to society. The argument here is further that in the absence of protecting novel ideas the inventor will keep his or her invention secret and it will die with him or her. Hence, it is in the interest of society to induce the inventor to disclose his or her secret for the use of future generations of inventors. It is proposed that this can best be done by granting exclusive rights to the inventor for his or her innovation in terms of efficient IPR protection. Such exclusive rights can be regarded as a contract the inventor gets from government if the inventor agrees to disclose the idea in question (see 5.1.1. below). As the nature of an idea or information good is non-rival, such exclusive rights will also help the inventor to directly exploit, or appropriate from, the idea as a value driven intellectual capital, which in its turn will provide an incentive to share the idea (see 5.1.2. below).

The information spill-over effects from patents has also been taken serious in the formal-modelling neoclassical economic literature. Building upon Arrow's (1962) problem of the inventor to exclusively appropriate from ideas ones they are disclosed in a patent document, as well as the communication rationale of the patent system, Rivera-Batiz and Romer (1991) incorporates perfect knowledge spill-overs and knowledge accumulation derived from patents directly into an endogenous growth model: "Holders of patents on previous designs have no technological or legal means of preventing designers of new goods from using the ideas implicit in the existing designs. The stock of A [knowledge or ideas] that can be put to use, with no compensation, by any individual researcher is therefore the entire stock of knowledge about the previous designs, provided that there exist a communication network that makes this information available" Rivera-Batiz and Romer (1991, p.537-538)

Hence, IPRs should help to facilitate the world-wide sharing of ideas, creative efforts, and new technologies national and world-wide. It is believed that this creates faster knowledge spill-over and a more coherent technological and industrial development, which in turn will strengthens the national or global economy. Thus the IPR rationale for increased information spill-over can be regarded as a 'political expediency' rationale.

5.1.1. 'Incentives to disclose ideas' rationale

The 'incentives to disclose ideas' rationale is about incentives to disclose ideas in libraries (i) and incentives to disclose ideas in trade (ii):

(i) Negotiated incentive to disclose ideas in libraries:

Patents and copyrights, when filed, provide immediate information to rivals who can incorporate such into their own knowledge bases even though they cannot make direct commercial use of it. The rationale here is that patents are necessary as incentives to induce inventors to disclose their new inventions instead of keeping them secret. That is, perhaps there would be enough incentive to invent without patents, but they would not be disclosed due to the inventor was afraid of loosing control of the idea. Hence, by issuing patents protecting the inventions, inventors would agree to disclose their inventions which subsequently would become part of society's knowledge base.

To avoid interpretation of patents as 'privileges' Machlup and Penrose (1950, p.26) also explain how this argument in the nineteenth century was developed as part of 'social contact theory'. In this statue a patent is not regarded as a privilege granted by society, but a bargain between society and the inventor. Basically it is an exclusive rights contract the inventor gets if he or she agrees to disclose a novel idea.

(ii) Incentive to disclose ideas in trade:

Secondly, a rationale is that IPRs provide direct incentives for sharing ideas through trade in the sense that knowledge, per definition, faces increasing returns to scale. It can be argued that although knowledge is not a new feature of capitalist production, it is taking on a greater weight in the globalizing world when protected by an IPR. Assessing this trend is complemented by the economic nature of knowledge or ideas themselves. The fact that knowledge can be consumed jointly, and can be reproduced

very cheaply means that it has some of the qualities of a public good (usually referred to as the 'expandable' or 'non-rival' aspect of a public good). But, unlike a public good, it is possible for the creator of an idea to exclude others from using it by use of IPRs, opening the possibility for wider commercial exploitation. Establishing property rights for ideas means a market price higher than its marginal cost, which tends to zero, giving rise to rents. This in turn implies an incessant incentive or drive to expand the market for ideas so as to generate greater rents. In this context, IPRs are in principle able to create a market for knowledge, and as ideas face increasing return to scale by nature, this give rise to increasing rent or profit as markets expands (Rivera-Batiz and Romer, P. (1991).

Controversy:

However, as raised in Machlup and Penrose (1950, page 26) there were many (conflicting) objections to such bargain agreements that challenge the information disclosure and spill-over rationales from IPRs:

If inventors chose to keep inventions secret society will not lose much because usually similar ideas are developed elsewhere, due to the social or collective nature of inventions.

It is practically impossible to keep ideas secret. Eager competitors will find a way to find out (e.g. reverse engineering, espionage) (This is a typical argument regarding appropriability problems)

Where an inventor thinks that he or she will succeed in guarding a secret, he or she will not take out a patent. Hence, this argument states that patents are only taken out where the secret is difficult to keep or where others develop similar ideas. Hence, there is a net loss in the system since rational inventors would only use the patent system to restrict access to markets, and would not cause disclosure of unique inventions.

It has also been argued that since patents are only granted at a certain stage of an invention, the patent system encourages secrecy in the development stage. Without patents, inventors would quickly publish their ideas under development to secure recognition and fame. Thus, patent systems encourage secrecy and when patent disclosure finally comes about, it is at a huge social cost in terms of 'lost past disclosure at the development stage'. It can even be argued that if ideas are published before they have developed into patentable inventions, ideas would ripen more quickly and would much sooner be available for practical application elsewhere.

5.1.2. Rationale of uniformity, order, increased information, increased spill-over and better advice

A central 'political expediency' rationale of organising science and technology at the macro level is that an IPR system not only provides economic incentives, but also offers information concerning new trajectories, structural changes in technological development, as well as the technological capabilities of industry and sectors. This information provided through the IPR system allows governments to be more effectively advised on science and technology policy matters. E.g. so far, patent

statistics have shown promise and some success in analysing: international patterns of innovative activities in relation to trade and production; patterns of innovative activities amongst firms, and their effects upon competence as well as performance and industrial structure; rates and directions of innovative activities in different technical fields and industrial sectors; and links between science and technology. (See e.g. Andersen 2001, the work by Science Policy Research Unit at the University of Sussex, and Cantwell and colleagues at the University of Reading). Also, a national and international IPR system brings in national and international uniformity in the way the knowledge base is organised into scientific classes, so scope of analysis and comparison increases.

The transparency of knowledge and systems of organisation also seeks to promote cross-country trade in IPRs, and hence international integration of science, technology and creative efforts, stimulating prosperity world-wide.

Finally, this transparency of knowledge helps to prevent the duplication of creative effort and encourages coordination of activities, allowing inventive resources to be used more efficient. It follows that through open disclosure, IPRs also provides an informal as well as formal (e.g. in patent pools) way of collaborating around setting standards.

Controversy:

None really objects to the usefulness of the information spill-over rationale for promoting information on science and technology matters, as well as for promoting trade in ideas and standard setting.

However, there is less agreement on whether the information spill-over objective have positive impact on to the system in terms of economic incentive matters (see e.g. Arrow 1962 who argues how the disclosure of ideas through the patent system results in appropriability or under-reward problems, and hence less invention incentives and under investment problems).

6. Conclusion

For policy design it is important to state our aims and objectives as well as implement the right mechanism that we believe will help us to reach our aims and objectives. However, it would not be unfair to argue that the aims and objectives of the IPR system have since the nineteenth century not been discussed at either the policy scenery or in economic journals or within other disciplines. Focus has solely been on the updating of regime to capture protection of new technologies, and the enforcement of the system, without agreeing on what we want from it, or if IPRs is the best way to achieve those aims.

As outlined in this paper, IPR instruments differ considerably in precise intent, depending on your philosophy of civilization. Some of the intents could even turn out to be counter-exclusive. For example, enhancing human rights versus industrial progress could be a choice that we will have to make. Basically, our understanding of

IPR instruments' mode of operation also differs considerably. On the one hand we have e.g. Arrow (1962) who argues that the IPR system is inefficient as it under-rewards the inventor, and on the other hand Plant (1934) argues that it is inefficient as it over-rewards the inventor. Then there is Machlup and Penrose (1950) who argue that the IPR system rewards the venture capitalist who (due to great bargaining power against the inventor) can use the protected idea for pioneer exploitation. This was just some examples out of many. The complexity surrounding the IPR system is manifold, and we cannot take the effect or efficiency of any IPR regime for granted.

The controversies surrounding IPRs is not to be solved from philosophy or from exercises in theoretical logics. We need to ask ourselves what we wish to achieve from the system, and we need empirical research to explore further and more genuinely the social and economic effects of such. Before this, we cannot design IPR policy or even know if IPRs is the appropriate policy instrument in the first place.

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