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I. INTRODUCTION

We were asked by DG Competition to provide an economic evaluation of the 2004 Technology Transfer ("TT") Guidelines that would serve as an input into the formal review process initiated a few months ago. When assessing a long-standing piece of competition policy, the best approach is certainly to turn to the related cases that have arisen since the policy document came into force. However, for better or for worse, very few "technology transfer" cases have appeared on the European Competition radar since 2004. *A priori* then, it seems that the 2004 Guidelines have done a decent job of giving a reasonably clear picture of the types of conducts that might land an undertaking in hot water.

We therefore decided to organize our report around two different questions. First, have there been developments in industry practice that might call for a revision, clarification, or extension of the current Guidelines? Second, do we, as economists, feel that the current Guidelines are logically consistent, both internally and with respect to other policy documents emanating from DG Competition?

II. NEW DEVELOPMENTS: PATENT THICKETS

Over the last ten years or so, economists and policy-makers alike have become increasingly concerned about the potential adverse effects of so-called "patent thickets." For economists, patent thickets refer to situations where access to a large number of intellectual property rights ("IPRs") are required in order to design a product without undue fear of litigation, and these IPRs are owned by a significant number of different undertakings. A current and well-publicized example of patent thicket is the smart phone industry where a given device incorporates dozens if not hundreds of standards and each of these standards can involve a large number of patents. Rightly or wrongly, there is a perception that such thickets have become a more serious issue with the emergence of increased modular technology in a number of fields.

Patent thickets raise two main policy concerns. The first concern is pragmatic. In the presence of thickets, firms must negotiate with a large number of other parties to secure access to the necessary IPRs. Negotiations take time and their outcome depends on a number of factors such as the congruence between the parties' objectives or simply the personalities involved. The larger the number of parties, the more likely it is that "something will go wrong" so that negotiations and, hence, product introductions into the market are delayed or even fail.

The second concern—often referred to as "royalty stacking"—relates to the overall royalty payments that firms trying to access the relevant IPRs are likely to face. To the extent that royalty payments are output related, the higher such payments, the higher the prices of the final products and, hence, the lower consumer welfare. This issue arises because, from the point of view of a

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firm aiming to produce a device for the downstream market (e.g. a smart phone) the IPRs in a thicket are *complements*.

When we think about the pricing of *substitutes*, our usual concern is that prices might be too high. This is after all what drives a large part of competition policy toward horizontal mergers. If two independent parties each sell their own brand of mineral water, a price decrease by the first firm does increases its own demand but also decreases demand for the other brand of mineral water. Since the firms are independent, this negative externality is ignored and both firms are fairly eager to cut prices to gain sales. If, on the other hand, the two firms merge, then each "brand director" takes into account that cutting price on one type of mineral water decreases demand for the other type. This leads to higher prices in the post-merger situation.

With complements, the analysis is reversed. Decreasing the price of one of the IPRs in the thicket *increases* the demand for all IPRs in the thicket. Independent firms do not take this effect into account and hence set prices that are too high compared to what would be profit-maximizing for all IP owners jointly. So prices are higher when different pieces of IP belong to different owners and the total price/royalty paid to access a given thicket increases with the number of different owners involved.

So, patent thickets seem to be bad news for consumer welfare….but what does this have to do with competition policy? The link comes from the fact that *some of the practices that might alleviate the negative effects of patent thickets might themselves raise significant antitrust issues*. So, if one feels that patent thickets have indeed become a more significant issue since 2004, should one relax the antitrust treatment of these "alleviating" practices?

A. Cross-Licensing

Obviously, patent thickets can be overcome through cross-licensing between the multiple owners of relevant IPRs. However, such cross-licensing of *complementary* IPRs might be objectionable because it can modify the behavior of the contracting parties through two channels. Each of these channels is only a concern if the cross-licensing involves positive running royalties that are linked to the output (or sales) of the two firms involved.

Suppose that A and B enter into a cross-licensing agreement. The first effect comes from the fact that output-related royalties raise the marginal cost of each of the two parties. This is true even if the same rate of royalty applies to each firm. If firm A owes a £2 unit royalty to B and B also owes a £2 unit royalty to A, the net payment between the two firms might well be nil (if they have the same output) but each firm's marginal cost is still increased by £2: each additional unit produced costs £2 more. Of course, this mutual increase in marginal cost increases the retail prices of both firms, moving the prices towards the level that would prevail if the firms set their prices jointly. In other words, output-related royalties can be used to move independent parties toward more collusive price levels, to the detriment of consumers.

The second effect is similar to the effect of partial cross-ownership. When deciding whether or not to compete harshly with firm B, firm A now realizes that, if more aggressive behavior on its part means lower sales for B, then it also means lower licensing revenues from B. Clearly, this decreases the firms' incentives to compete intensely.

Of course, these two effects do not mean that cross-licensing is a bad thing. In fact, if all IPRs in the thicket are essential to the production of the downstream device, consumers are better off with cross-licensing, even if it leads to higher prices, than without licensing since this would mean that no device could reach the downstream market at all. The issue then arises when the IPRs in a given thicket are *imperfect* complements, i.e. if they help improve the product (even quite significantly) but are not strictly necessary for the product to actually exist. In this case, one could legitimately fear that the parties to a cross-licensing agreement might set royalties that are significantly higher than the value-added of the corresponding IPRs in order to achieve a more collusive outcome.

Fortunately, this type of behavior is already considered in the current version of the Guidelines, which state that:

> Article 81 (1) may be applicable where competitors cross license and impose running royalties that are clearly disproportionate compared to the market value of the licence.

B. Patent Pools

Another customary solution to patent thickets issues is the formation of patent pools. These pools might be linked to a specific standard or be defined with respect to a broader criterion such as a given technology field or subfield. Since Standard Setting Organisations ("SSOs") were already analyzed in some depth as part of the recently revised *Horizontal Guidelines,* we will not focus here on the various types of abusive conducts that might arise at various stages of the standard setting process, but simply focus on patent-pools and SSOs as ways of solving the two policy problems created by patent thickets: lack of agreement and royalty stacking.

It is important to underline at the outset that the economics literature on patent pools, while growing, is still in development. We have therefore nothing like the same body of knowledge on which to rest as for traditional licensing contracts. The cornerstone of economic analysis of patent pools is Lerner & Tirole.[2] The authors look at the incentives for forming an industry-wide patent pool that incorporates a potentially varied set of patents—from patents that are close substitutes to patents that are perfect complements (i.e. "essential" patents). The question is whether, left to their own devices, industry participants would form pools that lead to higher or lower IP prices than those that would prevail without the pool. In other words, were we to leave private parties free to form industry-wide pools, would the pools that emerge be good for welfare or not?

For our purpose, the paper has two main results. The first result is bad news. Whether or not a patent pool that arises at the initiative of private parties is socially desirable does not depend on whether or not the IPRs that it contains are substitutes or complements *in the sense that we traditionally give to these words.* Concretely, this means that one cannot judge whether a given patent pool lowers or increases prices by simply looking at whether the technologies contained in the IPR are substitutes or complementary.

[2] J. Lerner & J. Tirole, *Efficient Patent Pools*, AMER. ECON. REV. 691 – 711 (2004).

The second result of Lerner & Tirole offers hope for a relatively simple rule: Provided that each IPR owner retains the right to license its IP independently outside of the pool, then we should expect industry-wide patent pools that form at the initiative of the industry members to always be welfare improving. Since the possibility of independent licensing outside the pool is a criterion for leniency both in the United States and in the Technology Guidelines, one might then think that we have it all figured out: Let us simply impose this requirement and relax in the knowledge that whatever pool forms under such conditions can only be good for welfare. Alas, things are not quite as simple as that, as the Lerner & Tirole result was derived under some assumptions that are unlikely to be fulfilled in practice.

The first such assumption is that all firms in the industry are identical. In practice though, there will be some asymmetries. In particular, some firms are likely to contribute more or better IPRs to the pool than others. Helpfully, Lerner & Tirole do show that, even with such asymmetries, the independent outside licensing clause suffices to guarantee the emergence of socially useful pools *but only if pools are allowed to discriminate between members to accurately reflect their varying contributions*. This is an aspect of "pool governance" that is not addressed in the current guidelines and that seems to go against antitrust authorities' usual preference for "non-discrimination." This would be a useful issue to address as part of the on-going revision of the Guidelines.

The second problematic assumption is that Lerner & Tirole only consider industry-wide pools. This means that pool membership is not an issue. However, most pools involve only between 30 and 60 percent of industry participants (measured in terms of market share),[3] so the issue of pool membership does need to be addressed.

Unfortunately we currently know very little about this issue. The little that we know[4] suggests that the independent outside licensing clause still ensures that socially useful pools emerge, *provided that pool members can set membership rules*. Indeed, the one formal analysis that we have shows only that membership rules based on unanimity by existing members lead to socially desirable pools if combined with the independent licensing rule. Again, pool membership is not discussed in any detail in the current guidelines…. and the membership rules that might be necessary to ensure a socially desirable outcome might look a little too restrictive for antitrust authorities. In this case, however, we feel that the current state of economic knowledge is not yet advanced enough to warrant a full discussion of this issue in the revised Guidelines.

We would like to make two further remarks before closing this section. First, the results presented above only apply to pools that are formed at the initiative of industry members. Indeed the whole analysis relies on which pools members would find profitable to form and maintain. Our conclusions cannot, therefore, be applied to situations where patent pools are formed by some competition authority or some other regulator as a remedy to merger or a solution to some perceived market malfunction.

[3] A. Layne-Farrar & J. Lerner, To Join or Not to Join: Examining Patent Pool Participation and Rent-Sharing Rules, mimeo, (2008) *available at* http:/ssrn.com/abstract=945189.

[4] S. Brenner, *Optimal Formation Rules for Patent Pools*, 40(3) ECON.THEORY 373-378 (2009).

Second, the one case where the analysis of Lerner & Tirole and our usual intuition of what "complementary" technologies are coincide is when all IPRs are essential. In such a situation a pool with independent outside licensing is always desirable. This provides support for the Guidelines' current restriction of exemption to such pools of essential patents; a restriction that, in our opinion, it would be premature to relax.

III. A POSSIBLE INCONSISTENCY: GRANT-BACKS

Grant-back clauses appear in more than 40 percent of all licensing agreements. Put simply, they stipulate that at least one of the two parties, licensor or licensee, commits to license further developments of the licensed technology to the other party. In this section we will, for simplicity, focus on licensing agreements where the grant-back clause only applies to the licensee.

Because of the difficulty of setting up any credible compensation schemes for innovations that have not yet occurred, grant-back clauses do not usually specify a *quid pro quo* payment for the party that makes further technological developments to the other. For this reason, the main concern about grant-backs is that they decrease the incentives to innovate for the party that is subject to this obligation. If a licensee knows that she will have to share further technological developments for free with the original licensor, then her incentives to further improve the licensed technology are diminished compared to a scenario where she could make those further developments her own. This is precisely why the recently revised *Horizontal Guidelines* state that, in the absence of any synergies, research joint ventures ("RJVs") decrease incentives to innovate. So, if one worries about the impact of RJVs on innovation incentives, it would seem logical to also worry about the impact of grant-back clauses.

Grant-back clauses can be exclusive or not; they can also relate to so-called "severable" innovations or to "non-severable" innovations. The grant-back is exclusive when the licensor has exclusive rights over the further developments of its technology by its licensee. The TT Guidelines do not object to non-exclusive grant-back clauses. Broadly speaking, an innovation is "severable" if it can be used without infringing the patent that was the object of the original licensing agreement. The TT Guidelines look unfavorably at grant-back clauses that apply to severable innovations but not on clauses that only apply to non-severable innovations.

A negative attitude towards grant-back clauses for severable innovations makes perfect sense since allowing the initial patent holder to extend its exclusivity to non-infringing innovations would amount to an ex-post revision of the scope of protection that patent law sees fit to grant to innovators. On the other hand, this principle does not extend to non-severable innovations since the licensor can prevent its use[5] by third parties.

Still, as grant-back clauses on non-severable innovations do reduce incentives to innovate, one would need some strong argument in their favor to justify their continuing exemption. Such a positive case for grant-backs mostly relies on the "but for" argument: If the licensor could not include a grant-back clause in the licensing contracts, she would not license her technology in the first place and the welfare benefits traditionally associated with licensing (e.g. diffusion of knowledge through the common market) would be lost.

[5] Or, at the very least, its use by undertakings who do not yet have a license for the original technology.

Let us examine this argument more closely. A first necessary condition for the argument to be valid is that further innovation by the licensee is indeed *caused* by the licensing agreement, i.e. without access to the licensor's technology, the licensee would not innovate or would innovate at a lesser rate. Given that patent applications are supposed to provide all information required by "one versed in the art" to replicate the invention, other inventors should be able to take the "next big step" without a license. That this full documentation requirement is often flouted in practice is not an excuse.[6] On the other hand, it seems reasonable to claim that smaller, more "know-how" like innovation might indeed be the direct result of the licensing agreement. So the policy of leniency toward exclusive grant-back of non-severable innovations survives the first test.

A second necessary condition for the "but for argument" to have any strength is that the patent holder actually suffers from the fact that its licensee innovates. This is where the argument utterly fails. One can, in fact, show formally that the licensor is always better off if there is further innovation by some of its licensees, for mostly two reasons. First, improvements in the initial technology should increase the sales of the corresponding product. This, in turn, must increase the royalty income of the licensor.[7] Second, the anticipation that a licensee would be able to innovate and might be able to retain some of the surplus associated with such innovation increases the licensee's willingness to sign an initial agreement with high royalty payments. So, if further non-severable innovation cannot hurt the licensor, then one cannot claim that it would cause the licensor to refuse to license in the first place.

For completeness, one must also consider a more subtle version of the "but for" defense. In that version the benefit of grant-backs is not that such clauses are required to ensure that licensing takes place, but that such clauses lead to lower output-related royalties and hence to lower retail prices for the goods that incorporate the technology. This version of the argument is not amenable to any simple, intuitive analysis. Still we can report that, based on a formal economic analysis included in our report, we reached a rather ambiguous conclusion. In most real life situations, there are three main types of agents to consider: the initial licensor, the innovating licensee, and other licensees. What we could show is that, in most situations, the inclusion of a grant-back clause leads to higher royalty payments for some parties but to lower royalty payments for others. The overall welfare impact is therefore uncertain.

Given the weakness of the "but for" argument, there seems to be an inconsistency between the current treatment of RJVs in the *Horizontal Guidelines* and the treatment of exclusive grant-back clauses for non-severable innovation in the *TT Guidelines*. Other things being equal, both types of agreements decrease incentives to innovate. Accordingly the *Horizontal Guidelines* indicate that, beyond some market-share thresholds, evidence of synergies should be offered to justify the formation of RJVs. It would seem that a similar requirement should be imposed for exclusive grant-backs of non-severable innovations—rather than take the

[6] One should add that the likelihood that significant further innovation is indeed caused by the licensing agreement is even less likely in countries where patent law allows for a significant experimental exemption.

[7] This assumes that part of the royalty payment is linked to sales or output. If it is not, the argument still goes through but it involves higher fixed payments that anticipate the additional value that will be created by further innovation.

"but for" argument at face value, credible evidence in support of this agreement and/or evidence of other sources of efficiencies should be required. This would mean that only non-exclusive grant-back clauses would fall within the exemption, and that the distinction between severable and non-severable innovations would become less significant.