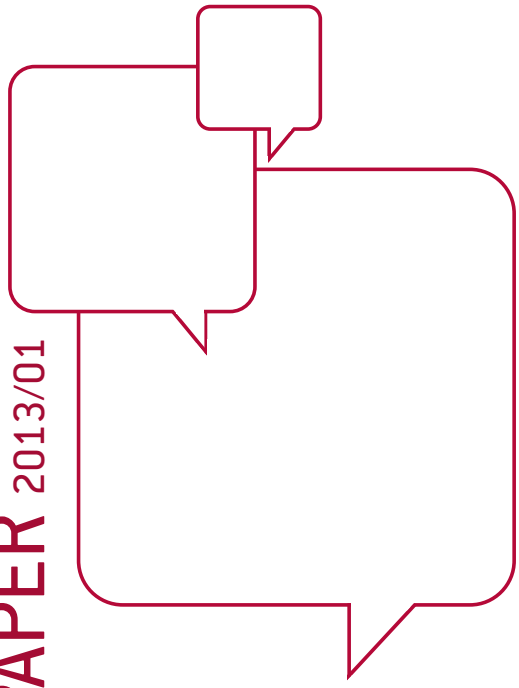

BRUEGEL WORKING PAPER 2013/01

EUROPEAN ANTITRUST CONTROL AND STANDARD SETTING

MARIO MARINIELLO*

Highlights

- Standards reduce production costs and increase products' value to consumers. Standards however entail risks of anti-competitive abuse. After the adoption of a standard, the chosen technology normally lacks credible substitutes. The owner of the patented technology might thus have additional market power relative to locked-in licensees, and might exploit this power to charge higher access rates. In the economic literature this phenomenon is referred to as 'hold-up'. To reduce the risk of hold-up, standard-setting organisations often require patent holders to disclose their standard-essential patents before the adoption of the standard and to commit to license on fair, reasonable and non-discriminatory (FRAND) terms.
- The European Commission normally investigates unfair pricing abuse in a standard-setting context if a patent holder who committed to FRAND ex-ante is suspected not to abide to it ex-post. However, this approach risks ignoring a number of potential abuses which are likely harmful for welfare. That can happen if, for example, ex-post a licensee is able to impose excessively low access rates ('reverse hold-up') or if a patent holder acquires additional market power thanks to the standard but its essential patents are not encumbered by FRAND commitments, for instance because the patent holder did not directly participate to the standard setting process and was therefore not required by the standard-setting organisations to commit to FRAND ex-ante.
- A consistent policy by the Commission capable of tackling all sources of harm should be enforced regardless of whether FRAND commitments are given. Antitrust enforcement should hinge on the identification of a distortion in the bargaining process around technology access prices, which is determined by the adoption of the standard and is not attributable to pro-competitive merits of any of the involved players.

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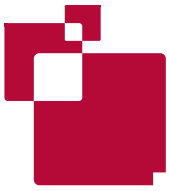
Research assistance from Francesca Barbiero is gratefully acknowledged. Opinions expressed are the author's alone.



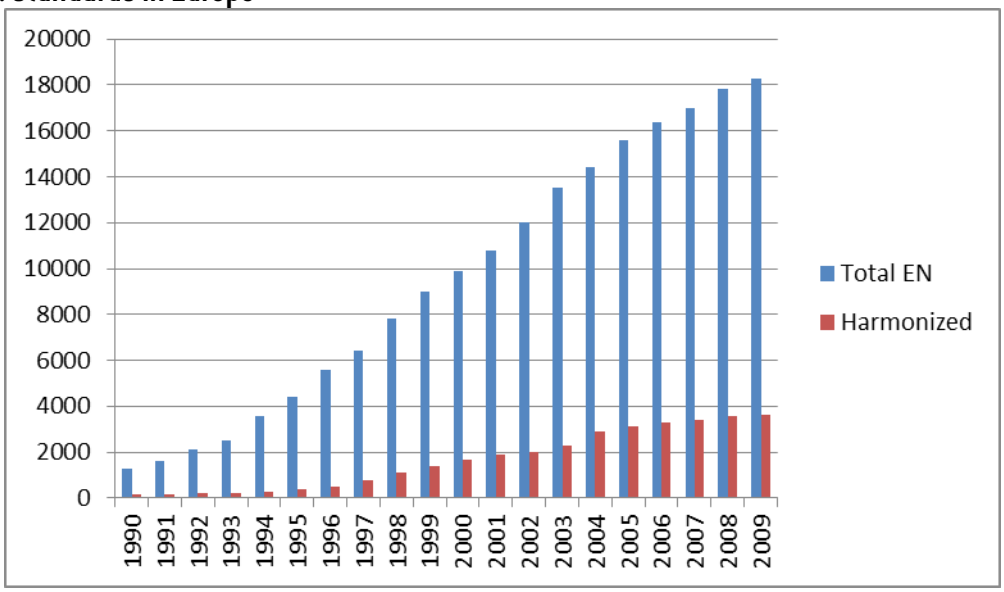
FEBRUARY 2013

1. Introduction

Standardisation agreements have as their primary objective the definition of technical or quality requirements with which current or future products, production processes, services or methods may comply[1]. Within the European Union, standardisation is essentially a voluntary process involving market players choosing to converge on common technical specifications under the coordination of independent standard setting organisations (SSOs).

Standardisation plays a crucial role in fostering economic development. Standards ensure interoperability of networks and often bring about significant reductions in transaction and production costs due to economies of scale and scope. They increase efficiencies and limit asymmetric information between producers and consumers. They can promote competition, making entry easier into industries with strong network externalities. By tailoring the evolution of the development of a production technology and by spreading relative information, they make investment in innovation more viable, thus reducing the uncertainty surrounding the outcome of research and development. Economic studies have attempted to qualify the macroeconomic impact of standards, suggesting that a one percent increase in the overall stock of standards in a country can be correlated with up to one percent GDP growth[2]. There has been a constant expansion in the portfolio of European standards, from 1,280 deliverables in 1990 to 18,286 deliverables in 2009 (Figure 1), most of which are industry-initiated. The proportion of standards mandated by the European Commission has also increased, reaching 34 percent in 2009.

Figure 1: Standards in Europe



Source: European Commission

The European Commission recognises the crucial role of standardisation. The Commission's communication of June 2011, *"A strategic vision for European standards: moving forward to enhance and accelerate the sustainable growth of the European economy by 2020"*, defines the benefits of standards for the European industry as 'tremendous'[3]. The European Council has recently reiterated

[1] Guidelines on the applicability of Article 101 TFEU to horizontal co-operation agreements, section 7: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2011:011:0001:0072:EN:PDF. Article 101 TFEU lists agreements between undertakings that are prohibited under EU competition law.

[2] Commission Staff working paper: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SEC:2011:0671:FIN:EN:PDF

[3] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL AND THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE. A strategic vision for European standards: Moving forward to enhance and accelerate the sustainable

the role of standardisation in boosting private investment and the need for an acceleration, simplification and modernisation of standardisation procedures[4].

But the Commission has also been wary about the risks that standardisation might entail, particularly in respect to potential loss of competition. Guidelines published in 2011 on the application of Article 101 of the Treaty on the Functioning of the European Union (TFEU) to cooperation agreements dedicate an entire section to standardisation[5]. The guidelines lay down the conditions under which standard-setting organisations may not, normally, infringe competition rules, that is: when they minimise the risk of abuse by allowing unrestricted participation by any willing party and by ensuring that the process is fully transparent and that access to standardised patents is provided on fair terms (see the next section). The Commission's Directorate-General for Competition, which is in charge of enforcing competition law in the EU, is also investigating, or has investigated, a number of cases of abuse of dominant position (Box 1 on the next page).

growth of the European economy by 2020, COM(2011) 311, page 6. Available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0311:FIN:EN:PDF

[4] EUROPEAN COUNCIL OF 4 FEBRUARY 2011 - CONCLUSIONS (EUCO 2/1/11 REV 1). Available at: http://register.consilium.europa.eu/pdf/en/11/st00/st00002-re01.en11.pdf

[5] See footnote 1.

BOX 1 – The main EU antitrust cases

Below is a brief description of the main antitrust cases investigated by the European Commission. No substantial precedent has yet been set and clear-cut guidance on enforcement against unilateral abuse is still missing.

The Rambus case: Rambus Inc., a US licensing company active in the semiconductor industry, was accused by the EU and US antitrust authorities to have engaged in 'patent ambush', ie a type of exploitative behaviour by which a participant to a standard-setting process intentionally withhold information regarding patents which are later claimed to be relevant to the standard. In its Statement of Objection, the EC took the view that Rambus abused of its dominant position, as in the absence of the 'patent ambush' it would not have been able to ask the royalty rates it then required. The EC case resolved in Rambus committing to a five year cap on its royalty rates for products compliant with the standards.

The Qualcomm case: Qualcomm Inc., a US licensing company, was involved in 2007 in investigations by the EC concerning an alleged abuse of dominant position, following complaints filed by six mobile phones manufacturers. The EC investigated whether royalties that Qualcomm charged after its patent technology became part of EU's 3G standard were unreasonably high despite its FRAND commitments. However, by the end of 2009, all complainants withdrew their complaints and the EC closed the proceeding.

The Nokia vs IPcom case: In June 2008 Nokia filed a complaint to the EC against IPCom, the owner of a portfolio of standard-essential patents that the company had previously purchased from Bosch. Nokia alleged that IPCom was infringing competition law by asking excessive royalties in breach of FRAND commitments that Bosch made before selling the patents to IPCom. In December 2009, IPCom declared it was ready to take over Bosch's commitments to grant licenses under FRAND. The EC welcomed IPCom's public declaration and, after Nokia withdrew the complaint, decided not to open the investigation initially sought by the company.

The Samsung case: In January 2012, the EC opened an antitrust investigation over Samsung alleged abuse of dominant position due to the infringement of FRAND commitments related to patents essential to the 3G standard. A formal complaint filed by Apple, due to the injunction reliefs sought by Samsung in several EU countries, which were seen as an attempt to block Apple's mobile phone sales. Despite the withdrawal of Samsung's injunctions in December, the EC took a formal step in the investigation procedure by issuing a Statement of Objections.

The Google – Motorola case: In April 2012, the EC opened proceeding against Motorola Mobility Inc., which has been recently purchased by Google, to assess whether the company has infringed FRAND commitments over the use of essential patents by seeking injunctions against Apple and Microsoft in several EU countries. The case is still ongoing against 'willing licensee'. In January 2013, a settlement between Google and the Federal Trade Commission in the US FTC limiting Google's ability to seek injunction relief was signed.

However, it is uncertain if antitrust, or competition law, is the right instrument for correcting distortions of the market induced by the adoption of standards[6]. Abuses are very difficult to identify. Even when patent holders are required to provide access to their essential patents (SEPs) on fair, reasonable and non-discriminatory (FRAND) terms, the definition of the fair level for the price to access the standardised technology is an extremely complex task and competition authorities may simply lack the tools to perform it. FRAND commitments moreover have a contractual nature and should normally be enforced via contract law, rather than competition law. The timing of enforcement against unilateral abuse is also an issue, since under EU law only 'dominant' companies can be pursued for abuse. But the adoption of a standard can occur when the company in question does not yet have market power. It therefore does not necessarily follow that abuses related to standards should result in EU competition policy enforcement.

Based on insights from the economic literature, this article discusses the competition concern and how that concern can translate into harm for European consumers (section 2). The economics of unfair pricing abuse and a proposal to expand the scope of Commission antitrust enforcement against exploitative abuse are detailed in section 3. Section 4 concludes.

2. Ex-post abuse and European competition policy

The discussion about the role that competition policy enforcement should play in correcting market distortions arising from the adoption of standards has been dragged into case-specific matters. Contributions by practitioners and academics have been sponsored to support patent-holders' and licensees' opposing views, given the lack of scientific consensus on a unique methodology to enforce antitrust control. Companies have been frequently accused of using courts or competition authorities for strategic purposes, in order to enhance their bargaining positions relative to counterparts while negotiating patent access prices. Understanding the role that can be played by competition authorities therefore requires taking a step back.

2.1 *FRAND and the ex-post / ex-ante comparison*

After the adoption of a standard (ie ex-post), the chosen technology normally lacks credible substitutes: switching to competing technologies becomes relatively too expensive for manufacturers. The owner of the patented technology might thus have additional market power relative to locked-in licensees, and might exploit this power to charge higher access rates. In the economic literature this phenomenon is referred to as 'hold-up'[7]. To reduce the risk of hold-up, standard-setting organisations often require patent holders to disclose their standard-essential patents before the adoption of the standard (ie ex-ante) and to commit to license on FRAND terms.

Arguably, the primary purpose of FRAND is to render the adoption of the standard 'competition-neutral' in that it should aim at stripping players of any additional market power accruing to them solely because the standard de-facto rules out any other potentially competing technology. At the same time, patent holders should not be deprived of the reward they are entitled to for their R&D efforts under normal competitive conditions. Making that effective in practice is a tough challenge for academics and practitioners since it requires being able to disentangle the effect on prices due to the restriction of competition from the effect due to the quality of the new technology.

Economic literature wrestles with the definition of FRAND. Swanson and Baumol (2005) propose an auction-like mechanism which should take place before the loss of completion effectively

[6] See, for example, Teece and Sherry (2003).

[7] See, for example, Shapiro (2001), Layne-Farrar *et al* (2007), Farrell *et al* (2007), Shapiro (2010) and Mariniello (2011).

materialises, in practice suggesting that FRAND rates should be benchmarked to ex-ante market conditions. Farrell *et al* (2007) endorse the ex-ante/ex-post approach and suggest that "*courts should interpret the fair and reasonable prong of FRAND as the royalties that would have been voluntarily negotiated before users became committed to using the patented technology.* [...] *This is typically not the same as the level of royalties that would be voluntarily negotiated ex post.*" Layne-Farrar *et al* (2007) argue that FRAND rates should be calculated according to patents' Shapley value, ie their marginal contribution to the total value of a technology. Mariniello (2011) discusses the limits of those approaches stressing the merits of the ex-ante/ex-post approach, warning however that, because of ex-ante imperfect information, a proper FRAND definition should imply *"rates* [that are] *not worse than those which the patent holder would have committed to ex-ante in the context of a standard setting contest conditional on the information that is available ex-post"*. The author then suggests a screening-test based on four conditions to skim-off cases in which FRAND commitments cannot be infringed.

Notably FRAND is not supposed to be associated with a specific price ex-ante. Information on the value of a technology available ex-ante is often low. The value of technologies materialises only when the standard is effectively implemented, when patent holders weigh the relevance of their portfolio relative to other patent holders' portfolios and licensees' production strategies, and when the market gets started and end-customers finally reveal their preferences[8]. The impossibility of ex-ante complete contracting means that FRAND commitments must be flexible enough to allow the technology's price to adapt to its value as revealed ex-post, when information is enhanced and uncertainty minimised. But the intrinsic ambiguity of the meaning of 'fair' in FRAND leaves ample scope for interpretation, and therefore, for litigation (Mariniello, 2012).

2.2 *Channels to harm*

In the current competition policy practice, a behaviour might be deemed to be anti-competitive only in so far as it negatively impacts consumer welfare[9]. In this context, consumers might be harmed in essentially three ways. Compared to a situation of fair competition, consumers could face higher product prices, lower quality or variety of products, or reduced expected innovation in the future. The first two types of harm can be an effect of hold-up. The third type of harm is, instead, an effect of 'reverse hold-up'.

To illustrate the difference between hold-up and reverse hold-up, consider the following stylised example. A certain technology is selected as the standard. A company owns a portfolio of patents essential to that technology. If there is still to be competition between technologies after the adoption of the standard, the patent holder would be able to charge an access rate of four percent per unit sold by a manufacturer using that technology (everything else being equal). Four percent is the FRAND rate, according to the definition explained above. The patent holder however uses the additional market power gained through the adoption of the standard to force the licensee to accept a six percent rate which translates into higher prices for end-customers. This is a case of hold-up. In an alternative scenario, the licensee threatens to go to court to force the patent holder to abide by its FRAND commitment, expecting that the patent holder will not be willing to undergo the financial distress caused by a court proceeding, and obtains a two percent rate, ie below the FRAND level. Anticipating

[8] By way of example: the UMTS standard for 3G mobile phone communication was adopted by ETSI, the European Telecommunication Standard Institute, at the end of 1999. 3G networks however started to roll-over in Europe only three years later, in March 2003.

[9] Competition authorities maximise consumer welfare, but economists debate whether that, or total welfare, should enter the object function of competition policy (see Motta, 2004, for a discussion). Some argue that, under certain conditions, maximising consumer surplus yields optimal social outcomes. See Neven and Roller (2005).

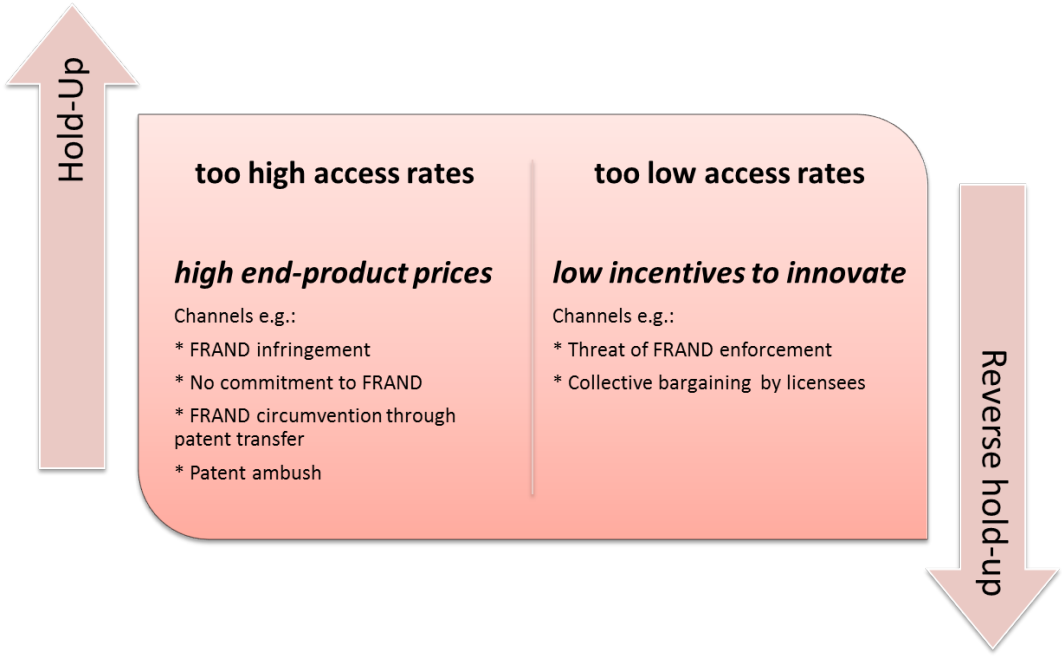
that risk, patent holders refrain from investing in innovation in first place. This is a case of reverse hold-up[10].

While hold-up abuses are rather intuitive, it may be difficult to understand why a patent holder could suffer from an abuse, given that it is often presumed to hold monopoly power if controlling a patent deemed essential to access the standard technology. It would be erroneous though to believe that ex-post the adoption of a standard the patent holder has always full bargaining power. First of all, a patent may simply deemed not valid. As Lemley and Shapiro indicate in their seminal paper titled 'Probabilistic patents' (2005): "e*conomists often assume that a patent gives its owner a well-defined legal right to exclude others from practicing the invention described in the patent. In practice, however, the rights afforded to patent holders are highly uncertain.*" Besides patent validity, a patent holder may face a number of other constraints, particularly when negotiating with a company holding a high share of the downstream market. The patent holder's outside option in a negotiation around the price to be paid for accessing its essential technology may as well be not significantly different from zero if, for example, its counterpart in the negotiation does not face any significant competitive alternative downstream and de-facto is an 'incontournable' partner. Under these circumstances, there is no reason to believe that holding a valid patent essential to a standard would automatically empower any patent holder of the ability to charge monopoly prices. More generally, as noted in Whish and Bailey (2012), page 771: "*it would be wrong to assume that it is always the patentee that is in the more powerful bargaining position: a patentee may be an individual inventor and his prospective licensee a powerful company, in which case the former's position may be weak*."

In other words, regardless of the role (licensor or licensee), a market player may have a strong or weak bargaining position vis-à-vis its counterpart, after the adoption of the standard, leaving scope for hold-up and reverse hold-up abuses. I will now discuss in detail how consumers can be harmed when each of the two abuse types materialise.

[10] Striking the balance between short-term benefits (e.g. lower end-product prices) and long-term benefits (eg higher expected innovation) is a broad and complex exercise that has been tackled by researchers from different angles (see Aghion *et al*, 2002). That exercise is outside the scope of this paper.

Figure 2: Potential sources of harm



Hold-up

In *hold-up* cases, a patent holder extracts rents that it would not be able to obtain if it would still face competition ex-post. Rey and Salant (2012) show that, from a welfare perspective, a single owner of SEPs may have an incentive to grant too few or too many licenses. The closer is competition downstream, the stronger is the incentive of the upstream monopolist to increase licensing fees in order to reduce downstream competition and protect the manufacturers' rents it would then appropriate. Conversely, when variety is particularly valuable, the upstream monopolist may have an incentive to grant too many licenses in order to extract the higher value that consumers attribute to more heterogeneous products. In a similar fashion, Schmidt (2006 and 2008) identifies a link between a patent holder's business structure and technology access pricing: vertical integration helps internalising double-mark up effects (pushing access prices down) but likewise creates an incentive to raise rivals' costs downstream (pushing access prices up), in order to benefit from the resulting reduction in downstream competition[11].

As indicated above, SSOs have attempted to deal with hold-up concerns with the introduction of FRAND rates which any patent holder holding SEPs is required to commit to. Besides the objective difficulty with enforcing FRAND commitments, it should be stressed that not all patent holders that could potentially perpetrate a hold-up abuse should be expected to be bound by FRAND commitments ex-post.

This is for example the case for patent holders who own essential patents to the standard but did not directly participate to the standard setting process or abided to the rules imposed by the SSO. That can happen for several reasons. A patent holder might simply be unaware that it holds essential patents at the time the standard is selected and, therefore, not required to commit to FRAND. This is not surprising, given the high degree of complexity and uncertainty which the adoption of a standard may

[11] In a recent study, Avvika calculates the total royalty burden that pure manufacturers should expect to sustain for accessing 4G technology on the basis of royalty rates that have been publicly announced by patent holders, can be as much as 14.8 percent. See: http://www.investorvillage.com/uploads/82827/files/LESI-Royalty-Rates.pdf

entail (particularly in the ICT sector). A patent holder can likewise choose not to participate in the standard-setting process in order not to be forced to commit to FRAND, despite the drawback of not being able to contribute to shaping the new standard. Layne-Farrar *et al* (2011) show that introducing caps to royalty rates may distort innovators' incentive to participate to SSOs, leading to sub-optimal equilibria, from a welfare perspective. The standard-setting process in the EU and US for the Third Generation (3G) mobile standard stalled for about a year between March 1998 and March 1999 because two of the major patent holders for the candidate technologies, Qualcomm and Ericsson, refused to give FRAND commitments, arguably using them as leverage in their negotiations on the development of the standards. Until March 1999, when the two companies reached an agreement, the 3G standard-setting process could not make real progress, given the level of uncertainty about the commitments. Patent holders' participation in standard-setting process cannot be taken for granted.

A patent holder may also attempt to circumvent FRAND commitments by transferring its patents to a different entity. If the SSOs rules do not explicitly envisage that the FRAND commitment is, once given, embedded to the whole patent portfolio of the committing patent holder, it is unclear whether a new entity purchasing the patents should be considered bound by the original FRAND commitment. This issue was at the core of Nokia's antitrust complaint to the EC against IPCom refusal to abide to IPCom's patents' previous owner's, Bosh, commitments (see Box 1). Eventually IPCom's gave in to Nokia's pressure and publicly committed to FRAND. The EC welcomed IPCom's public commitment but no official precedent was set, since no formal investigation was ultimately opened. The EC guidelines on the applicability of Article 101 TFEU to horizontal co-operation agreements clearly indicate that FRAND commitments should survive patent transfer[12]. However, it is not clear on which basis an abuse by the new owner would be pursued, since the guidelines apply to the cooperation agreement implemented by the SSO, not to a single company's unilateral abuse.

A patent holder may also deceptively hide its ownership of essential patents ex-ante. This is known as 'patent ambush', an instance of which was investigated by the European Commission in the context of the Rambus case (see Box 1).

Reverse hold-up

In reverse hold-up cases, the licensee is able to squeeze out from the licensor rates that are lower than what was expected ex-ante for a successful innovation. In that case, the effect is to reduce the future incentive for investment in R&D, therefore depriving consumers of future consumption opportunities. Since only essential patent holders are required to commit to FRAND, little attention has so far been paid to the potential obligations for perspective licensees[13].

Reverse hold-up may appear counterintuitive. Elimination of competition at technology level would naturally be associated with an increase in the market power of the gatekeepers that own patents essential to the technology that won the standardisation contest. Economic theory however points out channels through which a licensee may see its bargaining position enhanced relative to an essential patent holder after the adoption of the standard. Theoretical analysis suggests that reverse hold-up can occur because, ex-post, the parties face an asymmetric risk: the patent holder is bound by its

[12] See footnote 2. Paragraph 285 reads: "*To ensure the effectiveness of the FRAND commitment, there would also need to be a requirement on all participating IPR holders who provide such a commitment to ensure that any company to which the IPR owner transfers its IPR (including the right to license that IPR) is bound by that commitment, for example through a contractual clause between buyer and seller.*"

[13] The fact that no case of alleged reverse hold-up abuse has been brought into the public domain should not be taken as a signal that this not a problem. As Farrell (2011) puts it: *"we … can't assume that the absence of a dispute means the absence of a problem. … So, looking to the frequency of disputes to gauge whether there is or is not a pervasive or serious problem, it seems to me, quite a leap".*

FRAND commitment while the licensee clearly is not. The threat of litigation related to FRAND commitments can thus be used as bargaining leverage, particularly when the counterparty is unlikely to be able to sustain the costs of the court proceedings.

Ganglmair *et al* (2012) design a simple but powerful model to capture the impact of ex-post [F]RAND enforcement on welfare explicitly controlling for the licensor's and the licensee's bargaining power. They find that when the manufacturer has a sufficiently low bargaining power or the innovation has sufficiently low potential social value, the risk of hold-up reduces the incentive for the manufacturer to invest in the standardised product. That happens because the manufacturer anticipates that its investment would be appropriated by the patent holder in the form of higher fees. This effect feeds in the patent holder profit function reducing expected revenues from R&D and, therefore, reducing incentives to innovate in first place. Under these conditions, ex-post enforcement of [F]RAND commitments with damage remedy solves the hold-up problem and therefore induce the socially optimal level of investment. However, when the bargaining power is sufficiently skewed towards the licensee and innovation has a sufficiently high social value, the enforcement of [F]RAND commitments negatively affect social welfare because it dissuades the innovator from pursuing research projects which are valuable to society. The key factor leading to this result is the asymmetry in the damage claim: being a one-sided commitment, enforcing [F]RAND limits the surplus that the innovator can extract from the manufacturer, but not vice-versa.

Empirical evidence point out that, particularly for small, financially constrained innovators, difficulties to access litigation may lead to inefficient equilibria were patent access price is too low to guarantee optimal innovation.

Lerner (1995) uses a database to examine the patenting behaviour of 419 biotechnology firms and shows that, everything else being equal, companies with higher litigation costs tend to patent fewer innovations than their rivals with lower litigation costs. This would suggest that small biotechnology firms conceive their research strategies to avoid legal conflicts with larger firms and tend to rely relatively more on trade secrets than on patents to protect their initial investment compared to bigger firms.

Lanjouw and Schankerman (2001) examine a large dataset of 5,452 patent cases and find that the probability of litigation is significantly correlated with the number of claims and the number of forward citations per claim. The authors suggest that a 'reputation effect' plays a major role in the decision to litigate: a patent is more likely to be litigated when subsequent citations to that patent come from firms active in closely related technology fields. If the benefit of litigating a patent spill over to the protection of other patents through reputation effect (ie signal of willingness and ability to litigate) then the same patent would be worth more if owned by a larger firm, since bigger patent portfolio increases interaction likelihood. The authors conclude that high enforcement costs can weaken small companies' incentives to R&D and entry.

Lanjouw and Lerner (2001) explore the link between the financial status of companies involved in a lawsuit for a patent claim and the use of preliminary injunction. They use a dataset of 252 patent lawsuits and find that injunction relief is significantly more likely to be sought if the plaintiff is large and significantly bigger than the defendant, in terms of sales, employment and cash and equivalents. Facing a financially constrained counterpart gives a comparative advantage to the plaintiff, because the infringer is more vulnerable to the financial distress caused by the court proceeding. The authors conclude that injunction relief tend to benefit stronger firms and is particularly damaging to capital-constrained rivals.

Lanjouw and Schankerman (2004) use a dataset including 13,625 patent cases to address the questions 'are small firms handicapped?' in protecting their intellectual property rights. They find that firms owning a large patent portfolio and therefore firms that tend to trade patents and have repeated interactions over time have a comparative advantage, because they can rely on reputational effect to enforce their claims. According to the authors, large firms rely less on courts than smaller companies that are therefore put at disadvantage. The authors also find that courts proceeding initiated by large or small firms lead to outcomes which are not statistically different, suggesting that differences in the litigation probability is not driven by differences in patent quality. However, small innovators are particularly affected by high litigation risks since they face relatively higher litigation costs.

Financially weak patent holders might thus prefer to accept a disadvantageous agreement instead of running the risk of not surviving the financial distress brought by a court proceeding. Resource requirements are normally very burdensome: the 2011 report of economic survey the American Intellectual Property Law Association indicate that filing a patent lawsuit or having to defend against one in the US in 2011 could cost from $650,000 (if the claim is less than $1mln worth) to $5mln (if the claim is more than $25mln worth)[14]. The 2012 PWC patent litigation study reports that the average duration for a patent trial in the US is 2.5 years[15]. In fast and dynamic industries such as telecommunication, 2.5 years can be an unreasonably long time span and the survival of a small company can be at risk if involved in court proceeding. Due to the high fragmentation of the European national patent systems, lower aggregate costs or faster proceedings ought not to be expected in Europe[16].

Small innovators' objective difficulty to enforce their rights can furthermore contribute to explain the insurgence of Non-Practicing Entities (NPEs) or 'patent-trolls': companies that do not innovate themselves but purchase patents from innovators, aggregate them in a single patent portfolio and then challenge manufacturers in court to maximise their revenues from technology access rates (see Shrestha, 2010 and Risch, 2011). There is a growing uneasiness by public authorities towards NPEs, since they are often accused to contribute to make manufacturers' licensing burden unsustainable. It follows from the above discussion that the most intuitive way to reduce the relevance of NPEs would be to reduce patent enforcing cost for small innovators.

The economic literature also suggests that small companies experience greater difficulties to access the necessary capital to finance their R&D efforts, and are therefore more sensitive to risks associated to reduced future streams of revenue due to reverse hold-up abuses. Obtaining capital from a financial institution is more difficult if history shows that inventions are under-compensated because of ex-post abuse[17].

Another channel through which a reverse hold-up abuse can materialise derives directly from the collective nature of the standardisation process. As Farrell (2011) has recently indicated, when entering into negotiations with licensees, a patent holder has already made its sunk investment in R&D. Since standard-setting is essentially a coordinated process, even if negotiations are bilateral, they are still exposed to biases arising from group dynamics, which can ultimately result in patent holders conceding unreasonably low access fees[18]. For example, a patent holder may negotiate its

[14] American Intellectual Property Law Association (2011). Report of the Economic Survey.

[15] http://www.pwc.com/us/en/forensic-services/publications/2012-patent-litigation-study.jhtml

[16] See van Pottelsberghe de la Potterie and François (2009).

[17] See Deverux and Schiantarelli (1990), Schifferer and Weder (2001), Beck *et al* (2005), Veugelers (2009). Hall (2002) argues that there is clear evidence that *"small and start-up firms in the R&D-intensive industries face a higher cost of capital than their larger competitors"*.

[18] *"The other thing we should think about (E) is what's sometimes called the reverse hold-up problem (E) it could happen that the SSO or its implementer members squeeze the patent holder down to a penny for its intellectual property. (E) There*

access rates with an underlying threat of having its technology cut-off from the standard, despite its potential value to consumers, if licensees are (collectively) confident that no alternative products implementing a superior technology will likely appear in the future.

In a similar fashion, Geradin (2010) warns about the risk of abusing standard-setting process to limit patent holders' legitimate claims, either through a manipulation of the process for the selection of the standard technology or through an interpretation of FRAND inconsistent with the purposes of patent systems, ie guarantee that innovators are properly rewarded. The author emphasises the risk that low prices induced by manipulation of standard-setting process would skew the allocation of rewards in favor of vertically integrated players, who do not rely on licensing fees as the only source of income from their patented technology[19]. While a vertically integrated company can justify ex-ante R&D investment with ex-post downstream revenues and increased bargaining power vis-à-vis other patent holders thanks to cross-licensing, a pure upstream patent holder fully relies on licensing fees to make its original investment in R&D profitable. This is easy to see if a general reduction in patent pricing is brought to the extreme: if the equilibrium access price to the technology would be 0, that could still be potentially viable to vertically integrated firms, which would benefit from lower production costs downstream, but it would certainly not be viable for pure upstream innovators, who would get zero profits. Furthermore, the dependency on licensing prices is exacerbated when the source of revenues is uniquely related to the standardised technology. If the invention developed by the innovator only serves the purposes of production of the standardised product, an abuse in that market has potentially dramatic consequences for the innovator, who would not be able to rely on any other alternative source of revenue related to its invention.

Arguably, such a manipulation of the standard setting process would fall under art 101 TFEU which regulates horizontal cooperation agreements. However, it is unlikely that competition control would be able to capture those biases, given the technical complexity of standard setting process.[20] The table below reports the European Telecommunication Standard Institute (ETSI)'s classification of participants to standard setting processes. ETSI standards are key in the most significant antitrust cases (except Rambus) that have been investigated by the European Commission until today. According to current ETSI's rules, small-medium enterprises, universities, public research bodies and micro-enterprises can express only one vote each during the standard setting process. The voting power increases with the ECRT, the electronic communication related turnover in Europe. Companies with an annual turnover of €8bln or more can express a maximum of 45 votes. Or, in other words, the vote of a large telecommunication market player may count up to 45 times the one of small one. Under these circumstances it does not seem unlikely that the way in which the standard is selected and built-up is skewed towards the interests of bigger players.

are two things going on there. One is the fact that the patent holder has sunk its research expenses before that negotiation takes place. (E) And the other is the fact that for this to happen, probably you have to have the SSO implementer members in some sense negotiating jointly," Farrell (2011).

[19] See also Sidak (2009).

[20] For a discussion on monopsony power in standard setting see Lemley (2002) and Skitol (2004).

Table 1: European Standard Setting Institute (ETSI) voting rights allocation

CLASS	ECTR (millions of EURO)	NUMBER OF UNITS	CONTRIBUTIONS* (EURO)
	SMEs, user & trade associations, additional membership		6.000
	Universities, public research bodies and not-for-profit user associations		2.000
1	Micro-Enterprises	1	3.000
2	Up to 15	2	9.380
3	136 to 200	3	12.760
4	201 to 450	6	22.900
5	451 to 700	9	33.040
6	701 to 1350	13	46.560
7	1351 to 2000	18	63.460
8	2001 to 3500	24	83.740
9	3501 to 5000	30	104.020
10	5001 to 8000	37	127.680
11	above 8000	45	154.720

*Excl. VAT – Source: ETSI.

3. Fighting abuse through EU competition law

The European Commission is well placed to intervene in cases in which the distortions arising from the adoption of standards imply an objective risk of harm for consumers. Article 102 TFEU allows for direct action against 'unfair' pricing practices[21]. There are reasons however, for suggesting that the Commission should exercise caution, and the Commission has indeed been prudent.

Many have argued that ex-post antitrust intervention (or threat thereof) is a second best compared to preventing abuse by improving standard-setting rules[22]. Even the best set of rules, though, is unlikely to bring the risk of ex-post abuse to zero.

In current practice, antitrust enforcement against unfair pricing has been always anchored to infringement of FRAND commitments. Antitrust action has only been taken when FRAND commitments have not been infringed if an explicit abuse could be verified ex-ante (as in the case of patent-ambush). But anchoring intervention to FRAND commitments means that not all sources of harm are tackled, and may prove excessively cautious: if the standard introduces a distortion in competition that significantly alters the bargaining process between the parties, there could already be a legitimate justification for antitrust action.

[21] Art. 102 TFEU prohibits *"any abuse by one or more undertakings of a dominant position (E) in so far as it may affect trade between Member States (E) Such abuse may, in particular, consist in: (a) directly or indirectly imposing unfair purchase or selling prices or other unfair trading conditions"* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:12008E102:EN:HTML

[22] For example, see Neelie Kroes, Commissioner for Competition between 2004 and 2010: *A more productive type of intervention is, however, when the Commission follows the adage that "prevention is better than cure". In other words, it is a lot better if we can prevent abuses of standard setting processes from occurring in the first place rather than have individual problem cases coming onto our radar screen.* Speech at Harvard Club of Belgium, 'De Warande', Brussels, SPEECH/09/475 (available at: http://europa.eu/rapid/press-release_SPEECH-09-475_en.htm?locale=en). Art 101 TFEU guidelines (see footnote 1) are certainly an example of a good attempt in that direction.

3.1 Scepticism towards exploitative abuse enforcement

Despite the broad wording of Article 102 TFEU, generally speaking the European Commission is rightfully very careful in intervening directly against unfair pricing abuse. In more than 20 years of antitrust control, the Commission has taken only a handful of decisions related to excessive pricing abuse, most notably the General Motors, United Brands, Deutsche Post and Scandlines cases (Whish and Bailey, 2012; Hou, 2012). Unless markets are protected by insurmountable and long-lasting entry barriers, high prices are self-correcting: they signal that the market is profitable; entry should therefore be expected to eventually occur and over time erode the monopolist's market power. High prices may also be the necessary reward that, ex-post, justifies the risky investments made when the market was still in development. It is extremely difficult to establish if a price is 'unfair', and competition authorities, as compared to regulatory bodies, lack the expertise to intervene in price-setting matters. Direct price intervention is a tool likely to be subject to political pressure[23]. By intervening, competition authorities risk undermining the natural competitive process, reducing the incentive to enter a market, to innovate or invest in the development of new products, altering the allocation of economic surplus in such a way that the most efficient firms are no longer rewarded for their efforts, and subverting consumers' interests to the interests of rent-seeking politicians.

More generally, it is the very nature of competition policy rejecting the idea of direct intervention on prices. Competition policy is founded on the belief that markets are potentially able to allocate available resources in such a way that general welfare is maximised. It therefore aims at eliminating all sources of distortion which may induce market failure in order to allow the market to converge to such optimal equilibrium. It however begs no value judgment: eliminating sources of market failure, stimulating competition and maximising consumer welfare are simply devices to get to the most efficient social outcome. Direct intervention on prices therefore de-facto represents the acceptance of a failure of competition policy. It seems unsounded to argue that competition authorities would be the best placed to perform such a duty. That perhaps explains the reluctance to intervene shown by the European Commission in the past and the skepticism often flagged by high-ranked EC officials[24].

There exists, however, a grey area where there is a blurring of the boundaries between competition policy and other tools for welfare maximisation, such as regulation, which more naturally encompass direct price intervention. In situations in which regulatory means are absent or cannot be implemented in a timely way, market power is stably shielded from competitive pressure in the long run, and the observed price effect is due to a past failure of competition policy control, then competition authorities can exert direct pressure on prices (Motta and de Streel, 2007). Roller (2007) named those cases in which competition control could not be exerted when it was in effect needed as 'gap' cases[25]. The economic logic underlying the reasoning that supports ex-post intervention in gap cases responds directly to the core critique of non-interventionists. Assuming that no other source of mitigation of market power exists (ie future entry or regulation), the fundamental problem with intervention is that the strength of market power that allows unfair pricing can be the legitimate prize that rewards previous investment. Competition policy cannot take that reward away without undermining dynamic incentives to innovate. But if the abuse originates in a distortion of competition, then lowering the ex-post reward is not undermining a healthy process that fosters innovation. It is discouraging anti-competitive behaviour.

[23] See Motta (2004), Evans and Padilla (2004), O'Donoghue and Padilla (2006), Motta and de Streel (2007) Fletcher and Jardine (2007), Roller (2007), Hou (2011) and Whish and Bailey (2012).

[24] See Lowe (2003) and Paulis (2007).

[25] See also Vickers (2005) and Neven and de la Mano (2009).

The difficulty with gap cases, however, is that they require the identification of an abuse in the company's history preceding the alleged ex-post abusing behaviour. However, an alteration of competition may occur also in absence of abuse. This is particularly true in the context of standard setting, where the restriction of competition is artificially induced by a more or less representative group of industry actors. The loss of competition induced by the choice of the standard is a necessary condition to obtain its related benefits. If, thanks to this restriction of competition, a market player later on acquires the power to extract rents which would not otherwise be able to extract, the same reasoning of the gap cases should apply: an unfairly high price cannot be justified as a legitimate reward for the innovator.[26] It therefore warrants intervention. Arguably, there could still be scope for tackling such an abuse by attributing the fault of ex-post distortion to the standard setting process itself. This would be done under art. 101 TFEU which sanctions harmful association of undertakings and it would follow the conditions pinned down by the guidelines for the application of Article 101 TFEU to horizontal cooperation agreements[27]. It is difficult to see how the European competition authority would implement that in practice, though, particularly when the abuse is perpetuated ex-post and unilaterally by a well determined single entity.

Anchoring intervention to FRAND infringement when a specific ex-ante abuse cannot be identified would therefore seem a reasonable compromise to avoid the risk of harmful antitrust action. It indeed follows the same logic of gap cases: the risk of displacing incentives to innovate is minimised if something wrong in the past behaviour of the company lies behind the observed price.

However, this approach has two critical limits on (a) legal and (b) substantive grounds. In the first case, FRAND commitments have a contractual nature and would seem to be more properly enforced through private law. Competition policy enforcement cannot be conditional on contractual arrangements between players, without running the risk of losing universality and dragging authorities into market players' private disputes. In addition, even if action is brought when a specific abuse committed ex-ante is verified, such as in the case of patent ambush, there is still a legal hurdle to face. EU antitrust law (Article 102 TFEU) applies only to dominant companies. But if the abuse is committed before the adoption of the standard in order to acquire dominance after the adoption, a fortiori the player cannot be liable under Article 102 TFEU, because the player was not yet dominant at the time of the abuse.

The second limit is substantive. Not all sources of harm as described above can be tackled in this way. This applies particularly to the case of reverse hold-up, in which no FRAND infringement can occur, because licensees are not required to commit to FRAND, and no abuse is necessarily identifiable ex-ante.

3.2 Solution: disentangling antitrust action from FRAND

Article 102 guarantees a legal basis for intervention against unfair pricing. At the same time, it is not necessary to link enforcement to ex-ante abuse or FRAND infringement. It is sufficient to verify that the adoption of the standard artificially altered the normal competitive dynamics and empowered a player with significant additional bargaining power, which it would not have been able to enjoy without the adoption of the standard. That is consistent with the underlying logic of the ex-post/ex-ante comparison: it is the *change* in the balance of bargaining powers from ex-ante to ex-post which is *potentially* harmful and should lead to the antitrust authorities paying attention. That is the underlying logic of Swanson and Baumol (2004) and Mariniello (2011): by comparing ex-ante to ex-post dynamics (conditional on the information which is available ex-post), the authors suggest a

[26] Nor an unfairly low price can be justified as a competitive outcome, as I explained above, in the case of reverse hold-up.
[27] See footnote 1.

methodology to pin down the increment in bargaining power of patent holders. The 4 screening conditions suggested by Mariniello (2011) aims at skimming off cases in which an abuse could not be performed since there was no increase in bargaining power from ex-ante to ex-post[28]. Additional conditions can be conceived to identify when the bargaining power is effectively and significantly enhanced by the adoption of the standard.

Focusing on the shift of power resulting from the adoption of the standard allows the risk most feared by non-interventionists to be avoided: that the rewards arising from investment in innovation will be wiped out. In fact, if a technology is already recognised ex-ante as the only truely viable technology for the industry, the adoption of the standard might not lend any significant additional market power to patent holders. De facto, patent holders already held market power before the adoption, if their invention was already so successful. If that is the case, then no ex-post abuse can be considered to have taken place. Or, in other words, pursuing an abuse would, under those conditions, run the risk of unduly penalising an already successful technology, just because it had been formally recognised as the standard. Likewise, a licensee might not be empowered by the adoption of the standard if it objectively lacks the financial strength to credibly threaten a patent holder with litigation over a FRAND commitment during the negotiation process, thus forcing it to accept too-low access prices. In those circumstances, reverse hold-up cases should not be pursued.

It follows naturally that antitrust authorities might have a comparative advantage relative to regulatory bodies in implementing this approach. While regulators are better equipped than antitrust authorities to identify the price which maximises social welfare, antitrust authorities are better equipped to assess the impact of an actual or potential loss of competition, and therefore are better placed to reconstruct a competitive counterfactual and identify the existence of an increase in bargaining power due to the adoption of the standard. Despite lacking the deep sectoral knowledge that regulators may have, competition authorities have powerful inquiry tools and are less likely to suffer from industry capture. Inspecting the internal documentation and correspondence of companies before, during and after the adoption of the standard can give a good overview of the marginal impact of the adoption on the players' relative bargaining positions[29].

Notably, all standard setting alleged abuse cases that have up to now been pursued by the European Commission could have equally been pursued under the proposed framework, possibly with a less creative interpretation of the European Treaty. For example, the Rambus case was arguably pursued on 'gap' cases grounds: by deceptively conceive the ownership of SEPs when the standard was being adopted, Rambus acquired market dominance that later on abused to extract excessive royalties from locked-in licensees (patent ambush). However, the same case could have been pursued under the proposed approach by noting that Rambus acquired market power which was not due to the superiority of its technology; the underlying conjecture is indeed that Rambus' technology was selected as standard because the industry was not aware that Rambus owned essential patents for which it would have demanded an excessive access price. Had the industry known, another technology would have been selected. This indicates that the adoption of the standard altered the balance of bargaining powers, favouring Rambus. That is already sufficient to warrant antitrust scrutiny. There is, in other words, no need for the antitrust authority to qualify Rambus' deception as an abuse (and enter the difficult discussion as regards Rambus' liability for an abuse committed while it was not yet dominant). It is just sufficient to take the deception as an indication that Rambus' market

[28] The suggested conditions are the following: (1) ex-ante, a credible alternative to the adopted technology exists; (2) ex-ante, prospective licensees cannot reasonably anticipate the licensor's ex-post requests; (3) ex-post, the licensor requests worse licensing conditions than ex-ante; (4) ex-post, the licensee is locked into the technology.

[29] See Mariniello (2011) for an overview of the implementable inquiry methodologies.

power increased after the adoption of the standard for reasons which are not related to the quality of Rambus' technology.

Similarly, the most recent cases hinging on the use of injunction for patents encumbered by FRAND commitments (Samsung and Google cases), could be assessed against that background. The use of injunction could be deemed anticompetitive if it turns out that the adoption of the standard altered the balance of bargaining powers in favor of the player seeking injunction relief after having tried to charge a price which is above what it would have been able to charge if the adoption of the standard would not have altered the balance of bargaining powers. It would make no difference if any of the players committed to FRAND before the adoption of the standard.

4. Conclusions

This working paper has explained how standard setting may entail anti-competitive effects. In particular, it discussed insights from the economic literature and suggested that harm to consumers can occur both because of too high and too low ex-post technology access rates. Too high access rates may translate in higher end-customers' prices; too low access rates may imply lower future innovation. Furthermore this article has explained why practitioners show skepticism when regarding competition authorities' directly intervention against unfair pricing practices. Most importantly, economists fear that intervention can in fact further distort the competitive process by penalising operators that might consider monopoly rents as the reward that justifies their initial research investment. That explains why the Commission has cautiously linked intervention to the existence of FRAND commitments by patent holders. However, FRAND commitments are contractual agreements between private entities and do not provide for the necessary degree of universality required by competition authorities to tackle all sources of potential market distortion caused by the adoption of a standard.

The key factor that should trigger an antitrust inquiry is if the adoption of a standard has significantly altered the distribution of bargaining power between patent holders and prospective licensees. When such a distortion is identified, antitrust scrutiny should be warranted, regardless of the existence of FRAND commitments. An increase in bargaining power that is only due to the restriction of competition and not to the pro-competitive merits of a market operator should not be used to extract better pricing conditions without being considered a breach of competition law. Identifying the increase in market power and establishing the correct competitive counterfactual is a complex but not unfeasible task which competition authorities are capable of performing, given the powerful inquiry instruments they are endowed with.

Delinking antitrust enforcement from FRAND commitments while focusing just on the increase in bargaining power induced by the adoption of a standard would therefore avoid legal pitfalls while still responding to the skepticism of non-interventionists.

This approach has a number of other substantial advantages. First, it eliminates the dependency link between competition authorities and the rules of standard-setting organisations, which might not always minimise anti-competitive risks[30]. Moreover, any potential distortion of the incentives to participate in the standard-setting process would be eliminated, if antitrust action is no longer conditional on FRAND commitments. Most importantly, this approach would make it possible to tackle reverse hold-up abuse. While no such cases have emerged into the public domain so far (since FRAND commitments do not bind licensees), the risk of harm to consumers in the form of lower future

[30] Art 101 TFEU could in principle address that issue (see also the guidelines for the application of art 101 TFEU to horizontal cooperation agreement http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2011:011:0001:0072:EN:PDF). However, that is very difficult in practice, particularly when ex-post abuses have an unilateral nature.

innovation is very concrete. There exist a significant number of potential or actual market players that could be strongly affected by ex-post hold-up or reverse hold-up abuse. This is particularly true in the case of smaller players, which are more vulnerable to abuse (they are more sensitive to changes in revenues or costs and they find it more difficult to access the courts to preserve their legitimate claims), and which may represent a significant share of the market[31].

A symmetrical approach towards excessively high and excessively low access prices is the best way to achieve competition policy's ultimate objective: maximisation of consumer welfare, in the form of lower prices today and greater innovation tomorrow.

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[31] To give an example relative to the market for mobile phones: on the licensees' front, in the third quarter of 2012, 25 percent of the global market was supplied by small manufacturers each with less than two percent market share (see http://www.fiercewireless.com/europe/special-reports/analyzing-worlds-11-biggest-handset-makers-q3-2012.). On the licensors' front, a study by iRunway suggests that about 20 percent of patents for 4G technology are held by small and medium-sized companies or NPEs (see http://www.i-runway.com/images/pdf/iRunway%20-%20Patent%20&%20Landscape%20Analysis%20of%204G-LTE.pdf)

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