

Economics of patent pools

Patent pools aim at granting a single license for a package of patents belonging to different owners. Since the late 1990's, they have been used for licensing technology standards such as the Digital Versatile Disc, the MPEG video compression format or the 3G telecommunications norms – an evolution that has fuelled both antitrust debates and research in economics. This note provides a state of art summary of the economic literature on this question. It presents successively the pro-competitive effects of patent pools; their potential anticompetitive effects and how to prevent them; and the problems related to the formation of patent pools when patent owners have vested interests.

Pro-competitive effects

The scattering of patents reading on a technology standard is problematic when it comes to licensing these patents to producers of standard-compliant goods. Decentralized licensing indeed generates various inefficiencies that harm licensors as well as licensees. This is why, conversely, pooling patents and licensing them jointly can be welfare enhancing.

Saving transaction costs

High transaction costs are a first consequence of separate licensing. Producers of standard-compliant goods must identify and assess the patents they need to license; enter in relation with all relevant patent owners; and negotiate a separate license with each of them. The more numerous the patent owners are, the longer the delays and the larger the search

and bargaining costs. Patent owners in turn incur parallel costs of monitoring and enforcing licensing contracts that were concluded with the same licensees.

Organizing the joint licensing of all patents helps mitigate transaction costs. This is well illustrated by the patent pool dedicated to the MPEG2 video compression standard. In 1997, owners of patents reading on this standard delegated to a joint-owned enterprise, MPEG-LA, the task of licensing their patents as a single package. In 2004, the pool was gathering 650 patents from 25 organizations, that is more than 90% of the standard's patents. The MPEG2 patent pool offers the possibility of "one-stop shopping" to users of the standard. Noticeably, it also achieves economies of scale by handling the certification of patents, instead of letting each patent holder demonstrate that its own patents are valid and do read on the standard. All these economies are beneficial to both patent owners and standard users. By reducing the cost of licensing a standard, they allow its greater diffusion.

Avoiding multiple marginalization

Besides mitigating transaction costs, the main rationale for creating patent pools is what economists refer to as multiple marginalization. This term originally designated the profit loss resulting from the stacking of monopoly margins in vertical activity chains (Cournot, 1836). Applied to the standards covered by multiple complementary patents, it means that the royalties claimed by each owner and the total amount of royalties will be too high compared with the economic optimum. As a consequence, the costs of

using the standard are excessively high for licensees, thereby limiting diffusion of the technology. At the same time, patent owners earn less royalty revenue than they could have if they had coordinated their licensing policies. Concentration – the textbook solution to multiple marginalization – may not be a realistic solution in the case of technology standards. It is for instance difficult to envisage a merger between Canon, France Telecom, Samsung, Fujitsu, General Electric, Bosch, Sony and the University of Columbia to fix the multi-marginalization problem in the case of the MPEG2 standard. Creating a patent pool is a more realistic option, with similar effects. Granting a single package license with a global royalty for all patents indeed prevents multi-marginalization. The royalty revenue can then be divided between patent owners according to a previously agreed-upon sharing key. As we have seen, it is in the mutual interest of patent owners to settle on such a solution.

Antitrust treatment of patent pools

Besides their pro-competitive effects, patent pools give their members various opportunities to coordinate for anti-competitive purposes. These opportunities usually consist in pooling more patents than what is necessary to achieve pro-competitive effects.

Anticompetitive patent pooling

This is firstly the case when competitors pool substitutable patents. In March 1998, the FTC challenged for instance a pool created by Summit Technology, Inc and Visx, Inc, claiming that it was anticompetitive. This pool contained patents related to two different types of lasers used for laser-eye surgery, and suppressed any price competition between the two products. As stated by the FTC: “Instead of competing with each other, the firms placed their competing patents in a patent pool and share the proceeds each and every time a Summit or VISX laser is used.” This statement can be generalized. Competition between substitute patents does

not raise any multi-marginalization issue that should be fixed by joint price setting. To the contrary, separate price setting guarantees in this case that price competition can work to the benefit of consumers. The argument of transaction costs reduction does not work either, since customers need license only one patent when patents are substitutes. To prevent anti-competitive effects, patent pools should thus rule out substitutable patents, and include only patents that complement each other.

Patent pools can also be anticompetitive when they contain only complementary patents. This happens when some patents included in the package are complementary but not absolutely necessary for using the standard. Adding these kinds of patents to the pool can be a way to foreclose competition among substitute patents that could be used indifferently as complements to the essential patents, by picking one of them and putting it into the pool.

How to screen patents

Preventing these forms of collusion requires a severe screening of the patents that will be included in a pool. Antitrust authorities have therefore forged the notion of patent “essentiality” to sort out the patents that can be authorized in a pool. Essential patents are complementary patents that are necessary to the standard, have no substitute, and are legally valid. This definition is however difficult to implement in practice. Knowing the exact scope and validity of a patent necessitates in-depth assessment by experts. Moreover, the essentiality of patents may evolve over time, for standard are regularly updated as the technology is upgraded.

In this context, the licensing rules implemented by patent pools can be helpful to screen essential and non-essential patents. Patent pools must comply with a set of licensing guidelines aiming at preventing discrimination and other abuses. Among these rules, the requirement that members of a pool be allowed to license their essential patents separately from the pool works as an effective

safeguard (Lerner & Tirole, 2004; Lerner et al, 2005). The safeguard relies on the incentives for patent owners and licensees to circumvent the patent pool when the package license contains more than what users actually need. The threat of seeing the licensees' escape works as corrective mechanism for the patent pool; it prevents it from trying to add non-essential patents into its package license.

Patent pool formation can fail

Patent pools are unstable because essential patent owners have incentives to hold out their participation, in order to benefit from the collective self-discipline accepted by those who joined the pool. Indeed an essential patent owner can always charge a higher price if it manages to set its price after the others (U.S. DoJ & FTC, 2007).

Patent hold-outs

Why is it so? The incentives to free ride relate to the multi-marginalization problem which patent pools are supposed to fix. We have seen that all patent owners are better off if they manage to jointly reduce their royalty. But it is even more profitable for a single patent owner to let the others jointly reduce their royalties, while keeping the freedom to charge high royalties for its own patents (Aoki & Nagaoka, 2004; Brenner, 2005).

The W-CDMA telecommunication standard is an extreme example of this problem. A 3G platform covering five standards (W-CDMA, EDGE, CDMA2000, TD-CDMA and DECT) was approved in 2002 by U.S., European and Japanese antitrust authorities. It established in 2004 a joint licensing scheme with a cap of 5% for the collective royalty rate. Yet only 7 of the 73 firms claiming essential patents on W-CDMA committed to the collective license (Bekkers & West, 2006). Among them there is only one of ten largest essential patent owners. Qualcomm, who claims about a third of essential patents (Goodman & Myers, 2005), did not join the pool, nor did Motorola, Ericsson and Nokia, the next largest essential patent holders.

Disagreements on royalties

Failing to agree on the way collective royalties will be split is an additional reason why the creation of patent pools can fail. Once the standard has been defined, each essential patent is necessary to use the standard. Hence users would be ready to pay a high price for even a minor patent provided this grants them access to the standard. By contrast, "reasonable" royalties should be calculated by applying an "ex ante competition principle": they should reflect the superiority of the licensed technology over alternative options that were not selected in the standard (Swanson & Baumol, 2005). Reaching consensus on the application of this principle is however difficult.

In practice, patent pools often allocate royalties based on the number of patents owned by each member. This formula is applied by the MPEG2 and 3G patent pools. It has the merit of simplicity and clarity. It is, however, difficult to accept for the owners of a small number of highly valuable patents. The splitting of the DVD pool is a good illustration. The DVD pool was created in 1995 by 10 patent owners. However, Thomson eventually decided to quit the pool and license its patents separately. It was followed by Philips, Sony and Pioneer who created a separate pool (hereafter, 3C) that licenses its technology widely too. The separation was caused by a disagreement on the rule to share royalties. The initial pool splits royalties based on the number of patents, which was not acceptable for the members of the 3C pool. It is estimated that the 3C members hold about 42% of the total patents, while the royalty share of the 3C pool is 56% (Aoki & Nagaoka, 2004). This suggests that members of the 3C pool viewed their patents as more valuable than the average patent in the initial 10-firms pools.

Conclusion

Economic analysis has clearly demonstrated the pro-competitive effects of patent pools, and how to prevent their anti-competitive effects. It has also highlighted the limits of

patent pools, which creation ultimately depends on the capability of their members to converge on a mutually beneficial agreement.

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Microeconomix and the authors are advising one of the parties in the complaints filed against Qualcomm with the European Commission. However this note is written on the authors' own initiative.

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