EU competition law vs. standard setting agreements

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Standard setting agreements may raise a tension between the competition policy and the innovation policy. The present article provides an economic perspective on the application of the European Union competition law to standard setting agreements and discusses its potential effects on innovation.

1. INTRODUCTION

Firms sometimes develop different technologies applying to the same use. For example, two competing technologies have been invented for storing data and high-definition video: HD DVD and Blu-ray. Different formats of text files (such as for example Microsoft Word, TeX and PDF) may also serve as an example of competing technologies.

In the presence of competing technological solutions, it may be more efficient for the society to rely on one technological standard instead of having to choose between the competing alternatives. Introducing a common standard may raise efficiency because of network externalities, economies of scale or presence of complementary products. Therefore, it may be less costly for the society to rely on one technological standard rather than on competing technologies. Furthermore, by assuring compatibility, standard introduction may stimulate demand and development of complementary products. For example, the choice of a given technological solution in a given type of microprocessors allowing for faster data processing may stimulate the development of the new graphic cards allowing for better user experience.

Standards are also useful when creating a technology which requires relying on a multitude of patents. Complex technologies sometimes require combining different patents held by different firms. For example, the technology MPEG-2, which is the technology for encoding of moving pictures and associated audio information, relies on 425 patents held by 28 firms.[339] Various patent holders may hence need to coordinate with each other in order to introduce a new technology. Standard setting processes enable such coordination.

Standard setting organizations recognize beneficial effects of standards and facilitate their development. By enabling the communication between developers and users of competing technologies, they help to compare alternative technological solutions and give the concerned market players an opportunity to coordinate for one industry standard. They may hence contribute to the development of new technologies or to the selection of one technology of the competing technologies as an industry standard. Their role may therefore be beneficial for the consumers, provided that they do not facilitate collusion or allow for patent ambushes[340].

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[339] These statistics have been indicated by Lévêque (2007).

[340] A patent ambush occurs when a member of a standard-setting organization reveals the information that it owns, has pending, or intends to file a patent relevant to the emerging standard only after the standard is introduced.

In order to introduce a new standard, standard setting organizations rely on standard setting agreements. A standard setting agreement is a formal agreement between the holders of intellectual property rights (IPR) for technological solutions used in the standard. It defines a set of rules on how to adopt a standard. It may specify the joint ownership of the standard and the licensing rules. It may indicate the essential patents for using the given standard. It may be also based on open-source technologies.

Standard setting agreements may be beneficial for consumers. By enabling standard adoption, they may lead to the creation of new or better products. Without a standard setting agreement in place, adopting a standard requires a potential user to identify and obtain licenses for every single patented component, which may be a very slow, complicated and costly process. Standard setting agreements help avoiding these unnecessary delays and implementation costs.

However, standard setting agreements between different patent holders may raise antitrust concerns. By combining various technological solutions while neglecting others, they may lead to the exclusion of the competing technological solutions. This may give additional market power to the holders of patents relevant to the standard enabling them to charge excessive royalties. This risk of the hold-up problem may be sometimes foreseen by standard setting members, when all the patents relevant to the standard are known by them. It may however also be difficult to avoid, if the relevant patents are not known by the standard setting members in the standard development phase.

There are two important possible applications of European Union competition law to standard setting agreements. First, some standard agreements may constitute a horizontal agreement forbidden by Article 101 of the Treaty on the Functioning of the European Union ("TFEU"). Second, excessive royalties charged after the standard adoption may be interpreted as abuse of dominance forbidden by Article 102 TFEU.

There may be a certain tension between the application of European Union competition law to standard setting agreements and the innovation policy. The goal of European Union's innovation policy is to stimulate innovation: "*The main current European Union's innovation policy is the Innovation Union, Europe 2020 flagship initiative. Its aim is to boost Europe's research and innovation performance by speeding up the process from ideas to markets.*"[341] An effective application of the competition policy to innovative markets may support this goal by ensuring a level playing field and eliminating cartels and abuses of dominance, by giving a chance for new inventions to challenge existing technologies and compete with them on the merits. However, in certain contexts such as standard setting agreements, it may also distort innovation by eliminating a perspective of sufficient returns to investments in innovation. As technologies become more complex, a single invention may be insufficient to guarantee such returns. Firms may need to be then assured that standard setting agreements are a viable option of generating sufficient returns to investments in innovation. The application of the competition law to standard setting agreement may cast a doubt on

[341] The extract from the webpage of the European Commission's Directorate General Enterprise and Industry concerning Industrial Innovation Policy, http://ec.europa.eu/enterprise/policies/innovation/policy/index_en.htm

whether after reaching a standard setting agreement the holders of the relevant patent could actually generate sufficient returns.

The present article comments on the application of the European Union competition law to standard setting agreements between different patent holders from an economic perspective, highlighting its potential impact on innovation. It first explains the economic rationale of applying Article 101 (1) TFEU to standard setting agreements and next proceeds to the applicability of Article 102 TFEU to standard setting agreements. The final conclusions are presented in the last section.

2. APPLICATION OF ARTICLE 101 TFEU TO STANDARD SETTING AGREEMENTS

2.1 The existing regulation: Article 101 (1) vs. Article 101 (3) TFEU

A standard setting agreement may constitute a horizontal agreement between the competitors and therefore be forbidden by Article 101 (1) TFEU. Article 101 (1) TFEU prohibits various types of horizontal agreements distorting competition. There are two main possible ways by which standard setting agreements could distort competition. First, they may distort upstream competition (between patent holders) by selecting one technological solution over the other competing solutions. Second, they may distort downstream competition (between the producers using the standard) by introducing excessive or discriminatory licensing terms.

A standard setting agreement may be also exempted from Article 101 (1) TFEU by Article 101 (3) TFEU, which exempts horizontal agreements contributing to technological progress. A standard setting agreement may contribute to the emergence of new technologies based on the existing technological solutions and stimulate future innovation efforts. These positives effects on technological progress may be potentially used as an argument to apply Article 101 (3) TFEU to standard setting agreements.

In order to assess whether a standard setting agreement may be exempted from Article 101 (1) TFEU, one needs to establish whether an actual standard setting agreement (a) contributes to technical or economic progress, (b) while allowing consumers a fair share of the resulting benefit, (c) without imposing restrictions which are not indispensable for the attainment of the efficiencies[342], and (d) without eliminating competition in respect of a substantial part of the products in question.

2.2 Effects of standard setting agreements on technological progress

Standard setting agreements may directly contribute to technological progress. Without a standard setting agreement, it may be difficult or very expensive to develop certain technologies that require pooling of a high number of patents. For example, as indicated by Lévêque (2007), the MPEG2 standard relies on 425 patents held by 28 firms and the WCDMA standard involves 6000 patents held by 30 firms. Relying on potential users to collect all the necessary licenses for an emerging technology may end up in a failure. It may be an impossible or very expensive task to become a licensee of all the necessary patents. Furthermore, in contrast to the patent holders, the potential users may be less

[342] For example, a hard core price fixing couched as standard setting agreement would not be exempted.

informed about the patented technological solutions and thus be unable to collect all the necessary components to create the best state-of-the-art technology.

Standard setting agreements may not only affect directly technological progress but also have indirect effects on technological progress. By accelerating the standard emergence, standard setting agreements promote a wide use of new technologies and stimulate development of complementary technologies. Furthermore, by increasing certainty of standard implementation, standard setting agreements may increase the expected returns to the innovation efforts and therefore stimulate future innovation. As stated by Competition Commissioner Joaquin Almunia, "*[e]fficiency enhancing co-operation agreements between competitors, and in particular R&D and standardization agreements, can further innovation and competitiveness in Europe*".[343]

The European Commission Guidelines on the applicability of Article 101 TFEU to horizontal co-operation agreements recognizes the potential beneficial impact of standard setting agreements on technological progress but warns about the potential for restrictions, too:

> *"263. Standardisation agreements usually produce significant positive economic effects, for example by promoting economic interpenetration on the internal market and encouraging the development of new and improved products or markets and improved supply conditions. Standards thus normally increase competition and lower output and sales costs, benefiting economies as a whole. Standards may maintain and enhance quality, provide information and ensure interoperability and compatibility (thus increasing value for consumers).*
>
> *264. Standard-setting can, however, in specific circumstances, also give rise to restrictive effects on competition by potentially restricting price competition and limiting or controlling production, markets, innovation or technical development. This can occur through three main channels, namely reduction in price competition, foreclosure of innovative technologies and exclusion of, or discrimination against, certain companies by prevention of effective access to the standard."*[344]

2.3 Potential anticompetitive effects of standard setting agreements

A standard setting agreement may raise antitrust concerns if it leads to the upstream foreclosure (the exclusion of the competing technologies solutions) or downstream foreclosure (the exclusion of downstream producers interested in using the standard). The potential anticompetitive effects of the upstream foreclosure have raised lots of discussion in the economic literature and are discussed below.[345]

[343] EC Press Release IP/10/489 of 04/05/2010

[344] Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements, (OJ C 11/1, 14.1.2011), §§ 263 -264.

[345] Given limited space, the present article will not discuss the potential downstream foreclosure resulting from a standard setting agreement.

2.3.1 Hold-up problem and upstream foreclosure

A standard setting agreement may result in the upstream foreclosure. While at the standard development phase replacing one particular technological solution by another may be relatively easy, the replacement of the same technological solution by another technological solution may become much more complex once the standard is developed. Combining various technological solutions may require lots of development efforts and once these efforts are made replacing one of the used technological solutions may be extremely difficult. In that situation, the technological solutions that did not find its use in the standard may be never actually used by the final users. Then, their owners may be forced to quit a given market.

The upstream foreclosure resulting from a standard setting agreement appears more likely if the adoption of the standard leads to customer lock-in or implies too high switching costs from the adopted technology to the alternative technology. When adopting a new technology is costly[346], users may prefer to adopt only one technology and refrain from using the alternative technology. Then, it may be very difficult for the owners of the technological solutions not used in the adopted technology to convince the users to start using its particular technological solutions. In that case, if the owners of the technological solutions not used in the standard do not find any other application of their technological solution, they may be forced to quit the relevant market.

The upstream foreclosure resulting from a standard setting agreement may also be more likely in presence of network effects. If a successful introduction of the alternative technological solution requires convincing most of the customers to abandon the adopted standard and switch to the alternative technology, users of the adopted standard may never be willing to consider switching to the technological solution not included in the standard.

The upstream foreclosure resulting from a standard setting agreement may be also related to the interoperability issues. In certain situations development of one standard may stimulate the development of the other compatible technology that is incompatible with the technology that potentially constitutes an alternative to the introduced standard. For example, an introduction of a standard for a given type of microprocessor may yield a risk of the incompatibility between newly developed memory cards and an alternative microprocessor. In that case, an alternative type of microprocessor may have little chances to survive.

The economic literature (see for example Farrell et al., 2007) indicates that in certain circumstances an elimination of alternative technological solutions may lead to the abuse of the increased market power of the remaining patent holders. Such an abuse is often referred to as the hold-up problem. The following example illustrates the hold-up problem.

Suppose that:

- there are two competing patents (A and B) and one complementary patent C
- one of the competing patents (A or B) may be combined with the complementary patent (C) in order to create a technology

[346] The necessary investments may for example include re-arranging the production facilities in order to allow the adoption of the new technology.

- the creation of the technology is specified by a standard setting agreement
- competing technological solutions (covered by patents A and B) are not ex-ante compatible with the complementary technological solution (covered by patent C), so standard development requires additional effort to make the complementary technological solution compatible with one of the competing technological solutions
- investments in compatibility are technology specific, in the sense that making the complementary technological solution compatible with one of the competing technological solution does not make it automatically compatible with the other competing technology
- assuring compatibility costs 30 € per a technological solution and the holder of the patent C incurs this cost
- once compatibility is assured, the involved parties announce their royalties and license it to the downstream producer without incurring any marginal cost.
- using the emerged standard, a downstream producer produces a product at a zero unit production cost (excluding the royalties) and sells it at a price of 100 €.

Then, as indicated in table 1, before the investment in compatibility is made, the competition between holders for replaceable patents (A and B) will drive their royalties to 0 € and the holder of patent C will fully exploit its market power by setting a royalty of 100 €. The situation changes if the holder of patent A does not commit to its royalty before the holder of patent C invests in compatibility between the technology covered by patent A and the technology covered by patent C. Once the investment is done, the holder of patent A knows that it may set a royalty of 30 €, because the only alternative faced by the holder of patent C is to negotiate a technology development with holder of patent B. In the best case scenario, this outside option would be related with a new investment in compatibility (30 €) and no royalty demanded by holder of patent B. In that case, holder of patent C could set a royalty of 100 €, which is the difference between the retail price (100 €) and the royalty demanded by the holder of patent B (0 €). Therefore, after the investment is made, the reservation value of the holder of patent C is 70 €, which corresponds to the difference between the royalty that the holder of patent C could obtain in case of reaching a standard setting agreement with the holder of patent B (100 €) and the cost of assuring compatibility between the technology covered by patent B and the technology covered by patent C (30 €). Given this reservation value of 70 €, the holder of patent A may at most demand a royalty of 30 €. By not committing to the royalty ex-ante, the holder of patent A may thus be able to increase its royalty from 0 € to 30 €. Such a potential royalty increase is often called the hold-up problem.

Table 1: Example 1 of the hold-up problem

	Royalties set <u>before</u> investments in assuring compatibility	**Royalties set <u>after</u> investments in assuring compatibility**
Additional cost incurred when replacing a replaceable patent (A or B) included in the standard by the competing alternative	0 €	30 €
Royalty for replaceable patent (A or B) not included in the standard	0 €	0 €
Royalty for replaceable patent (A or B) included in the standard	0 €	30 €
Royalty for irreplaceable patent (C) included in the standard	100 €	70 €
Joint royalty for the standard	100 €	100 €
Retail price	100 €	100 €

The potential hold-up problem may not only harm downstream firms but also negatively affect the consumers. This is not the case in the above example, but it may happen if royalties constitute marginal costs that are passed on to the consumers. The following example provides an illustration of the hold-up problem passed on to the consumers.

Suppose that:

- There is technological solution 1 offered by holder of patent A and holder of patent B.
- There is technological solution 2 offered by holder of patent B and holder of patent C.
- A technology may be constructed on the basis of one of the patents for technological solution 1 and one of the patents for technological solution 2.
- There are two competing downstream producers facing zero marginal costs but the royalties.
- A cost of adoption of each technological solution is 30 € and is specific for each patent.
- Patent holders face no costs.

Then, as illustrated in table 2, if patent holders set their royalties before downstream producers incur their implementation costs, the upstream competition will drive each royalty to 0€. Then, the downstream competition will drive the retail prices to 0 €. If however, royalties are set after the investments in implementation are made, the required royalties will increase. Each holder for the patent included in the standard will now require 30 €, which is equal to the cost of switching to the competing alternative. The joint royalty will be hence 60 € (as 2 x 30 € = 60€). The royalty increase is a typical hold-up problem. What's more interesting in this example is the impact on consumers.

Given that the joint royalty increases from 0 € to 60 €, the retail prices will also increase from 0 € to 60 €. This is because royalties constitute here marginal costs that are passed on to consumers. All in all, in this example technology adoption costs may lead to the hold-up problem causing price increase.

Table 2: Example 2 of the hold-up problem

	Royalties set <u>before</u> investments in the implementation of the technology	**Royalties set <u>after</u> investments in the implementation of the technology**
Additional cost incurred when replacing a patent included in the standard by the competing alternative	0 €	30 €
Royalty for each patent included in the standard	0 €	30 €
Royalty for patent not included in the standard	0 €	0 €
Joint royalty for the standard	0 €	60 €
Retail price	0 €	60 €

The potential hold-up problem results from upstream foreclosure (disappearance of alternative technological solutions). Standard setting agreements sometimes select one technological solution over the others. The technological solutions not included in the standard may face no possibility for commercial application and therefore disappear from the market. Such market exclusion may give additional market power to the remaining technological solutions. The additional market power of patent holders that faced ex-ante competition may lead to potential anticompetitive abuses.

The hold-up problem may concern replaceable patents. In the presence of ex-ante competition, a standard setting agreement may lead to the upstream foreclosure giving additional market power to the patent holder that faced ex-ante competition. That may result in the hold-up problem, which is in the abuse of the additional market power gained by exclusion of competing technological solutions. In example 1, such an abuse consisted of increasing the royalty for replaceable patent included in the standard from 0 € to 30 €.

Holders of irreplaceable patents may not be the source of the hold-up problem, because they do not gain additional market power by joining a standard setting agreement. If a given patent holder faces no ex-ante competition for its technological solution, any potential upstream foreclosure does not increase its market power, implying that it will not be able to abuse its additional market power. It may not hence be the source of the hold-up problem. Furthermore, it may be potentially harmed by the hold-up problem. In example 1, the presence of the hold-up problem results in decreasing the royalty for irreplaceable patent from 100 € to 70 €.

2.3.2 Difficulty of solving the hold-up problem ex-ante

In theory, the potential hold-up problem arises when patent holders do not set their royalties before the standard is adopted. The natural question to ask is hence whether the simplest solution to the hold-up problem would be to oblige the concerned patent holders to set their royalties before the standard adoption. The answer to this question appears to be negative. In practice, such a solution may be difficult to implement.

Patent holders developing a standard are often not willing to fix the royalty for the emerging standard before it is introduced in the market. While developing the standard, patent holders do not know all the potential uses of the emerging technology and are thus unable to estimate the potential profits they will be able to generate on licensing it. They may hence find it not easy to agree on the royalty charged for the emerging technology and the division of this royalty between the involved patent holders.

It may be difficult to agree ex-ante on the royalty charged for the emerging technology no matter whether the royalty is nominal or proportional. Setting ex-ante a nominal royalty may be difficult, because it may yield a risk of setting too high a royalty yielding very low profits or alternatively setting too low a royalty as compared to the potential profits. What's more, as indicated by Lévêque and Ménière (2008), negotiating royalty fees before the standard emerges might be too costly.

Deciding ex-ante on a relative royalty (set as a percentage of the sale price) may be also challenging because the parties of the standard setting agreement may wrongly estimate the price elasticity for the downstream product. The relative royalty constitutes the marginal cost of the downstream producer and as such may be passed on the consumers by the downstream producers. Therefore, in order to maximize their profits, the upstream patent holders need to well estimate the possible effects of their relative royalties on the downstream demand. When it is still unknown to which products the royalties will apply this may be simply impossible.

Requiring the concerned patent holders to set ex-ante the division rule of the joint royalty between the relevant patent holders may be also unrealistic. Marginal contributions of different patent holders to the economic value of the developed standard are often not known ex-ante. Not knowing the final uses of the emerging standard, the patent holders may find it very difficult to estimate their economic impact on the economic value of the standard. Without this information, it is unclear on which business variables they could base their negotiations on the division rule.

2.3.3 FRAND as a practical solution to the hold-up problem

Given that there may not exist a perfect ex-ante solution to the potential future hold-up problem, the possible solution may need to rely on ex-ante commitment not to charge excessive royalties ex-post. While parties may not be willing to fully commit to future royalties, there may still reach certain agreement limiting potential future abuse of the increased market power. In particular, while reaching a standard setting agreement, they may commit not to abuse the additional market power gained from excluding competing technological solutions.

The idea of solving the hold-up problem ex-ante while postponing the royalty setting for the future relies on the commitment that the concerned patent holders will behave in the future as if the competing technological solutions that could have been used in the standard were not eliminated. There does not appear to be any particular reason why a standard setting including such ex-ante negotiation logic would not be reached. Before the standard is adopted, a holder of a replaceable patent is willing to join such an agreement, because if it does do not join such an agreement, its technological solution will be likely replaced by a competing alternative in the developed standard. Similarly, a holder of an irreplaceable patent may have nothing against such an agreement because it does not face any competing technological solutions ex-ante and thus the agreement would not really limit its behavior.

There have been practical attempts of solving the hold-up problem without forcing the patent holders to commit to the royalties ex-ante. In particular, standard setting organizations (for example JEDEC[347]) try to resolve the potential hold-up problem by requiring its members to commit to FRAND (Fair, Reasonable And Non-Discriminatory) licensing terms.[348] The FRAND commitment requires the royalties set ex-post to be fair, reasonable and non-discriminatory, without specifying these royalties ex-ante.[349] This practical solution allows the patent holder to postpone setting its royalties until the economic value of the emerging standard is known, while assuring that royalties charged ex-post are not excessive or discriminatory. The execution of the FRAND commitment relies on the contract law, as a violation of FRAND terms may be always brought to the court.

FRAND terms may be interpreted as licensing terms that would have been negotiated ex-ante if the economic value of the standard had then been known. Such an interpretation may rely on estimating the marginal contributions of every patent used in the standard. This approach clearly distinguishes between patents facing ex-ante competition and unique irreplaceable patents. The marginal contribution of the former is small, as it may be replaced by the competing alternative. Therefore, FRAND relying on ex-ante negotiation logic would attribute a small royalty to this patent holder.[350] The marginal contribution of the latter is relatively high as without its participation the standard would not arise. Therefore, FRAND relying on ex-ante negotiation logic would attribute higher royalty to this patent holder.

By attributing low royalties to patent holders facing ex-ante competition, FRAND terms relying on ex-ante negotiation logic may eliminate the potential hold-up problem. The hold-up problem is related to the abuse of supplementary market power gained after the standard emergence. It applies to patent holders facing ex-ante competition. By eliminating ex-ante competition, certain patent holders may be sometimes able to charge excessive royalties ex-post. These excessive royalties, known as the hold-up problem, would not be allowed under FRAND terms relying on ex-ante negotiation logic. Such

[347] For more information concerning JEDEC, see http://www.jedec.org/.
[348] See Farrell et al. (2007).
[349] While levels of royalties are often not set ex-ante, standard setting organizations sometimes require patent holders to commit to a royalty cap (see Leveque and Meniere, 2009).
[350] For the same reason FRAND terms relying on ex-ante negotiation logic would attribute relatively low royalties to so-called patent trolls. Patent trolls are companies holding patents of minor or null marginal contributions and enforcing these patents against the alleged infringers. Given their minor (or null) contributions, FRAND terms relying on ex-ante negotiation logic would attribute relatively low royalties to them.

terms attribute low royalties to patent holders which represent low marginal contribution. These ones face ex-ante competition.

2.4 Guidelines on applicability of Article 101 TFEU to standard setting agreements

The recently published guidelines on applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements recognize FRAND terms as one of the three conditions that if satisfied may indicate that a given standard setting agreement is not anticompetitive.[351] These three conditions are: (1) unrestricted participation in standard setting, (2) transparent procedure for standard adoption and (3) fair, reasonable and non-discriminatory terms for granting the access to the standard.

The three conditions identified by the guidelines seem to rely on different goals. The first two conditions (unrestricted participation and transparency) appear to maximize beneficial effects of standard setting agreements on technological progress. The last condition appears to be more related with the elimination of potential anticompetitive effects.

The unrestricted participation required by the guidelines gives an opportunity for patent holders to explain how their technological solutions could contribute to the emerging standard. As the recent innovations are not often common knowledge, unrestricted participation of potentially concerned inventors may help to develop a standard benefiting from the best available technologies. The unrestricted participation also gives a possibility for potential users of the emerging standard to voice their needs. This may help the developers of the standard to better match the specific requirements of the downstream producers and hence may contribute to the development of a wider range of products using a given standard.

The transparency of the standardization work is likely indicated in the guidelines in order to smooth the standard setting process. Standardization requires lots of coordination between different inventors as well some feedback from the downstream producers or the developers of the complementary technological solutions. The transparency of the process may facilitate such coordination. It seems for example that a potential inventor will be more willing to participate in the standard setting procedures if it is assured that the potential omission of its technological solution from the standard will be done in a transparent manner. Similarly a downstream producer potentially interested in the emerging standard may be more willing to comment on the emerging standard, if it is well informed that this standard is developed, has means to voice its comments and will be assured that its comments will be considered.

The third condition identified by the guidelines explicitly refers to the FRAND terms. The FRAND terms may in theory solve the hold-up problem, but this depends on how they are interpreted in practice. While there is no clear economic interpretation of FRAND[352], there is certain understanding that the fair and reasonable prong of FRAND may be given by licensing terms that would have been negotiated, if the parties had

[351] Guidelines on the applicability of Article 101 TFEU to horizontal co-operation agreements, § 280.
[352] See Layne-Farrar (2010) and Layen-Farrar et al. (2007).

knew the value of the innovation ex-ante[353]. As discussed in the previous subsection, such an interpretation appears to well address the potential hold-up problem.

The guidelines indicate two possible ways of verifying whether royalties charged ex-post are FRAND: (1) comparison of royalties charged ex-post with those charged before the standard adoption[354] and (2) comparison of royalties charged ex-post with the royalty rates charged for the same patent in other comparable standards[355]. Both ways tend to ignore the potential harm to innovation. As inventing may be a costly and risky process, the perspective of sufficiently high returns is needed to stimulate firms' investments in innovation. Those high returns imply royalties exceeding the development costs, so that firms could recover investments in both successful and unsuccessful innovation efforts. The royalties suggested by the guidelines may not satisfy this condition. The royalties charged before the standard adoption or the royalties charged for using the same technical solution in the other standard may not fully cover investments in innovation. A patent holder may be sometimes inclined to temporarily charge a very low licensing fee before the standard is set, as marginal patenting costs may be very low. The charged royalties may then not allow recovering (often very high) fixed costs.

All in all, the guidelines concerning application of Article 101 TFEU to standard setting agreements seem to make an important step in clarifying that standard setting agreements may contribute to technological progress and may be therefore highly desirable. They also rightly acknowledge that standard setting agreements may lead to hold-up problems. They seem to ignore however the fact that by limiting the level of royalties for all patents included in the standards they may eliminate incentives to reach a standard setting agreement and undertake innovation efforts.

2.5 FRAND as the solution to the hold-up problem that recognizes the goals of the innovation policy

It seems that FRAND terms may be used as a solution to the potential hold-up problem that does not harm innovation, if they are interpreted as licensing terms that would have been negotiated ex-ante if the value of the innovation was then known. Such an interpretation leads to a different treatment of holders of replaceable patents and holders of irreplaceable patents. The marginal contribution of the replaceable patent is rather small, as it may be always replaced by some other competing patent. Therefore, FRAND terms relying on the ex-ante negotiation would likely attribute a rather small royalty to this patent holder. The situation would be different for the holder of the irreplaceable patent. Its contribution is very important, because the standard would not emerge without it. FRAND terms based on the ex-ante negotiation logic would thus likely attribute a higher royalty to the holder of the irreplaceable patent.

FRAND terms relying on the ex-ante negotiation logic may eliminate the hold-up problem and be therefore neutral for competition. The source of the hold-up problem is related to the potential abuse of the supplementary market power gained after the standard is adopted. The ex-ante negotiation logic would attribute small royalties to the ex-ante replaceable patents, as their marginal contributions are not high. Therefore,

[353] See Farrell et al. (2007).
[354] Op Cit, §289.
[355] Op Cit, §290.

patent holders gaining supplementary market power would not be able to abuse it by charging excessive royalties.

FRAND terms relying on the ex-ante negotiation principle may stimulate innovation. While they attribute low returns to investments in replaceable technologies, they assure higher returns to investments leading to creation of irreplaceable technologies. Firms may hence be motivated to undertake innovation efforts aiming at inventing the irreplaceable patents. Even if they invent replaceable patents from time to time, returns to their irreplaceable patents may be still sufficient to allow them to recover all their investments in innovation.

As well designed FRAND terms may eliminate the potential hold-up problem, it would seem adequate to exempt standard setting agreements using FRAND terms from Article 101 (1) TFEU. This exemption could apply as long as FRAND terms are used, no matter whether they are required from all the concerned patent holders or only from holders of replaceable patents. Whether FRAND terms apply to all the relevant patent holders or only to those who have invented replaceable technologies, the potential anticompetitive effects of standard setting agreements should be eliminated. From the competition point of view, it seems to be no reason to forbid standard setting agreements obliging all the involved patent holders to respect FRAND terms or standard setting agreements implying FRAND terms on only firms holding patents on replaceable technologies.

3. APPLICATION OF ARTICLE 102 TFEU TO STANDARD SETTING AGREEMENTS

Standard setting agreements may lead to the violation of the Article 102 TFEU if they result in excessive pricing. Article 102 (2a) TFEU prohibits a company in a dominant position to directly or indirectly impose unfair purchase or sell prices or other unfair trading conditions. The EU national competition authorities may treat excessive royalties charged by a licensor holding a dominant position as excessive pricing employed by a dominant firm and hence as the violation of Article 102 (2a) TFEU.[356]

While there have not been many cases investigating potential excessive royalties charged after reaching a standard setting agreement, there are two recent relevant cases: the *Rambus* case and the *Qualcomm* case. The *Rambus* case started in August 2007, when the European Commission sent a Statement of Objections accusing Rambus, a technology licensing company, of breaching Article 102 TFEU by claiming unreasonable royalties for the patents used in the adopted standard related to computer memory chips.[357] Rambus did not commit to any type of FRAND terms in the standard setting process and was accused of manipulating the standard setting process so that the emerging standard would rely on patents held by Rambus without disclosing those patents in the process. This alleged deceptive strategy could have potentially helped Rambus to gain a dominant position without committing to FRAND terms. If the involved parties had known about the existence of the patents held by Rambus, they might have had potentially impose the FRAND terms on Rambus. Not having

[356] See Geradin (2008).
[357] EC Press Release MEMO/07/330 of 23/08/2007. For a detailed discussion of the *Rambus* case see Killick and Berghe (2010).

committed to FRAND terms, Rambus had allegedly more flexibility to charge higher royalties and allegedly abused this power.

The *Rambus* case ended with commitments. In June 2009, Rambus announced that it had reached a tentative settlement with the European Commission.[358] Under this settlement, the European Commission would not find Rambus liable and Rambus would commit to offer licenses with maximum royalty rates for certain memory types and memory controllers. The settlement was formally accepted by the European Commission in December 2009.[359]

The royalty policy implemented by Rambus after the standard was set might have fallen under Article 102 TFEU. After the standard was adopted, Rambus might have held a dominant position. Then, excessive royalties may be interpreted as abuse of dominance prohibited by Article 102 TFEU.

It appears less clear whether the alleged deception strategy of Rambus is forbidden by Article 102 TFEU. Article 102 TFEU prohibits abusing a dominant position, but does not necessarily prohibit gaining a dominant position. The alleged deception strategy relying on not disclosing the relevant patents may be used to gain a dominant position, but does not seem to be an abuse of the existing dominant position. It hence does not appear very clear why Article 102 TFEU would apply in this case. The Rambus case did not shed any light on this potential uncertainty, as it ended after the Commission accepted the commitments proposed by Rambus,

Excessive royalties have been also investigated in the *Qualcomm* case. Qualcomm holds essential patents in the WCDMA standard, a part of the 3G (third generation) standard for European mobile phone technology (also referred to as "UMTS"). After the formal complaint of Ericsson, Nokia, Texas Instruments, Broadcom, NEC and Panasonic, all mobile phone and/or chipsets manufacturers, accusing Qualcomm of not respecting FRAND terms, the European Commission initiated formal antitrust proceeding against Qualcomm in October 2007.[360] The investigation aimed at establishing whether Qualcomm held a dominant position in the WCDMA licensing market and whether it had breached its FRAND commitment. In its press release, the European Commission seemed more focused on abusing supplementary market power gained as a result of standard setting than on abusing previously held market power: "[*t*]*he complaints are based on their understanding that the economic principle underlying FRAND commitments is that essential patent holders should not be able to exploit the extra power they have gained as a result of having technology based on their patent incorporated in the standard*." The investigation closed in November 2009 after all the complainants withdrew their complaints.[361]

Given that the above presented cases (*Rambus* and *Qualcomm*) did not ended with formal decisions, it is quite difficult to draw sharp conclusions from them. Yet, they tend to suggest that the application of Article 102 TFEU to excessive royalties may not

[358] Press Release of Rambus dated 11/06/2009, http://www.rambus.com/us/news/press_releases/2009/090611.html.
[359] Press Release of Rambus dated 09/12/2009, http://www.rambus.com/in/news/press_releases/2009/091209.html.
[360] EC Press Release MEMO/07/389 dated 01/10/2007.
[361] EC Press Release MEMO/09/516 dated 24/11/2009.

depend on the history that has led to the given licensing policy. The fact that Rambus did not commit to FRAND terms, whereas Qualcomm had such a commitment did not seem to affect the allegations. In both cases, excessive royalties have been indicated as a potential antitrust concern. In general, from the perspective of Article 102 TFEU the potential anticompetitive effects of licensing policies do not seem to depend on whether there was a standard setting agreement in place and whether the parties committed to FRAND terms.

Application of Article 102 TFEU to standard setting agreements may imply the risk that no difference is made between the patent holders gaining the market power as a result of the standard setting agreement from those that would have the market power even in the absence of the standard setting agreement. By focusing on firms in dominant positions it treats equally the firms that could potentially benefit from the hold-up problem and the firms that do not improve their market positions by participating in a standard setting agreement. It thus may potentially eliminate the hold-up problem, but at the same time it may negatively affect inventors of new and unique technologies that do not contribute to the hold-up problem.

Even though European competition policy very often does not object high royalties charged by the patent holders[362], it is not clear whether the European Commission will follow the same approach in the case of the standard setting agreements. On one side, the *Rambus* case tends to suggest that the focus of the European Commission in dealing with standard setting agreements may be on the question of whether royalties are high. On the other side, the *Qualcomm* case may suggest that the European Commission may be more concerned by the question of whether by participating in a standard setting agreement the concerned patent holder reaches additional market power.

The competition policy restricting the level of royalties may affect innovation. The emerging possible approaches may yield different potential impacts for innovation. The first possible approach consists of restricting royalties of all the patents relevant to the standard. It may eliminate the possibility of sufficient returns to investments in innovation and by consequence discourage it. The second approach relies on eliminating returns to investments in innovation in technological solutions that face competition and leaving some rents for the innovators of unique irreplaceable technological solutions. It may be potentially effective in stimulating innovation efforts in the domains that face no potential or actual competition.

4. CONCLUDING REMARKS

There may be sometimes a tension between competition policy and innovation policy.[363] While innovation policy recognizes a dominant position as a reward to innovation efforts and hence one of the engines of technological progress, competition policy may prevent innovators to fully exploit their dominant positions. More in

[362] The application of the competition law to markets characterized by high innovation rate tends to play more important role after the patent expiry. For example, the European Commission appears to be more concerned about the behaviour observed around the period of the patent expiry in the pharmaceutical industry, when the generic producers consider an entry, rather than by the behaviour of the producer of the drug that will be still protected by the patent for quite some time.

[363] For an interesting discussion of the relation between the US antitrust laws and intellectual property ("IP") laws see Brumfield and Schepler (2010).

particular, high royalties may be perceived as perfectly normal from the point of view of innovation policy and be forbidden by the competition law.

Standard setting agreements complicate the traditional tension between the competition policy and the innovation policy by eliminating ex-ante competition. The traditional tension between competition policy and innovation policy concerns superior technologies without viable alternatives. Standard setting agreements may lead to the elimination of alternative technological solutions, increasing market power of the parties involved in the standard agreement. Competition policy may prohibit the abuse of this extra market power and try to limit potential licensing policies applying to the technological standards. On the other side, innovation policy may be opposed to such an approach, claiming that any restrictions imposed on the licensing policies may limit innovation efforts.

The recently published guidelines on the applicability of Article 101 TFEU and the recent cases concerning standard setting agreements may suggest that the European Commission may consider that standard setting agreements violate the competition law if they result in excessive royalties. The provisions of Article 102 TFEU prohibit different kinds of abuses including exploitative abuses such as excessive pricing and standard setting members may not be immune from such rules. This interpretation may cause certain tension with the European innovation policy. By decreasing the level of the expected royalties charged by the holders of patents relevant to a standard, competition policy may discourage investments in innovation. It may be therefore desirable to find a better method of assuring that standard setting agreements do not harm competition without discouraging too many investments in innovation. The real question lies hence in identifying tools providing the best balance between the two polices (i.e. the innovation policy and the competition policy) while ensuring the effectiveness of competition enforcement.

The overall policy goal could be to have competition policy forbid abusing additional market power generated by the standard setting agreement and allow exploiting market power that a patent holder would hold without participating in the standard setting agreement. Such a policy would treat differently holders of replaceable patents and holders of irreplaceable patents, forbidding the former to charge excessive royalties and leaving more freedom to the latter. It would hence leave sufficient rents for companies developing new technological solutions, without forcing the users of the emerging standards to pay for the technological solutions that are less innovative and face (at least ex-ante) competition.

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