



ON THE PRACTICAL IRRELEVANCE AND THEORETICAL INADEQUACY OF THE ROYALTY-STACKING BENCHMARK IN STANDARD-ESSENTIAL PATENT NEGOTIATIONS



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I. INTRODUCTION

In recent years technological standards have become more and more prevalent. Many new high-tech products, such as smartphones and tablets, are extremely complex, as they embed a great variety of technologies that are contributed by a large number of firms. Furthermore, the need to make the complex products sold by different manufacturers interoperable has pushed manufacturers to cooperate with technology developers in the creation of standards. Typically, this coordination takes place within Standard Development Organizations (“SDOs”). One of the purposes of an SDO is to facilitate the development of the best technology for each of the aspects of the standards and coordinate that development with the other technologies being adopted. Because most of these technologies are patented, their developers are entitled to receive a remuneration for the licensing of their standard essential patents (“SEPs”) in the form of a royalty payment.

The licensing of SEPs has become a controversial issue. Some companies, IP practitioners and scholars argue that SEP holders are over-rewarded as a result of what they call “patent hold-up” and “royalty stacking.”

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Those that argue patent hold-up is a problem consider that all that standardization bodies do is “select” one among several technologies to become part of the standard.² In doing so they argue, standard setting organizations (“SSOs”) create *de facto* monopolists in a context where before there was none. We note that, unlike traditional SSOs, modern SDOs, such as the European Telecommunications Standards Institute, do not limit themselves to select among extant technologies but often coordinate the development of new technologies for which there is no alternative. SDOs, unlike SSOs, do not create market power, which may explain why no one has yet produced evidence of patent hold-up in the case of technologies developed by modern SDOs.

Royalty stacking is the focus of this brief paper. The concept of royalty stacking is based on a well-known idea in economics, denoted the Cournot complements problem,³ and it applies to any context in which firms sell complementary goods. As an illustration of this phenomenon, consider the case of a firm that has a monopoly both in toothbrushes and toothpaste. Both goods are complementary because the demand for one product drives the demand for the other; the more toothbrushes are sold, the more people will be interested in buying toothpaste (and vice versa). The monopolist internalizes this feedback effect, meaning that when it chooses the price for toothbrushes it anticipates that a lower price increases the demand for toothpaste, for which it can also benefit. This is in opposition to the case in which one monopolist sells toothbrushes and another one sells toothpaste. Neither of them will take into account this effect and, as a result, each will set a price for its product higher than the one a monopolist selling both products would choose. This is particularly harmful both for consumers and, interestingly, for the separate monopolists.

The proponents of the idea of royalty stacking have applied the previous reasoning to the licensing of SEPs.⁴ They claim that patent holders licensing different and complementary SEPs will set royalties that are too high. Because SEPs are perfectly complementary – all technologies are essential to have a working product – a monopolist would choose the same royalty regardless of the number of technologies. However, the more fragmented patent ownership is, the higher the total or aggregate royalty burden will be faced by manufacturers implementing that standard. Furthermore, because manufacturers of standardized products cannot work around SEPs, SEP holders will receive a similar royalty payment, regardless of the strength of their patent portfolio or, in other words, irrespective to the relative contribution of the SEPs to the value of the standard.

II. THE ROYALTY-STACKING BENCHMARK

² Mark A. Lemley & Carl Shapiro, Patent Holdup and Royalty Stacking, 85 Texas Law Review 1991 (2007).

³ Augustin Cournot, *Researches into the Mathematical Principles of the Theory of Wealth* (Nathaniel T. Bacon trans., Macmillan 1987) (1838).

⁴ See also, Carl Shapiro, Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting, *Innovation Policy and the Economy* 119, (Adam Jaffe, Joshua Lerner & Scott Stern, eds., MIT Press 2001); Mark Lemley & Carl Shapiro, Patent Holdup and Royalty Stacking, 85 Texas Law Review 1991 (2007).



Those concerned with the possibility of royalty stacking in SEP licensing advocate the use of a “royalty-stacking benchmark” for assessing whether a royalty is fair, reasonable and non-discriminatory (“FRAND”).⁵ In a nutshell, using this benchmark would mean that a royalty would only be considered FRAND if it coincides with the royalty that a monopolist controlling all SEPs (or a pool comprising all relevant SEPs) would set.

Although the royalty-stacking benchmark may be appealing from the point of view of the Cournot complements theory, as with the case of patent holdup, there is no evidence that royalty stacking is a real issue in practice. In fact, Gupta and Galetovic (2016) show that, if anything, the available evidence proves the opposite: market outcomes are inconsistent with a royalty-stacking problem.⁶

A second practical concern with the use of this benchmark is that it may prove to be impossible to implement. First, licensing contracts are typically confidential so it is not possible to derive the aggregate royalty implications of a particular royalty request. Second, determining the royalty that would apply under a mandatory pool – i.e. the royalty the single monopolist would request – is a very difficult task because it requires considerable information about the price elasticity of demand of the end products implementing the technologies in question. For these reasons, this benchmark may create an under-compensation problem: while high royalty rates may have a negative effect on the final market as they raise prices, they may be essential to provide incentives for developers to innovate and create new technologies in the first place.

Together with the lack of empirical evidence, the plausibility of the idea of royalty stacking, and hence the justification for the royalty-stacking benchmark, has recently been challenged on purely theoretical grounds.

III. ACCOUNTING FOR VALIDITY CHALLENGES

In a recent paper⁷ we show that royalty stacking is no longer an issue if the standard Cournot complements model is amended to take into account that in the real world patents are probabilistic, i.e. that they are only valid and infringed with some probability, and hence they can be, and often are, challenged in court. This is obviously a very realistic feature and we have seen in recent years numerous lawsuits in which technology users and patent holders argue over the validity of the patents and whether they have been infringed or not.⁸

5 Mark A. Lemley & Carl Shapiro, Patent Holdup and Royalty Stacking, 85 Texas Law Review 1991 (2007). See also, *Microsoft Corp. v. Motorola, Inc.*, 854 F. Supp. 2d 993, 999 (W.D. Wash. 2012).

6 Alexander Galetovic and Kirti Gupta “Royalty Stacking and Patent Essential Patents: Theory and Evidence from the World Mobile Wireless Industry,” unpublished (2016).

7 Gerard Llobet and Jorge Padilla “The Inverse Cournot Effect in Royalty Negotiations with Complementary Patents,” unpublished (2016).

8 In fact the European Commission recently adopted a series of decisions aimed at protecting the right of potential licensees to challenge validity. See http://europa.eu/rapid/press-release_MEMO-14-322_en.htm.



Our model starts with the observation that, from the point of view of a technology user (or implementer) that produces in the downstream market, the decision to litigate is based on three important aspects: the strength of its patent portfolio, the legal costs of going to court and the additional profits that the producer expects to make if one or more patents are invalidated. Lower legal costs, weaker patents and higher expected gains from not being required to license the portfolio of a patent holder foster the decision of a technology user to litigate.

Of course, patent holders take into account the implementer's option to litigate when setting their royalties. In our model, litigation will impose a ceiling on the royalty rate that firms can demand. This cap varies depending on the strength of the patent holder's portfolio. A patent holder with a stronger patent portfolio will demand a higher royalty rate in the licensing negotiations than one with a weaker one. This is a first and important difference with the standard model underpinning the royalty-stacking benchmark. It is undoubtedly a better description of the actual royalty rates that firms negotiate, because stronger portfolios command higher royalty rates, irrespective of whether those negotiations involved essential or non-essential patents.

Furthermore, we find that two patent holders with a small portfolio may command a lower royalty rate than a unique patent holder with a portfolio that corresponds to the sum of both and that this will be the case when the legal costs involved in litigating validity and/or infringement are low.

Introducing the threat of litigation in the standard Cournot complements model adds further and more troubling implications for the theory of royalty stacking. The previous discussion is cast on the idea that the gains a technology user expects from going to court are only given by the savings arising from not paying royalties to the owner of the invalidated patent portfolio. This idea, however, is only accurate in the context of stand-alone technologies. With complementary technologies, i.e. when the value of a technology is a function of the contributions of all other complementary technologies, the gains from invalidating a patent portfolio depend on the royalties that the technology user is expected to pay to all other patent holders. As an illustration, consider the case in which all other patent holders are charging a very large royalty rate. Profits from the sale of the product are going to be small regardless of whether the portfolio of an additional patent holder is invalidated or not. In that case, when the total royalty stack – the sum of all royalty rates – is high, the gains from litigation are small and, thus, the incentives to go to court against a specific patent holder are weak.

IV. THE INVERSE COURNOT EFFECT

We denominate this new insight the “Inverse Cournot Effect,” to illustrate that it operates in the opposite way to the standard Cournot Effect. The Inverse Cournot Effect has far-reaching consequences. Because of this effect, when a patent holder considers which royalty rate to charge, it will take into account the effect of its choice on the total royalty stack. In particular,



it will internalize that setting a lower royalty rate not only reduces the risk of being litigated by technology users but also, that because its lower rate causes the royalty stack to be smaller, other patent holders are more likely to be litigated. This last effect is profit enhancing since when other patent portfolios are invalidated the total royalty rate goes down and the costs of downstream producer also go down, which necessarily translates into higher sales. Furthermore, the response of those patent holders to the increased risk of litigation will be to lower their royalty rate which will further expand end-product sales.

When is the Inverse Cournot Effect likely to be relevant? In our paper we show that this effect is stronger when patent holders' portfolios are asymmetric in size and strength. A patent holder with a more valuable portfolio that is not particularly concerned about being litigated might choose to lower the royalty rate when participating in a standard with small patent holders in order to constrain the royalties other patent holders may be able to extract and benefit from the increase in downstream output. In fact, we find that when patent holders are quite asymmetric and the litigation threat is credible the royalty stacking result does not arise anymore. That is, it is not true that the aggregate royalty rate is higher when patent ownership is fragmented.

When the patent portfolios are of a similar size or value, however, the Inverse Cournot Effect becomes less relevant. The reason is that a strategy of reducing the royalty to force other patent holders to lower theirs may backfire. This is because if the other patent holders end up being litigated, their portfolios may be invalidated, the total royalty stack may diminish and the result may be that the patent holder that set a lower royalty in the first place may face litigation later on.

It follows from the previous discussion that a model that accounts for the threat of litigation has radically different implications than the standard Cournot complements model regarding the likelihood and magnitude of the royalty-stacking problem. Patent holders will reduce their royalty demands to minimize the risk of litigation. They will also reduce them in order to force other patent holders to reduce theirs in order to avoid that risk. In fact, the resulting royalties may prove so low that, at least in the case of patent holders with small and weak portfolios, they may prefer to exit the licensing market and stop being active licensors. The consequence of all these effects is that it is no longer possible to claim that the aggregate royalty burden is increasing in the degree of fragmentation of patent ownership.

V. IMPLICATIONS FOR PATENT POOLS

While the economics literature has supported the view that patent pools involving complementary patents are welfare enhancing,⁹ this prediction is no longer obvious when the threat of a validity challenge is considered. Whether a patent pool increases social welfare or not will depend on the strength of the portfolio of the firms pooling their patents. If firms have large and valuable patent portfolios and, thus, are unlikely to be constrained by litigation, a

⁹ Lerner & Tirole, "Efficient Patent Pools," American Economic Review 94(3), 691-711 (AEA 2004).



patent pool will be beneficial from a social viewpoint for two reasons. First, because firms in the pool will coordinate their royalty demands in order to limit the adverse impact on downstream prices and output. This is the standard reason identified in the literature. In addition, by forming a patent pool large patent holders will lower even further their aggregate royalty if by doing so they constrain the royalty that small patent holders that do not participate in the pool can charge.

Instead, a patent pool involving small firms will typically reduce social welfare. The reason is that in this case patent holders will pool their portfolios in order to increase their strength and have stronger protection in court. This allows them to charge a higher total royalty which, in turn, raises the royalty stack. Furthermore, because the threat of litigation against these firms becomes less relevant, the Inverse Cournot Effect will be weaker and any large patent holder will have fewer incentives to lower its royalty for strategic reasons.¹⁰

VI. CONCLUSION

The previous discussion shows that although the royalty-stacking benchmark has received substantial attention in the policy debate it lacks not only practical evidence but also a proper theoretical foundation. Based on these findings, we see no reason at the moment to force patent holders to adjust their royalty requests downwards to accommodate the royalty demands of other patent holders.

¹⁰ In the case of a mixed pool, understood as a combination of large and small patent holders, the two effects go in opposite directions but it is typically the case that social welfare increases.