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## DEAL OR NO DEAL? LICENSING NEGOTIATIONS IN STANDARD-SETTING ORGANIZATIONS

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Technical standards benefit consumers and producers by facilitating product adoption, promoting compatible solutions, and helping to create an ecosystem of products and services in which competition can thrive.<sup>1</sup> However, standards also may create opportunities for the exercise of market power. Owners of patents with claims that are essential to a standard may “hold up” firms or consumers that are “locked-in” to a standard by charging high royalties for the use of products that comply with the standard.<sup>2</sup> This licensor (or seller) market power<sup>3</sup> arises “ex post,” i.e., after firms and consumers have made investments that are specific to the standard.<sup>4</sup>

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<sup>1</sup> I focus on technology standards necessary for interoperability. Technical standards may be determined in a formal process, such as the standard development organizations accredited by the American National Standards Institute (ANSI), or in a less formal committee structure. A “standard-setting organization” may refer to any organization that promotes a standard, regardless of accreditation. *See, e.g.,* Jonathan L. Rubin, *Patents, Antitrust, and Rivalry in Standard-Setting*, 38 RUTGERS L.J. 509, 513–14 (2007).

<sup>2</sup> *See, e.g.,* U.S. DEP’T OF JUSTICE & FED. TRADE COMM’N, ANTITRUST ENFORCEMENT AND INTELLECTUAL PROPERTY RIGHTS: PROMOTING INNOVATION AND COMPETITION 38 (2007) (“A holder of IP incorporated into a standard can exploit its position if it is costly for users of the standard to switch to a different technology after the standard is set.”) [hereinafter IP REPORT], available at <http://www.justice.gov/atr/public/hearings/ip/222655.pdf>; Joseph Farrell et al., *Standard Setting, Patents, and Hold-Up*, 74 ANTITRUST L.J. 603 (2007).

<sup>3</sup> Seller market power is sometimes called monopoly power, although monopoly power is the ability “to control prices or exclude competition.” *United States v. E. I. du Pont de Nemours & Co.*, 351 U.S. 377, 391 (1956). Concerns about holdup can arise if a rights holder possesses seller market power that falls short of monopoly power.

<sup>4</sup> Opportunistic conduct may occur when the parties to an economic transaction make investments that are specific to the relationship and contracts do not completely specify the terms of

Some standard-setting organizations (SSOs) have addressed the potential for the exercise of ex post market power by seeking to obtain commitments from participating patent owners to license their essential patents at terms that are fair, reasonable, and non-discriminatory (FRAND).<sup>5</sup> More recently, SSOs have considered “ex ante” joint negotiations by their members (potential licensees) with patent owners to more clearly establish parameters of the licensing terms for essential patents before the standard issues and firms and consumers make investments that are specific to the standard.<sup>6</sup>

Joint negotiation raises concerns that members of an SSO may engage in a different type of holdup. In particular, joint negotiation may create opportunities for potential licensees to exercise buyer market power,<sup>7</sup> and suppress royalty terms ex ante, but after rights holders have made irreversible research and development investments necessary to create and patent technologies that are essential to a standard.<sup>8</sup>

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trade. Specific investments create quasi-rents equal to the difference between the value of investments in the relationship and in their next most valuable use. If a contingency occurs that is not covered by the contract, parties can act strategically to obtain a share of these quasi-rents. For a sampling of the literature on specific investments and quasi-rents, see OLIVER E. WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM: FIRMS, MARKETS, RELATIONAL CONTRACTING* (1985); R.H. Coase, *The Nature of the Firm*, 4 *ECONOMICA* 386 (1937); Paul L. Joskow, *Vertical Integration and Long-term Contracts: The Case of Coal-Burning Electric Generating Plants*, 1 *J.L. ECON. & ORG.* 33 (1985); Benjamin Klein, Robert G. Crawford & Armen A. Alchian, *Vertical Integration, Appropriable Rents, and the Competitive Contracting Process*, 21 *J.L. & ECON.* 297 (1978); Oliver D. Hart, *Incomplete Contracts*, in 2 *THE NEW PALGRAVE: A DICTIONARY OF ECONOMICS* 752 (John Eatwell, Murray Milgate & Peter Newman eds., 1987). The ability to act opportunistically does not imply that rights holders necessarily exercise this ability.

<sup>5</sup> See, e.g., ANSI, *GUIDELINES FOR IMPLEMENTATION OF THE ANSI PATENT POLICY* (Feb. 2011) (“ANSI-accredited standards developer . . . [shall receive] an assurance that a license to such essential patent claim(s) will be made available to applicants desiring to utilize the license for the purpose of implementing the standard . . . under reasonable terms and conditions that are demonstrably free of any unfair discrimination.”). ANSI, the American National Standards Institute, establishes the consensus procedures that are the basis for about 9500 voluntary standards. See *Frequently Asked Questions*, ANSI, [http://www.ansi.org/about\\_ansi/faqs/faqs.aspx?menuid=1](http://www.ansi.org/about_ansi/faqs/faqs.aspx?menuid=1). I make no distinction between FRAND commitments and commitments to license under RAND (reasonable and non-discriminatory) terms.

<sup>6</sup> In the analysis that follows, I focus on royalty terms in licensing agreements, while acknowledging that licensing terms other than royalties (such as field-of-use restrictions, ability to sublicense, defensive suspension, etc.) are often very important to both licensors and licensees. Focusing on royalty terms simplifies the analysis, while providing useful insights into complex actual negotiations that involve additional terms and considerations.

<sup>7</sup> Buyer market power is sometimes called monopsony power, although the latter is the counterpart to monopoly power on the buyer side of the market. See Roger D. Blair & Jeffrey L. Harrison, *Antitrust Policy and Monopsony*, 76 *CORNELL L. REV.* 297, 306 (1991) (“[M]onopsony power is to the demand side of a market what monopoly power is to the supply side.”). In what follows I use the terms “buyer market power by an SSO” and “SSO monopsony power” to refer to the collective exercise of buyer market power and monopsony power by members of the SSO. Concerns about licensee holdup can arise if the SSO has buyer market power that falls short of monopsony power.

<sup>8</sup> The exercise of buyer market power by members of an SSO is a concern if, as is often the case, most members of an SSO are users rather than suppliers of technologies that are considered

The U.S. Department of Justice and Federal Trade Commission issued guidance to two SSOs regarding the disclosure of maximum royalties and the most restrictive terms under which rights holders would license their technologies.<sup>9</sup> Such disclosure may be a prelude to negotiations over actual patent royalties and licensing terms as the posting of a maximum rate could influence potential licensees to negotiate down the rate on an *ex ante* basis or not to vote for the technology in question.<sup>10</sup> The agencies have indicated that they would apply a rule of reason framework to evaluate the relative benefits and risks of joint negotiation of licensing terms.<sup>11</sup>

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for adoption. *See, e.g.*, David J. Teece & Edward F. Sherry, *Standards Setting and Antitrust*, 87 MINN. L. REV. 1913, 1928, 1931 (2003). While members of an SSO are often actual or potential competitors in markets for products that employ a technology included in a standard, such competition is not necessary for joint royalty negotiation to have anticompetitive effects. Technology users have a joint interest in securing a low royalty, and through collective action may be able to negotiate a lower royalty than any one of them could obtain through independent bilateral negotiation.

<sup>9</sup> *See* Business Review Letter from Thomas O. Barnett, Assistant Att’y Gen., to Robert A. Skitol, Drinker, Biddle & Reath, LLP (Oct. 30, 2006) [hereinafter VITA Letter], available at <http://www.justice.gov/atr/public/busreview/219380.pdf>; Business Review Letter from Thomas O. Barnett, Assistant Att’y Gen., to Michael A. Lindsay, Dorsey & Whitney LLP (Apr. 30, 2007) [hereinafter IEEE Letter], available at <http://www.justice.gov/atr/public/busreview/222978.pdf>.

<sup>10</sup> *See, e.g.*, J. Gregory Sidak, *Patent Holdup and Oligopsonistic Collusion in Standard-Setting Organizations*, 5 J. COMPETITION L. & ECON. 123, 173 (2009) (“[T]he patent holder’s unilateral declaration of its most restrictive terms’ is not really a unilateral act at all . . . [ , but a] predictable response to a new rule . . . that implies that the patent holder’s technology will be rejected for the standard in absence of such a declaration.”).

<sup>11</sup> *See* VITA Letter, *supra* note 9, at 8 (“Unless the standard-setting process is used as a sham to cloak naked price fixing or bid rigging, the Department analyzes action during the standard-setting process under the rule of reason.”); IEEE Letter, *supra* note 9, at 11; IP REPORT, *supra* note 2, at 55–56 (“Given the strong potential for procompetitive benefits, the Agencies will evaluate joint *ex ante* negotiation of licensing terms pursuant to the rule of reason.”); Chairman Deborah Platt Majoras, Fed. Trade Comm’n, Recognizing the Procompetitive Potential of Royalty Discussions in Standard Setting, Remarks at Conference on Standardization and the Law: Developing the Golden Mean for Global Trade 7 (Sept. 23, 2005) (“[J]oint *ex ante* royalty discussions that are reasonably necessary to avoid holdup do not warrant *per se* condemnation. Rather, they merit the balancing undertaken in a rule of reason review.”), available at <http://www.ftc.gov/speeches/majoras/050923stanford.pdf>; R. Hewitt Pate, Assistant Att’y Gen., Antitrust Div., U.S. Dep’t of Justice, Competition and Intellectual Property in the U.S.: Licensing Freedom and the Limits of Antitrust, EU Competition Workshop 9 (June 3, 2005) (“There is a possibility of anticompetitive effects from *ex ante* license fee negotiations, but it seems only reasonable to balance that concern against the inefficiencies of *ex post* negotiations and licensing holdup.”), available at <http://www.justice.gov/atr/public/speeches/209359.pdf>. The Agencies describe the general analytic framework for evaluation of collaborations among competitors in Fed. Trade Comm’n & U.S. Dep’t of Justice, Antitrust Guidelines for Collaborations Among Competitors (2000) [hereinafter Guidelines for Collaborations Among Competitors], available at <http://www.ftc.gov/os/2000/04/ftcdojguidelines.pdf>. For a different perspective, see Damien Geradin & Miguel Rato, *Can Standard-Setting Lead to Exploitative Abuse? A Dissonant View on Patent Hold-Up, Royalty Stacking and the Meaning of FRAND*, 3 EUR. COMPETITION L.J. 101 (2007); Damien Geradin & Anne Layne-Farrar, *The Logic and Limits of Ex Ante Competition in a Standard-Setting Environment*, COMPETITION POL’Y INT’L, Spring 2007, at 79, 97; James F. Rill & Christopher J. MacAvoy, *Ex Ante Licensing Negotiations in Standard Setting and the Rule of Reason*, ANTITRUST REP., Dec. 2010, at 67.

The tolerance for coordinated conduct by members of an SSO that may exercise buyer market power should depend on the likelihood and magnitude of ex post holdup.<sup>12</sup> If ex post holdup is unlikely, coordinated conduct to establish licensing terms ex ante has little benefit and may distort incentives for innovation by shifting the terms of patent licenses to favor technology adopters.<sup>13</sup>

If standard-related holdup is likely and substantial, joint negotiation of licensing terms by the members of an SSO before a standard issues can help fill the void left by vague FRAND commitments to limit possible opportunistic conduct. However, a less restrictive alternative is to rely on independent bilateral negotiations between potential licensees and rights holders along with a clear non-discrimination requirement (i.e., the ND prong of FRAND). Preventing undue discrimination between similarly situated licensees assures that firms will gain the benefits of licensing terms negotiated by early adopters before these early adopters and consumers make investments that are specific to a standard. This alternative policy requires SSOs or the courts to convey the meaning and requirements of non-discrimination in a technology licensing context, but it does not require a precise determination of fair and reasonable royalties.<sup>14</sup>

Historically, whether licenses that are subject to FRAND commitments are fair and reasonable has garnered more attention than whether the licenses dis-

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<sup>12</sup> Joint negotiation also may confer benefits by making it easier for members of an SSO to compare the technical merits of alternative technology choices. This is the type of conduct that members of an SSO normally undertake to evaluate alternative technology options. Unlike joint negotiation of licensing terms, joint evaluation of the technical merits of alternative technologies generally do not raise antitrust concerns.

<sup>13</sup> David Teece and Edward Sherry argue that total welfare is maximized if SSO members make technology choices based solely on performance and real resource costs. See Teece & Sherry, *supra* note 8, at 1931–34. There is controversy over whether total or consumer welfare is the appropriate standard for antitrust review. See, e.g., Joseph Farrell & Michael L. Katz, *The Economics of Welfare Standards in Antitrust*, COMPETITION POL'Y INT'L, Autumn 2006, at 3; Ken Heyer, *Welfare Standards and Merger Analysis: Why Not the Best?*, COMPETITION POL'Y INT'L, Autumn 2006, at 29. However, even under a total welfare standard, royalties and other licensing terms are relevant because they affect incentives for innovation and rent seeking. Furthermore, high royalties can create deadweight losses from underutilization of a technology that can offset performance benefits or resource savings. See, e.g., Mark R. Patterson, *Antitrust and the Costs of Standard-Setting: A Commentary on Teece and Sherry*, 87 MINN. L. REV. 1995, 1999–2003 (2003).

Note that holdup can disadvantage rights holders as well as consumers, particularly if standards invoke multiple complementary rights that lead to royalty stacking. See Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 1992 (2007); Michael A. Carrier, *Why Antitrust Should Defer to the Intellectual Property Rules of Standard-Setting Organizations: A Commentary on Teece and Sherry*, 87 MINN. L. REV. 2019, 2030–31 (2003) (“Holdup affects IP owners as well as IP users.”).

<sup>14</sup> Whether licensing terms are non-discriminatory is a separate inquiry from whether terms are fair and reasonable. In particular, license terms may discriminate among licensees, yet still be determined to be fair and reasonable.

criminate among licensees.<sup>15</sup> Despite the attention, no SSO, court, or enforcement agency has offered a workable and generally accepted definition of fair and reasonable licensing terms.<sup>16</sup> My proposal calls for a shift of emphasis from the “fair and reasonable” prong of FRAND, which is often inherently ambiguous, to the “non-discrimination” prong, which if clearly defined can provide meaningful protection against ex post holdup if bilateral negotiations between rights holders and industry members occur before firms and consumers make investments that are specific to a standard.<sup>17</sup>

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<sup>15</sup> See, e.g., Roger G. Brooks & Damien Geradin, Interpreting and Enforcing the Voluntary FRAND Commitment (July 20, 2010), available at <http://ssrn.com/abstract=1645878>. The authors found little documentary history relating to the meaning of “non-discriminatory.”

<sup>16</sup> See, e.g., Mark A. Lemley, *Intellectual Property Rights and Standard-Setting Organizations*, 90 CALIF. L. REV. 1889, 1913 (2002) (“One of the most common requirements imposed on IP owners is an obligation to license IP rights on reasonable and nondiscriminatory terms. But virtually no SSO policies specify what that phrase means, leaving courts to decide what terms are ‘reasonable.’”); Brooks & Geradin, *supra* note 15 (“[F]air and reasonable’ are on their face flexible terms the specific content of which is substantially left to the negotiation between the parties.”); Philippe Chappatte, *FRAND Commitments—The Case for Antitrust Intervention*, 5 EUR. COMPETITION J. 319 (2009); Patrick D. Curran, *Standard-Setting Organizations: Patents, Price Fixing, and Per Se Legality*, 70 U. CHI. L. REV. 983, 983 (2003); Gil Ohana, Marc Hansen & Omar Shah, *Disclosure and Negotiation of Licensing Terms Prior to Adoption of Industry Standards: Preventing Another Patent Ambush?*, 24 EUR. COMPETITION L. REV. 644, 648 (2003).

Cases that have addressed FRAND licensing commitments include *Broadcom Corp. v. Qualcomm Inc.*, No. 05-3350 (MLC), 2006 U.S. Dist. LEXIS 62090 (D.N.J. Aug. 31, 2006); *Nokia Corp. v. Qualcomm, Inc.*, No. 06-509-JJF, 2006 U.S. Dist. LEXIS 61383 (D. Del. Aug. 16, 2006); *Agere Sys. Guardian Corp. v. Proxim, Inc.*, 190 F. Supp. 2d 726 (D. Del. 2002); *Townshend v. Rockwell Int’l Corp.*, 55 U.S.P.Q. 2d (BNA) 1011, 1018 (N.D. Cal. 2000); *ESS Technology, Inc. v. PCTel, Inc.*, No. C-99-20292, 1999 U.S. Dist. LEXIS 23227 (N.D. Cal. Nov. 4, 1999). None of these cases resolved the contours of FRAND licensing commitments. The Third Circuit in *Broadcom Corp. v. Qualcomm Inc.*, 501 F.3d 297, 314 (3d Cir. 2007), held that “a patent holder’s . . . false promise to license . . . technology on fair, reasonable, and non-discriminatory . . . terms . . . coupled with [a standards-setting organization’s] . . . reliance on that promise when including the technology in the standard,” is conduct actionable under the Sherman Act, but did not offer a workable definition of FRAND licensing terms. The Federal Trade Commission addressed royalties in its case against Rambus, Inc., but only in the context of remedies. See Final Order, *Rambus, Inc.*, FTC Docket No. 9302 (Feb. 2, 2007), available at <http://www.ftc.gov/os/adjpro/d9302/070205finalorder.pdf>; Opinion of the Commission on Remedy, *Rambus, Inc.*, FTC Docket No. 9302, (Feb. 2, 2007), available at <http://www.ftc.gov/os/adjpro/d9302/070205opinion.pdf>.

<sup>17</sup> I do not consider an exhaustive list of policies that SSOs may pursue to manage technology choice and the exercise of patent rights. Such policies may include mandatory patent pools, royalty-free licensing, limits on patent assertion, and ex post regulation of licensing terms. For a selection of alternative approaches, all of which have serious implementation issues, see, e.g., Rudi Bekkers & Joel West, *The Limits to IPR Standardization Policies as Evidenced by Strategic Patenting in UMTS*, 33 TELECOMM. POL’Y 80 (2009); Robert P. Merges & Jeffrey M. Kuhn, *An Estoppel Doctrine for Patented Standards*, 97 CALIF. L. REV. 1 (2009). For an analysis of the merits of ex ante contracting and FRAND royalty terms, see Luke M. Froeb, Bernhard Ganglmair & Gregory J. Werden, *Patent Hold Up and Antitrust: How a Well-Intentioned Rule Could Retard Innovation* (Vanderbilt Law & Economics Research Paper No. 11-3, 2010), available at <http://ssrn.com/abstract=1735587>.

### I. BARGAINING OVER ROYALTY TERMS

Bilateral negotiations over licensing terms that occur before a standard issues protect those who make binding agreements with rights holders. But those who do not negotiate ex ante, including technology adopters that enter the industry after a standard has issued, may be exposed to ex post opportunistic conduct. The non-discrimination prong of a FRAND commitment can provide an umbrella of protection for technology users that negotiate licenses after firms and consumers have made investments that are specific to a standard.<sup>18</sup>

Is bilateral bargaining between a rights holder and licensees, along with a clear non-discrimination commitment, a superior alternative to ex ante joint negotiation or to bilateral bargaining with a weak or non-existent non-discrimination requirement? A comparison of the performance of different licensing regimes requires an understanding of how members of an SSO and rights holders may exercise market power. The standard textbook models of monopsony and monopoly are not applicable to licensing negotiations. In the standard monopsony model, a single buyer faces an upward-sloping supply curve for an input and reduces demand in order to obtain a lower price.<sup>19</sup> However, there is no supply curve for a single patented technology. In addition, in the standard model the competitive price is the marginal cost of production. In contrast, the marginal cost of licensing a technology, which is generally very low, does not establish the competitive royalty. The competitive royalty is the outcome of bilateral negotiations, and is related to the value created by the technology relative to its next-best alternative. Joint negotiation can suppress royalties below the competitive level by changing the bargaining that occurs between the patentee and potential licensees, in particular by changing the payoffs if the parties fail to negotiate a license. Similarly, the standard textbook model of monopoly does not inform the potential exercise of seller market power by rights holders because rights holders must negotiate with members of SSOs who may possess collective buyer market power.

I employ the cooperative Nash bargaining solution to compare different licensing regimes.<sup>20</sup> Bargaining over licensing terms involves many compli-

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<sup>18</sup> See also Anne Layne-Farrar, *Considering Whether Ex Ante Joint Negotiations Within Standard Setting Are "Reasonably Necessary,"* GLOBAL COMPETITION POL'Y, Spring 2008, Vol. 5, No. 1; Anne Layne-Farrar, Gerard Llobet & A. Jorge Padilla, *Preventing Patent Hold Up: An Economic Assessment of Ex Ante Licensing Negotiations in Standard Setting*, 37 AIPLA Q.J. 445 (2009) (Once pivotal players obtain reasonable rates, the "non-discriminatory" component of a RAND licensing commitment ensures that other pivotal players receive reasonable rates as well.).

<sup>19</sup> See generally Blair & Harrison, *supra* note 7.

<sup>20</sup> See John Nash, *Two-Person Cooperative Games*, 21 ECONOMETRICA 128 (1953); Ken Binmore, Ariel Rubinstein & Asher Wolinsky, *The Nash Bargaining Solution in Economic Modelling*, 17 RAND J. ECON. 176 (1986). The Nash solution follows from certain axioms that

cating factors, such as uncertain outcomes, asymmetric information about the values of technologies and the contributions of licensees to a technology's value, the credibility of disagreements, differential bargaining power and skill, and the individual circumstances of licensors and licensees. Although it is unlikely that the Nash bargaining model can capture the effects of these factors with a high degree of accuracy, the model is useful to compare the directional influences of different licensing regimes on licensing outcomes. In addition, licensing negotiations have many terms that are significant to the licensor and the licensee, such as field-of-use restrictions, grantback requirements, and the exchange of other intellectual property and know-how. While these other terms can be at least as important as the license royalty, I focus on the royalty because it allows a more straightforward comparison of the consequences of different licensing arrangements.

The Nash bargaining model applies to bargaining between two agents, although with some interpretation it can provide insights into multiparty negotiations. The model has two key components.<sup>21</sup> The first is the pair of outcomes that the agents would obtain in the event of a breakdown of the bargaining process, sometimes called the agents' "disagreement payoffs" or "threat points." The second component is the pair of outcomes that the agents can obtain if they bargain efficiently, sometimes called their "bargaining payoffs." The outcome of Nash bargaining maximizes the product of the difference between each agent's bargaining payoff and her disagreement payoff.<sup>22</sup>

For example, suppose that a single licensee and a single patentee negotiate for a license to a technology that has a value of \$100. The license provides for a royalty,  $R$ . I assume the royalty has no effect on the demand for the technology, which would be the case if it were paid as a lump sum. If the parties agree to a license, the patentee gets a payoff of  $R$  and the licensee gets a payoff of  $\$100 - R$ . Suppose that neither party can earn a payoff if they fail to reach an agreement (i.e., their disagreement payoffs are zero). The Nash bargaining outcome is the royalty that maximizes the product of their bargaining payoffs,  $(\$100 - R)R$ , which is  $R = \$50$ . If the licensee has a disagreement payoff of \$50 and the patentee has a disagreement payoff of \$30, the Nash

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describe reasonable outcomes of bargaining games and corresponds to a more descriptive model of bargaining under some assumptions. Under some conditions, the Nash solution is the outcome of a game in which one party makes an offer and the other party either accepts the offer or makes a counteroffer. If the parties discount the future at the same rate, the solution to this game converges to the Nash solution in the limit as the discount rate goes to zero.

<sup>21</sup> See, e.g., Binmore et al., *supra* note 20, at 176–79.

<sup>22</sup> Formally, suppose  $j$  represents agent 1 or agent 2. If  $s_j^d$  is agent  $j$ 's disagreement payoff and  $s_j$  is the agent's payoff with bargaining, the outcome of the Nash bargaining model maximizes the "Nash product"  $(s_1 - s_1^d) * (s_2 - s_2^d)$ . *Id.* at 178. Under some conditions this is equivalent to an outcome in which each agent receives her disagreement payoff plus one-half of the gain from bargaining.



solution is the royalty that maximizes  $(\$100 - R - \$50)(R - \$30)$ , which is  $R = \$40$ . Note that each party's bargaining payoff in the Nash solution is at least as much as its disagreement payoff.

I apply the Nash bargaining model to explore the outcomes corresponding to: (i) bilateral bargaining; (ii) ex ante joint negotiation; and (iii) bilateral bargaining with a non-discrimination constraint. Throughout, I explore a stylized example to highlight the differences in the three regimes. In the example, there is a single patented technology used to produce a downstream product by two potential licensees, firms A and B. When both A and B license the technology, they each sell one unit of the downstream product for a net profit of \$100. There is also an alternative, unpatented technology that can be used to produce the downstream product. When both A and B use the alternative technology, they each sell one unit of the downstream product for a net profit of \$60. The patentee has no alternative use for her patent. Her "disagreement payoff" is zero. If the patented technology is adopted after the standard issues and the adopting firm and consumers make investments that are specific to the standard, the cost of switching to the alternative technology is prohibitively expensive. As a result, the ex post value of the alternative technology is zero.

In this example, the total value of the patented technology is \$200 (\$100 for each firm). The total value of the alternative technology is \$120 (\$60 for each firm). The social value of the patented technology is its incremental value relative to the next-best alternative, measured before firms and consumers make investments that are specific to the standard. In this example, the total social value of the patented technology is \$80.

#### A. BILATERAL BARGAINING

Bilateral bargaining between a patentee and a potential licensee can occur ex ante, before a standard issues, or ex post, after the standard issues and firms and consumers make investments that are specific to the standard. Suppose firm A negotiates with the patentee ex ante under the assumption that firm B takes a license. Firm A has a disagreement payoff of \$60, which is the value of the alternative and unpatented technology. Nash bargaining between the patentee and firm A would result in a royalty that maximizes  $(\$100 - R - \$60)R$ . This royalty is \$20. If firm B independently negotiates a license ex ante, it would have the same payoffs and would negotiate the same \$20 royalty. The total royalty collected by the patentee from firms A and B with independent bilateral ex ante negotiation is \$40.

Suppose instead that firm B negotiates for a license ex post, after the standard issues, and decisions by firm B and others make switching to the alternative technology prohibitively expensive. Firm B has a disagreement payoff of zero ex post. Nash bargaining between the patentee and firm B would result in

a royalty that maximizes  $(\$100 - R)R$ . This royalty is \$50. The difference between the \$50 royalty ex post for firm B and the \$20 royalty ex ante for firm A is the result of lock-in to the adopted technology. Lock-in eliminates the non-patented technology as a credible alternative that would otherwise allow firm B to negotiate for a lower royalty.

When the patentee negotiates independently with each firm, and the outcome of the negotiation with one firm has no effect on the outcome of the negotiation with the other firm, the patentee can collect a total royalty of \$40 if she bargains with firms A and B ex ante (\$20 from each licensee), \$100 if she bargains with both firms ex post after the standard issues (\$50 from each), and \$70 if she bargains with one of the firms ex ante and with the other firm ex post (\$20 from the ex ante negotiation and \$50 from the ex post negotiation). The patentee may do better, however, if she can condition the outcome of one negotiation on the outcome of another negotiation. An example of a conditional negotiation is a threat to license either firm A or firm B on an exclusive basis.

Suppose that firms A and B are perfect substitutes from the perspective of obtaining value from the patentee's technology or the alternative technology. In that case, either firm A or firm B could sell two units of the downstream product with a net profit of \$100 per unit for the patented technology and \$60 per unit for the unpatented technology. An implicit assumption is that firm B (or firm A) cannot earn a profit using the alternative technology if firm A (or firm B) has an exclusive license for the patented technology, otherwise competition from one firm using the alternative technology would constrain bargaining with the other firm for the patented technology. Under these assumptions, an exclusive license to either firm A or B has the same values for the patented and alternative technologies as the total values of the technologies when the patentee negotiates independently with both firms. As a sole licensee each firm would be twice as large as it would be if both firms took a license.

I apply an extension of Nash bargaining to describe the possible effects of a threat to license the patented technology exclusively.<sup>23</sup> Assume negotiations occur ex ante. If firm A refuses a license, the patentee can choose to negotiate exclusively with firm B. The negotiation of an exclusive license with firm B would maximize the Nash product  $(\$200 - R - \$120)R$ . The corresponding

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<sup>23</sup> Threats to license exclusively either firm A or B technically are outside the description of the Nash bargaining model, which is limited to bargaining between two parties. However, with some assumptions, Nash bargaining approximates a dynamic bargaining game with alternating offers that captures the threat of an exclusive license. See, e.g., Henrik Horn & Asher Wolinsky, *Worker Substitutability and Patterns of Unionisation*, 98 *ECON. J.*, 484, 487–88 (1988) (applying Nash bargaining to exclusive bargaining with trade unions); Alp E. Atakan, *Bargaining: Separately or Together?*, 11 *REV. ECON. DESIGN* 295, 297 (2008).

royalty from this negotiation is \$40. This \$40 royalty establishes the patentee's disagreement point for negotiations with firm A. The patentee can earn this \$40 royalty from firm B if firm A refuses a license. Firm A, knowing that the patentee would not accept less than \$40 if it declines the offer of a license, might as well accept a royalty of \$40. Firm B can make the same calculation. If firm B refuses the patentee's offer, the patentee can earn \$40 from an exclusive license with firm A. Therefore, firm B would accept a license offer of \$40 from the patentee as well.<sup>24</sup>

In this example, the patentee can obtain \$40 from each firm by threatening to license the other firm exclusively. Although the patentee threatens to license exclusively, in equilibrium the patentee licenses both firms, collecting \$40 from each.<sup>25</sup> The threat merely allows the patentee to extract higher royalties. Ex ante negotiation with the threat of an exclusive license allows the patentee to collect a total of \$80. This equals the social value of the patented technology (the difference between the \$200 value of the patented technology and the \$120 value of the alternative) and is twice the amount that the patentee would collect if she negotiated independently with each firm without a threat of exclusive licensing.

A credible threat to license exclusively can allow the patentee to collect more than the social value of her technology if she negotiates with both firms ex post, after firms and consumers make investments that are specific to the standard. Ex post, the alternative technology is not a feasible option for either firm. Ex post as well as ex ante, a single licensee is sufficient to achieve the full value of the technology because the firms are perfect substitutes for each other. With an exclusive license, the negotiated royalty maximizes the Nash product  $(\$200 - R)R$ , which corresponds to a royalty of \$100. If the patentee can threaten to license the technology exclusively to firm A or B, the patentee would not accept less than \$100 from either firm. Each firm would accept a royalty offer of \$100, knowing that the patentee would not accept less than that amount, yielding a total royalty of \$200 to the patentee. When firms A

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<sup>24</sup> Another way to understand this result is to recognize that if the patentee licenses one of the firms, the other firm contributes no incremental value and, therefore, would earn no return greater than its disagreement payoff in Nash bargaining. Suppose the patentee and firm A agree to a license with a royalty  $R$ . A second license with firm B contributes no incremental value conditional on the license to firm A. Therefore, firm B should not obtain any private return for a license, which corresponds to a royalty of \$40. However, if the patentee has a license with firm B, then firm A offers no incremental value and the patentee should be able to renegotiate the license with firm A with a royalty of \$40. The patentee can extract a royalty of \$40 from both firms by putting each firm in the position of adding no incremental value through the threat of an exclusive license. Furthermore, note that paying a royalty of \$40 is (weakly) superior for each firm to the alternative of refusing a license.

<sup>25</sup> More generally, the patentee would license both firms if that maximizes the total value of the technology. See B. Douglas Bernheim & Michael D. Whinston, *Exclusive Dealing*, 106 J. POL. ECON. 64, 71 (1998).

and B are perfect substitutes from the perspective of the patentee and the patentee can threaten to license one of the firms exclusively, in ex post negotiations the patentee can obtain the total value of the licensed technology, which is \$200. This exceeds the total incremental social value of \$80 that the patented technology provides relative to the alternative. Indeed, in this example, licensees that negotiate ex post would be better off if the standard had specified the alternative technology.

A FRAND commitment would constrain a patentee from entering into an exclusive license. Nonetheless, a vague FRAND commitment could allow a patentee to threaten to license a competitor at a lower royalty or with less restrictive licensing terms. While not amounting to an exclusive license, the threat of a lower cost or less restrictive license to a competitor could significantly tilt licensing negotiations in favor of the patentee. A potential licensee arguably would be willing to pay more for a license in order to avoid an outcome that favors a competitor. Thus, while the threat of an exclusive license is extreme when a patentee is bound by a FRAND commitment, the ability of a patentee to threaten to offer asymmetric licensing terms to competitors would have qualitatively similar consequences in enhancing the bargaining power of a patentee and may be feasible even in an environment in which the patentee commits to offer licenses to all firms.

I next turn to likely bargaining outcomes with ex ante joint negotiation by members of an SSO. I compare these outcomes to the likely outcomes of bilateral bargaining with a clear non-discrimination requirement.

#### B. EX ANTE JOINT NEGOTIATION

Continuing with the previous example, suppose the two firms negotiate jointly with the patentee ex ante before firms and consumers make investments that are specific to the standard. I assume that ex ante joint negotiation takes the form of a single entity that negotiates with the patentee and internalizes the total value of the license. If the total royalty is  $R$ , the total value of the license is  $\$200 - R$  and the value of the alternative technology is \$120. With Nash bargaining, the royalty  $R$  maximizes  $(\$200 - R - \$120)R$ . The result is  $R = \$40$ . This is equivalent to a royalty of \$20 that is charged to each of the two licensees. In this example the social value of the technology is \$40 for each firm (\$80 in total), but the jointly negotiated royalty is \$20 per firm (\$40 in total). Ex ante joint negotiations allow technology adopters to share the social value of the technology. While this value sharing may have desirable implications for downstream product consumption and investment incentives, it also may have negative consequences by reducing incentives for invention.

The royalty of \$20 per firm with ex ante joint negotiation is the same as the royalty outcome per firm with independent ex ante bilateral negotiation. This

result holds because the two firms are identical and the simple bargaining model ignores other factors that may affect the royalty outcomes. I explore some of these complicating factors below, beginning with issues that relate to the governance of the SSO. In general, I conclude that ex ante joint negotiations are likely to result in royalties per firm that are lower than the royalties that most, if not all, licensees would pay with bilateral bargaining.

SSO members would have the ability to negotiate low royalties in ex ante bilateral negotiations if SSO governance rules require unanimity to include a technology in a standard, which would make each member pivotal to the technology adoption decision. If a member is pivotal, the adoption of the technology will succeed or fail based on its vote, which, assuming SSO members are symmetric, gives the member the power to negotiate as if it were negotiating on behalf of the entire SSO.<sup>26</sup> If, however, no member of the SSO is pivotal, then bilateral negotiations can result in much higher royalties compared to ex ante joint negotiation if there is no clear alternative to the patented technology or if selection of a better alternative would incur delays that joint negotiation would avoid. Moreover, bilateral negotiation does not prevent a patentee from securing higher royalties from firms that license the technology ex post, after firms and consumers make investments that are specific to the standard.

Most SSOs do not require unanimity, but instead require “consensus” or a super-majority for adoption of a technology in a standard.<sup>27</sup> In practice, rights

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<sup>26</sup> Under a unanimity requirement, each member of the SSO is pivotal to the adoption decision. Pivotal adopters can negotiate low royalties ex ante and avoid holdup ex post. *See, e.g.*, Layne-Farrar, Llobet & Padilla, *supra* note 18; *see also* Ilya R. Segal & Michael D. Whinston, *Naked Exclusion: Comment*, 90 AM. ECON. REV. 296 (2000) (discussing pivotal buyers in the context of exclusive dealing arrangements).

<sup>27</sup> ANSI policy states that “Voluntary consensus standards serve as the cornerstone of the U.S. standardization system. These documents arise from an open process that depends upon data gathering, a vigorous discussion of all viewpoints, and agreement among a diverse range of stakeholders.” ANSI, OVERVIEW OF THE U.S. STANDARDIZATION SYSTEM 2 (2d ed., July 2007), available at <http://publicaa.ansi.org/sites/apdl/Documents/News%20and%20Publications/Other%20Documents/US-Stdzn-System-FINAL.pdf>. The IEEE Standards Manual states that “The balloting group shall provide for the development of consensus by all interests significantly affected by the scope of the standard. This is achieved through a balance of such interests in the balloting group membership.” IEEE-SA STANDARDS BOARD, IEEE-SA STANDARDS BOARD OPERATIONS MANUAL § 5.4.1 (2011), available at <http://standards.ieee.org/guides/opman/sect5.html>. The JEDEC Manual of Organization and Procedure states that: “Unless specifically authorized by the Board [of Directors], all approval vote counts within JEDEC shall be a minimum of 2/3 of votes cast. All Board approval vote counts shall be a minimum of 3/4 of votes cast.” JEDEC, JEDEC MANUAL OF ORGANIZATION AND PROCEDURE § 5 (rev. of JM21M, May 2008), available at <http://www.jedec.org/sites/default/files/JM21P%5B1%5D.pdf>. The IEEE requires that at least 75 percent of a working group must vote on a proposed standard and 75 percent of the votes must be in the affirmative to adopt the standard. IEEE-SA STANDARDS BOARD, IEEE-SA STANDARDS BOARD OPERATIONS MANUAL § 5.4.3.1 (2011), available at <http://standards.ieee.org/guides/opman/sect5.html>. VITA has a similar policy. VITA STANDARDS ORGANIZATION, VSO POLICIES AND PROCEDURES § 7.2.1.1 (rev. 2.6, Nov. 2005), available at <http://www.vita.com/home/VSO/vso-pp-r2d6.pdf>.

holders do not know whether a particular member of an SSO is or is not pivotal to the technology adoption decision. The lack of a pivotal decision maker can give a rights owner greater ability to demand a high royalty. Nonetheless, the rights holder still must be concerned that members will vote against its technology and will hedge this risk by offering licensing terms that are favorable to licensees.

In many standardization decisions, some SSO members will have considerable influence over technology adoption decisions and may be able to negotiate lower royalties in bilateral negotiations than can other members. As a result, ex ante joint bargaining need not result in lower royalties than every member of an SSO could negotiate independently ex ante. Bilateral negotiation could allow some members of an SSO to secure low royalties or influence the adoption of their preferred technologies if they bargain with patentees ex ante. However, other firms would not have similar protections, particularly if they bargain ex post.

There are additional reasons why ex ante joint negotiation likely would result in lower royalties for most licensees. A patentee could not reasonably threaten to enter into asymmetric licensing terms with members of an SSO if the members bargain jointly, have symmetric objectives, and their negotiators represent their collective interests. In contrast, with bilateral bargaining, a patentee could threaten to license competing firms under asymmetric terms, which would give the patentee the ability to negotiate higher royalties or other licensing terms that are more favorable to the patentee.

A further reason supports a conclusion that ex ante joint negotiation likely would result in lower royalties compared to ex ante bilateral bargaining even if the patentee did not threaten to license on asymmetric terms in the bilateral bargaining regime. The simple bargaining model ignores the coordination costs of adopting an alternative to the patented technology. Technology values are uncertain, and parties may have different information about the potential values of the licensed technologies and its alternatives. Absent coordination achieved through joint negotiation, each potential licensee may be uncertain about whether the SSO members would choose an acceptable alternative technology and, if so, how long it would take to agree on an alternative. This uncertainty and the expected cost of delay would greatly lower the value to each firm of the next-best alternative to the patented technology in a scenario with bilateral bargaining and allow the patentee to negotiate higher royalties.<sup>28</sup>

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<sup>28</sup> A barrier to switching to an alternative technology is the difficulty of aligning expectations. See, e.g., Joseph Farrell & Garth Saloner, *Coordination Through Committees and Markets*, 19 RAND J. ECON. 235 (1988). Switching also may be difficult if alternatives are risky, if there is high demand for backward compatibility, or if switching would incur a loss of experience economies.

To illustrate, uncertainty and delay could lower the value of the alternative technology to each firm from \$60 to perhaps \$30. If firm A or B bargains independently with the rights holder ex ante under the belief that the alternative is worth only \$30, the negotiated royalty would maximize  $(\$100 - R - \$30)R$ . The uncertainty and delay would increase the royalty negotiated independently ex ante from \$20 to \$35. With greater uncertainty or delay, the potential licensee may discount the value of the alternative technology to zero. In that case, independent bilateral negotiation would result in a per-firm royalty of \$50, even if the negotiation occurred ex ante.<sup>29</sup>

Ex ante joint negotiation lowers the negotiated royalty by facilitating coordination and reducing the delay in adopting an alternative technology. Enhanced coordination and shortened delay are apparent efficiencies from joint negotiation. To the extent that alternatives are actually implemented in a standard, it is socially desirable to identify the best alternatives and to avoid unnecessary delays in developing the standard. However, the key attribute of the alternative technology is its value in negotiating a lower royalty for the members of the SSO.<sup>30</sup> If this royalty is too low, it can have negative consequences for economic efficiency by lowering incentives for innovation. In this example, enhanced coordination from joint negotiation results in a total royalty of \$40 (\$20 per firm), which is only one-half of the social value of the technology.

The costs of coordination and delay and the ability to threaten asymmetric licensing terms in a bilateral bargaining regime suggest that, on average, licensing costs with bilateral bargaining would be higher than the costs with joint negotiation even if bilateral bargaining occurs ex ante. Relative to ex ante joint negotiation, licensing costs almost certainly would be higher with bilateral bargaining if firms negotiate licenses ex post after investments that are specific to a standard make switching to an alternative technology unfeasible or very costly.

### C. BILATERAL BARGAINING WITH NON-DISCRIMINATION

A clear non-discrimination provision allows a potential licensee to benefit from agreements made by firms ex ante, before they are locked in to a standard, even if the potential licensee negotiates ex post. The provision also prevents a rights holder from threatening to withhold a license from a potential

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<sup>29</sup> Uncertainty and delay also would be costly to the patentee. That would not tilt the bargaining outcome to favor the licensee if the patent's disagreement payoff is zero, as assumed in the example, or more generally if the patentee's disagreement payoff is small compared to the disagreement payoff of the licensee absent uncertainty and delay.

<sup>30</sup> With bilateral bargaining, SSO members may accept a high royalty in order to avoid delay in choosing an alternative technology. In that case the apparent efficiencies from joint negotiation are never achieved.

licensee or to offer a license to a competitor with a lower royalty or less restrictive terms. Bilateral bargaining with a clear non-discrimination commitment results in a lower royalty relative to bilateral bargaining with a vague or non-existent non-discrimination requirement because the rights holder cannot improve its bargaining position by threatening to offer a better license to a competitor.

An extension of the Nash bargaining model allows a prediction of the royalty negotiated with bilateral bargaining and a non-discrimination constraint. Suppose the patentee bargains with firm A ex ante and must commit to charge the same royalty to firm B, whether bargaining with firm B occurs ex ante or ex post. Nash bargaining ex ante would establish a royalty,  $R$ , that maximizes  $(\$100 - R - \$60)2R$ . The factor of two appears in the Nash product because whatever royalty emerges from the negotiation with firm A also must apply to firm B (and, by the symmetry assumption, would be agreeable to firm B). If the patentee negotiates a royalty of  $R$  with firm A, its total royalty payment is  $2R$ . The royalty resulting from Nash bargaining with firm A is  $R = \$20$ , and this applies to both firms. This is the same royalty that results from ex ante joint negotiation by the members of the SSO.

The non-discrimination provision protects against holdup by extending the bargaining power of a firm that negotiates with the patentee ex ante to another firm that may bargain with the patentee ex post. By committing to license both firms at the same royalty, the non-discrimination constraint narrows the scope for strategic licensing conduct by the rights holder and assures that the rights holder cannot demand higher royalties from potential licensees that negotiate after firms and consumers have made investments that are specific to the standard.

The non-discrimination constraint implies that both firms A and B pay a royalty of \$20 if firm A negotiates ex ante. Without the non-discrimination requirement, firm B would pay \$50 if it negotiates ex post. Indeed, if there were other competitors that the rights holder could threaten to license at terms that are more favorable to these competitors, firm B might pay more than \$50 in order to avoid such a threat. Such a threat is not credible if the patentee is bound by a clear non-discrimination commitment.

In this example, bilateral bargaining with a non-discrimination commitment is no different from ex ante joint negotiation if there is at least one potential licensee that bargains with the rights holder before the standard issues. This establishes the royalty of \$20, which is then available to all subsequent licensees. Moreover, the example assumes that potential licensees are similar, which implies that there are no complications from aggregating diverse preferences in the case of ex ante joint negotiation or from applying the non-



discrimination requirement to licensees with different demands for the patented technology.

In a more realistic setting, potential licensees would differ in their valuations of the patented technology and its alternatives. It is plausible that a patentee that is subject to a clear non-discrimination requirement would target potential licensees that have a relatively high willingness to pay for the patented technology. This would establish a higher royalty base for future negotiations that are bound by the non-discrimination constraint. The patentee could not establish any royalty by targeting a particularly generous licensee. Assuming bilateral negotiations occur *ex ante*, the patentee would be required to choose a royalty that is acceptable to enough licensees to make them vote to adopt the patented technology. In the example, provided that SSO members are aware of royalty terms before the standard issues, this royalty can be no more than \$40 for those firms that value the patented technology at \$100 and an alternative at \$60.

Acting alone, SSO members will have some market power in negotiations with rights holders, and the non-discrimination requirement will assure that weaker members of the SSO and potential licensees that do not participate in the SSO will benefit from the power of stronger members. It is unlikely, however, that individual members of the SSO would have the same degree of market power that they would have if they bargained jointly. In particular, with *ex ante* joint negotiation, the costs of coordinating the decision to adopt an alternative technology would be lower and the delays associated with such decisions would be shorter than they would be if members of an SSO bargained bilaterally with or without a clear non-discrimination requirement. As in the case of bilateral bargaining with a vague or non-existent non-discrimination requirement, *ex ante* joint negotiation would result in lower royalties to the extent that it facilitates coordination to adopt an alternative technology.

The combination of bilateral negotiations and a non-discrimination commitment is a less-restrictive alternative to *ex ante* joint negotiations by the members of an SSO. Bilateral bargaining with non-discrimination provides protection against *ex post* opportunistic pricing if some licensees bargain with rights holders before a standard is defined and narrows the scope for strategic conduct by the rights holder that can result in higher royalties. The royalties negotiated with bilateral bargaining and a clear non-discrimination constraint are not likely to fall to levels that would result if all members of an SSO bargained jointly with rights holders before the standard issues. This result, however, can be economically efficient if *ex ante* joint negotiation results in royalties that discourage investment in innovation because they are far below the social values of the innovations.

#### D. ALTERNATIVE BARGAINING MODELS

These comparisons of alternative licensing regimes assume that negotiations follow the predictions of the Nash bargaining model or extensions of the Nash model to allow for multiple licensees. As noted, bargaining is a complicated activity and it is unrealistic to expect that real-world outcomes would correspond closely to the Nash solution. For this reason it is instructive to see if the comparisons survive under different bargaining assumptions.

Consider a regime in which the patentee has considerable power to set royalties when there is competition for a license. In particular, suppose that firms A and B bid for an exclusive right to a license. Furthermore, assume that the firms are perfect substitutes from the perspective of the patentee. Then, if the firms bid *ex ante* for an exclusive license, each would be willing to pay up to \$80 (its incremental value *ex ante* relative to the next-best alternative). The exclusive license would be “sold” at a royalty of \$80, which is equal to its social value. Similarly, if both firms bid *ex post* after making irreversible investments in the standard, the patentee would award an exclusive license with a royalty of \$200. These outcomes mirror the predictions of the Nash model when the rights holder can threaten to sign exclusive licenses. A difference is that in the Nash bargaining model, the patentee collects \$40 from each of the two firms *ex ante* and \$100 *ex post*, rather than signing an exclusive license for \$80 *ex ante* or \$200 *ex post*. The total royalties are the same in the two bargaining scenarios, but the market structures differ because the patentee licenses both firms under Nash bargaining.

If the patentee cannot discriminate between potential licensees, an alternative scenario is that the patentee can post a per-firm royalty and continue to increase the royalty until firms drop out of the bidding. The maximum per-firm royalty that the firms would accept is \$40 if the firms bid *ex ante* and \$100 if the firms bid *ex post*. The total royalty collected by the patentee would be \$80 if the firms bid *ex ante* and \$200 if the firms bid *ex post*. With two or more potential licensees, this scenario results in the same total royalty outcomes as in the bidding scenario. The patentee collects the total value of the technology, conditional on whether bidding is *ex ante* or *ex post*.

Neither the bidding nor the royalty-posting scenarios have a unique royalty outcome if there is a single licensee, as in the case of *ex ante* joint negotiation. In that case, equilibrium royalties could range from zero, if the potential licensee (or negotiator on behalf of members of an SSO) can commit to a take-it-or-leave-it offer, up to a royalty of \$80, if the patentee can commit to a take-it-or-leave-it offer and the negotiation takes place before firms and consumers make investments that are specific to the standard.

In the Nash bargaining model, the royalties collected in bilateral bargaining with a clear non-discrimination constraint are generally between the levels

corresponding to bilateral bargaining with a vague or non-existent non-discrimination requirement and the levels corresponding to ex ante joint negotiation. The total royalties collected from firms A and B in the bilateral Nash bargaining model are \$80 ex ante and \$200 ex post when the patentee can threaten to license exclusively. With a non-discrimination requirement, the total royalty is \$40 if at least one firm bargains ex ante and \$100 if both firms bargain ex post. The total royalty with ex ante joint negotiation is \$40. Issues of coordination and delay in the adoption of an alternative technology likely would increase the royalties that the patentee could collect in bilateral Nash bargaining by reducing the expected value of the alternative technology in those scenarios for which the alternative technology is a feasible choice.

## II. LIMITS TO BILATERAL ROYALTY NEGOTIATIONS WITH A NON-DISCRIMINATION COMMITMENT

A number of conditions have to be satisfied to make bilateral bargaining with non-discrimination an alternative to ex ante negotiation that protects firms and consumers from ex post opportunistic conduct by rights holders. These conditions include a workable definition of non-discrimination and disclosure of intellectual property rights with claims that are essential to a standard before firms and consumers make investments that are specific to the standard. In this section I also discuss other factors that affect the ability of bilateral negotiations with non-discrimination to achieve a balance between ex post opportunism and the exercise of market power in ex ante negotiations between members of SSOs and rights holders.

### A. NON-DISCRIMINATION: UNIFORM TREATMENT FOR SIMILARLY SITUATED LICENSEES

The power of the non-discrimination commitment depends on a workable definition of non-discrimination that does not sacrifice economic efficiency. It is artificial and counterproductive to impose a definition of non-discrimination that requires identical licensing terms for every licensee. Such a requirement is facially ambiguous and, if defined literally to mean that every licensee pays the same amount, would sacrifice economic efficiency. Does a non-discrimination requirement mean that every licensee pays the same total amount for a license or that every licensee pays the same amount per licensed unit? If the license applies a percentage royalty to a downstream product, should the percentage royalty be the same for all licensees or should the total royalty be the same, and should the royalty be the same for all products that employ the licensed technology?

Actual licensing programs by patent pools for patents that are subject to FRAND commitments include a wide range of fixed and variable royalty terms, often within the same licensing program. Despite the variation in li-

censing terms, these licensing programs are generally held to be non-discriminatory because they allow potential licensees to choose from the same schedule of royalty payments. Non-discrimination does not require that every licensee pays the same royalty, but rather that every licensee can choose from the same royalty schedule.

MPEG LA administers several patent licensing programs. ATSC is a set of standards for the transmission of digital television signals. MPEG LA offers a portfolio license for ATSC patents with a fixed royalty for each ATSC receiver product.<sup>31</sup> AVC/H.264 (MPEG-4 Part 10) is a digital video coding standard used in set-top boxes and other devices. The license terms for the MPEG LA AVC/H.264 patent portfolio depend on the number of licensed products and whether AVC/H.264 products are sold to end users or enterprises. The royalty terms include fixed fees and fees that decline with the number of licensed units subject to a cap, and allow small numbers of units to be licensed with no royalty.<sup>32</sup> MPEG-2 is a standard for the compression of audio and video signals. MPEG LA offers a portfolio of MPEG-2 systems licenses with a fixed royalty for each licensed mobile MPEG-2 systems signal receiver and a different fixed royalty for all other MPEG-2 systems devices.<sup>33</sup> MPEG LA represents that these patent licenses provide “fair, reasonable, and nondiscriminatory access” to its administered portfolios.<sup>34</sup> Yet the royalty schedules differ qualitatively as well as quantitatively for these patent portfolios.

Sisvel manages a licensing program for patents that are essential to the Digital Video Broadcasting-Terrestrial (DVB-T) standard, which specifies the framing structure, channel coding, and modulation for digital terrestrial television broadcasting. SISVEL licenses DVB-T essential patents on terms that it describes are fair, reasonable, and non-discriminatory. Licensees pay a fixed fee for every DVB-T receiver product sold if they select coverage under all DVB-T essential patents or a smaller fixed fee if they select coverage for only

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<sup>31</sup> MPEG LA, ATSC Patent Portfolio License Briefing 7 (Mar. 25, 2010) (PowerPoint presentation), <http://www.mpegla.com/main/programs/ATSC/Documents/atscweb.ppt>.

<sup>32</sup> MPEG LA, *AVC Patent Portfolio License Briefing* 8–9 (May 1, 2011) (PowerPoint presentation), <http://www.mpegla.com/main/programs/avc/Documents/avcweb.ppt>.

<sup>33</sup> MPEG LA, *MPEG-2 Systems Patent Portfolio License Briefing* 7 (Apr. 1, 2011) (PowerPoint presentation), <http://www.mpegla.com/main/programs/m2s/Documents/m2sweb.ppt>.

<sup>34</sup> MPEG LA specifically notes that it licenses MPEG-2 systems and AVC/H.264 patents on “reasonable terms and conditions” (see *MPEG-2 Systems FAQ*, MPEG LA, <http://www.mpegla.com/main/programs/M2S/Pages/FAQ.aspx>; *AVC/H.264 License Agreement*, MPEG LA, <http://www.mpegla.com/main/programs/AVC/Pages/Agreement.aspx>) and provides “fair, reasonable, and nondiscriminatory access” to its portfolios of patents relevant to the MPEG-4 and ATSC standards. See *Media / Licensing Programs Archive*, MPEG LA, <http://www.mpegla.com/main/pages/MediaArchive.aspx>; *Media / Licensing Programs*, MPEG LA, <http://www.mpegla.com/main/pages/media.aspx>.

a subset of the patent portfolio.<sup>35</sup> SISVEL also offers licenses under FRAND terms for patents that cover the CDMA2000 cellular standard. The royalty rate is a fixed fee per unit sold subject to a cap, both of which depend on the licensed functionality.<sup>36</sup>

VIA Licensing administers the licensing programs for several patent portfolios and represents that its licenses are intended to be offered “to the entire market on Reasonable And Non-Discriminatory (RAND) terms.”<sup>37</sup> The royalty for a portfolio license for patents that are essential to 802.11 wireless standards range from \$0.55 per licensed product for sales of less than 500,000 units per year to \$.05 per licensed unit for sales of more than 40 million units per year.<sup>38</sup> License fees for the VIA patent portfolio that covers Advanced Audio Coding (AAC) also decline with the number of units sold for consumer products, but are set at fixed per unit fees for professional products, some of which are subject to a maximum cap.<sup>39</sup> In addition, for cellular telephone products, licensees can choose from a royalty schedule that includes a fixed fee for sales of less than 7.5 million per year.<sup>40</sup> Via Licensing’s patent portfolio for MPEG-2 AAC is a subset of the AAC portfolio.<sup>41</sup> Royalties for this portfolio decline with volumes sold for consumer decoder and codec channels but are a flat rate for professional encoders.<sup>42</sup> The VIA licensing program for patents that cover the OpenCable Applications Platform is a fixed fee per license device and a fixed fee per subscriber.<sup>43</sup>

The DVD6C Licensing Group offers licenses for various DVD products at the greater of a fixed royalty or a percentage of the product’s net selling

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<sup>35</sup> See *DVB-T*, SISVEL, <http://www.sisvel.com/english/licensingprograms/dvbt/licensingprogram>.

<sup>36</sup> See *CDMA2000*, SISVEL, <http://www.sisvel.com/english/licensingprograms/cda2/license-terms>.

<sup>37</sup> See *Via Licensing—FAQs*, <http://www.vialicensing.com/about/faq.aspx>. VIA Licensing also represents that while it does not discriminate between licensees, “if there is something about the sample license that is impossible for you to comply with, Via Licensing would be happy to discuss the matter with you further.”

<sup>38</sup> See *Via Licensing—IEEE 802.11*, VIA LICENSING, [http://www.vialicensing.com/licensing/IEEE80211\\_fees.cfm](http://www.vialicensing.com/licensing/IEEE80211_fees.cfm).

<sup>39</sup> See *Via Licensing—Advanced Audio Coding, ACC License Fees*, VIA LICENSING, <http://www.vialicensing.com/licensing/aac-fees.aspx>.

<sup>40</sup> *Id.*

<sup>41</sup> See *Via Licensing—MPEG-2 AAC Standard, Overview*, VIA LICENSING, <http://www.vialicensing.com/licensing/mpeg2aac-overview.aspx>.

<sup>42</sup> *Via Licensing—MPEG-2 AAC Standard, License Fees*, VIA LICENSING, <http://www.vialicensing.com/licensing/mpeg2aac-fees.aspx>.

<sup>43</sup> See *Via Licensing—OpenCable Applications Platform, OCAP License Fees*, VIA LICENSING, <http://www.vialicensing.com/licensing/ocap-fees.aspx>.

price.<sup>44</sup> The Licensing Group represents that its royalties are fair and reasonable and that it does not discriminate among licensees.<sup>45</sup>

This is only a sample of the royalty terms for patent portfolios that licensors represent are fair, reasonable, and non-discriminatory. The royalty structures vary considerably among these programs and include fixed fees, fixed per-unit fees, fees that decline with the number of licensed units, different fees for different products, maximum caps, and exemptions for small numbers of licensed units. If the definition of non-discriminatory is that every licensee pays the same amount, then some of these programs fail the non-discrimination prong of FRAND.

Requiring all licensees to pay the same amount is not a prescription that is either fair or promotes economic welfare. It is not fair to require a firm that sells 1000 wireless units per year to pay the same fixed patent license fee as a firm that sells 1 million wireless units per year. A fixed fee also is inefficient if it excludes potential licensees that have a low willingness to pay. Non-discrimination should not require fixed per-unit royalties because fixed fees and royalties that decline with output have desirable efficiency properties by providing incentives for licensees to produce more to take advantage of lower fees for additional units.<sup>46</sup>

Non-discrimination requires uniform treatment for similarly situated licensees, but it does not have to be interpreted rigidly. Some flexibility in licensing terms is desirable.<sup>47</sup> A reasonable interpretation of the non-discrimination requirement of FRAND is that all licensees should be able to choose from the same schedule of royalties, which may be a fixed fee, a fixed per-unit running royalty, or a royalty that declines with output, among other arrangements. It also can be procompetitive to offer a choice of licensing terms because licensees will choose the combinations of price and quantity that give them the highest values. Moreover, royalty negotiations may be subsumed in negotiations over other licensing terms, including terms for patents that are not necessarily subject to FRAND commitments. Some licensees offer valuable consideration in trade, such as cross-licenses for their intellectual property, which may be netted against the price of a license. A non-discrimination re-

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<sup>44</sup> See *Royalty Rates under DVD6C Licensing Program*, DVD6C LICENSING GROUP, <http://www.dvd6cla.com/royaltyrate.html>.

<sup>45</sup> See *DVD Patent Joint Licensing Program Frequently Asked Questions*, DVD6C LICENSING GROUP, <http://www.dvd6cla.com/faq.html>.

<sup>46</sup> A fixed-fee royalty is a type of non-linear royalty because the average royalty is a declining function of the licensee's output. The marginal royalty payment is zero for a fixed fee, which aligns with the low marginal cost of licensing.

<sup>47</sup> Robert D. Willig, *Pareto-Superior Nonlinear Outlay Schedules*, 9 BELL J. ECON. 56, 56 (1978) ("For any uniform price unequal to marginal cost, there is a nonlinear outlay schedule that is preferred by each consumer and that yields greater vendor profit.").

quirement should not be interpreted to exclude parties from entering into these broader negotiations. The important requirement is uniform treatment for similarly situated licensees, rather than identical treatment for all licensees.

While flexibility in the design of a non-discriminatory royalty schedule is desirable, it should not allow a rights holder to negotiate any royalty with any willing licensee. The rights holder should be bound to comply with the royalty schedule. This limits the ability of the rights holder or the licensee to negotiate royalties that reflect the particular circumstances of each party, including different costs of switching to an alternative technology, and prevents a particularly powerful licensee from negotiating licensing terms that are uniquely attractive for that licensee. Instead, the non-discriminatory royalty is the level corresponding to the schedule that most closely corresponds to the licensee's type.

A commitment to offer the same schedule of licensing terms to every potential licensee does not guarantee that no licensee has a competitive advantage. A particularly influential licensee may negotiate a royalty schedule with a patentee subject to a non-discrimination requirement that marginalizes competition from other potential licensees. For example, a royalty schedule that declines sharply with output may exclude small competitors that would have to pay high royalties, or the negotiations may include other terms in licensing agreements that would be unfavorable to other licensees. In the extreme, the competitive effects of such negotiated licensing terms can be similar to an exclusive dealing arrangement between the influential licensee and the patentee, and should be analyzed accordingly under the antitrust laws.

Furthermore, if the patentee negotiates sequentially with licensees, the patentee may have an incentive to offer licensing terms to late adopters that disadvantage early adopters by allowing the latter to take sales from the former in return for higher fees. This flexibility to negotiate terms sequentially with licensees lowers the patentee's profits because early adopters will pay less for licenses if they anticipate adverse effects from subsequent licensees.<sup>48</sup> Therefore, a commitment to offer the same terms to all licensees simultaneously, perhaps by posting licensing terms, can benefit the patentee as well as avoid discriminatory outcomes, although such a commitment can limit the ability of rights holders and technology adopters to respond to market forces that have differential impacts on licensees.

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<sup>48</sup> See R. Preston McAfee & Marius Schwartz, *Opportunism in Multilateral Vertical Contracting: Nondiscrimination, Exclusivity, and Uniformity*, 84 AM. ECON. REV. 210 (1994). Note that licensing terms with late adopters can disadvantage early adopters even if late adopters are differentially locked in to the licensed technology as a consequence of investments that are specific to the technology, because the patentee can take advantage of lock-in by charging higher fixed fees.

Royalties are only one component of a licensing arrangement. Non-price licensing terms can be equally important. The value of a license depends on the restrictions that attach to the use of the licensed property. Many FRAND licensing programs place no field-of-use restrictions on licensees, while other programs restrict licenses to a particular use. The DVD6C Licensing Group offers a portfolio license only for patents that are necessarily infringed by implementation of the DVD standard specifications for Read Only discs, Recordable discs, Rewritable discs, Re-recordable discs, Rewritable/Re-recordable discs, DVD Video Recording, and +R/+RW discs.<sup>49</sup>

There are sound economic and business reasons for licensing restrictions.<sup>50</sup> Restrictions should not violate the non-discrimination prong of FRAND if they are applied uniformly to all actual and potential licensees. A similar conclusion applies to licensing terms, such as requirements that licensees grant back licenses to patents they file that are essential to a standard. The antitrust enforcement agencies have concluded that such requirements do not harm competition in some circumstances.<sup>51</sup>

The combination of bilateral bargaining and a flexible but vigorously enforced non-discrimination provision can be effective to limit ex post opportunism. To achieve these benefits will require a clear definition of the non-discrimination commitment and the obligations of licensors that are subject to these commitments, including whether licensors that make a non-discrimination commitment must publicly announce their royalty schedules and other licensing terms.

The challenge of defining licensing terms that are both flexible enough to achieve efficient utilization of intellectual property yet similar enough to avoid egregious discrimination is not unique to the proposed regime of bilateral bargaining with a clear non-discrimination requirement. If members of an SSO were to bargain jointly with rights holders, they too would face the problem of how to design licensing terms that satisfy these different objectives.

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<sup>49</sup> See *DVD Patent Joint Licensing Program Frequently Asked Questions*, *supra* note 45.

<sup>50</sup> For example, a licensing arrangement that prevents the licensee from dealing in other technologies may encourage the licensee to develop and market the licensed technology or specialized applications of that technology. U.S. Dep't of Justice & Fed. Trade Comm'n, Antitrust Guidelines for the Licensing of Intellectual Property ¶ 4.1.2 (1995), available at <http://www.ftc.gov/bc/0558.pdf>.

<sup>51</sup> See, e.g., Business Review Letter from Joel I. Klein, Assistant Att'y Gen., Antitrust Div., U.S. Dep't of Justice, to Gerrard [sic] R. Beeney, Esq., Sullivan & Cromwell, at 13 (June 26, 1997), available at <http://www.usdoj.gov/atr/public/busreview/215742.pdf>; Business Review Letter from Joel I. Klein, Assistant Att'y Gen., Antitrust Div., U.S. Dep't of Justice, to Garrard R. Beeney, Esq., Sullivan & Cromwell, at 14 (Dec. 16, 1998), available at <http://www.usdoj.gov/atr/public/busreview/2121.pdf>.



### B. DISCLOSURE OF INTELLECTUAL PROPERTY RIGHTS

Potential licensees cannot negotiate licensing terms with rights holders before firms and consumers make investments that are specific to a standard unless they are aware of proprietary rights for technologies that might be included in the standard specification. Without ex ante disclosure of proprietary rights, technology users may be exposed to ex post holdup.<sup>52</sup>

Recent antitrust actions have focused on inadequate disclosure in standard development contexts as a significant competitive issue.<sup>53</sup> However, disclosure requirements raise many thorny issues, such as who is responsible to search for patent claims that might be essential to a standard, how to evaluate patent claims, and whether disclosure extends to pending patents, patent applications, and planned applications.<sup>54</sup> Moreover, some patentees may have no intention of demanding royalties for their patents that may be essential to a standard but nonetheless would object to disclosing their patents and agreeing to license at FRAND terms because such a commitment may diminish the defensive value of their patents.<sup>55</sup> Disclosure and commitment to a schedule of licensing terms also may deter patentees from participating in standard-setting activities and, if they do participate, force some patentees to require royalties for their patents when they would have been content not to seek any royalties. Given the burden of disclosure requirements and the complex implications of disclosure for firms' patent strategies and for research plans that companies may wish to keep confidential, it is not surprising that many standard development organizations have weak or non-existent patent disclosure requirements.<sup>56</sup>

The absence of disclosure is a limitation on bilateral bargaining with a non-discrimination commitment, but this limitation applies equally to ex ante joint

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<sup>52</sup> Some SSOs have adopted policies in which a participating company undertakes a FRAND licensing commitment (with or without a royalty) for any patent claims that are essential to comply with a standard without having to disclose the patent claims. These policies often allow the patent holder to exclude certain essential claims by disclosing the patents containing those claims and stating that the automatic commitment will not apply to those claims. See, e.g., ANSI, 62-2007 ANSI Patent Policy Revision (2007), available at <http://publicaa.ansi.org/sites/apdl/Reference%20Documents%20Regarding%20ANSI%20Patent%20Policy/62-2007%20ANSI%20Patent%20Policy%20Revision.pdf>.

<sup>53</sup> These include Federal Trade Commission enforcement actions, such as *Dell Computer Corp.*, 121 F.T.C. 616 (1996); *Rambus, Inc.*, FTC Docket No. 9302 (issued June 18, 2002); *Union Oil Co. of Cal.*, FTC Docket No. 9305 (issued Mar. 4, 2003); and private cases, such as *Wang Labs., Inc., v. Mitsubishi Elecs. Am., Inc.*, 103 F.3d 1571 (Fed. Cir. 1997).

<sup>54</sup> See, e.g., Mark A. Lemley, *Ten Things to Do About Patent Holdup of Standards (and One Not to)*, 48 B.C. L. REV. 149, 157 (2007).

<sup>55</sup> A common defensive strategy if sued for patent infringement is to sue the plaintiff for infringement of the defendant's patents.

<sup>56</sup> See Lemley, *supra* note 16, at 1905–06; François Lévêque & Yann Ménière, *Technology Standards, Patents and Antitrust*, 9 COMPETITION & REG. NETWORK INDUS. 29, 39–40 (2008).

negotiation of licensing terms. In this respect, bilateral bargaining with a clear non-discrimination requirement is not inferior to ex ante joint negotiation. Furthermore, the absence of disclosure is a limitation for any policy that relies on a FRAND commitment, unless FRAND can be interpreted to apply retroactively to any intellectual property that should have been disclosed ex ante.<sup>57</sup>

### C. INCOMPLETE EX ANTE LICENSING CONTRACTS

Most licensing programs with FRAND commitments quote terms which, given the ambiguity of FRAND, the licensor may change in the future. This flexibility allows the licensor to respond to market developments that may justify different royalties or other licensing terms. However, it also allows the licensor to engage in opportunistic conduct to exploit lock-in after firms and consumers make investments that are specific to the licensed technology.

Opportunism can be constrained through contracts signed ex ante that specify future royalty obligations. But contracts may fail to specify all of the relevant payments and conditions, either because the outcomes are too uncertain or numerous to describe or because they cannot be described in ways that are enforceable under the contract.<sup>58</sup> A royalty agreement may not anticipate changes in prices of complementary products that affect the value of a licensed technology. A licensee may agree to a high ex ante royalty under the belief that the licensed technology offers large benefits relative to alternatives, but that may turn out not to be the case. Having made investments that make it costly to switch to an alternative, the licensee may have little choice but to pay the license fee. Or the technology may prove to be far better than anticipated, but the contract may leave little room to negotiate better terms for the licensor. There is a risk that rigid ex ante contracts may prevent licensors and licensees from responding to unanticipated market conditions, while incomplete or flexible contracts may allow for opportunistic conduct ex post.

The non-discrimination commitment, if enforced, provides some protection against ex post opportunism. Contracts signed ex ante provide a baseline for the value of a licensed technology before firms and consumers make investments that are specific to the standard and create the potential for holdup. Attempts to engage in ex post opportunism could be measured, albeit imperfectly, against the ex ante benchmark. Furthermore, the non-discrimination requirement does not abandon an inquiry into whether ex post rates are fair and reasonable, so in this respect it is no worse than a typical FRAND com-

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<sup>57</sup> For a proposal along these lines, see Merges & Kuhn, *supra* note 17.

<sup>58</sup> See Oliver E. Williamson, *Credible Commitments: Using Hostages to Support Exchange*, 73 AM. ECON. REV. 519 (1983); Lévêque & Ménière, *supra* note 56, at 38 (“Apart from the specifics of investment and opportunism, holdup can only occur when contracts are incomplete.”); *supra* note 4 (references).

mitment. Incomplete contracts pose a risk of ex post opportunism whether ex ante bargaining is bilateral or occurs jointly with the members of the SSO.

#### D. DISINCENTIVES TO LOWER ROYALTIES

A non-discrimination requirement is similar in some respects to a most-favored-customer (MFC) clause in a contract, under which a customer is assured that its price will be no higher than the lowest price paid by any another customer.<sup>59</sup> Critiques of MFC provisions point out that they discourage price cutting and can lead to higher equilibrium prices.<sup>60</sup> For example, suppose that 100 consumers are willing to pay up to \$10 and 50 consumers are willing to pay up to \$5 for one unit of a good with zero marginal cost. If a seller can identify customers' willingness to pay, offer differential prices, and avoid arbitrage, she would charge the first group \$10 and the second group \$5. The seller would serve both groups and earn revenues of \$1250, with an average price of \$8.33. If the seller offers a MFC commitment or agrees not to offer differential prices, she has to set a single price and would choose between the \$10 price that only the first group would pay and the \$5 price that both groups would pay.<sup>61</sup> In this example the seller would choose a price of \$10 and not satisfy the demand of the second group of customers.

As with a most-favored-customer commitment, a non-discrimination requirement can discourage rights holders from entering into licensing arrangements that are particularly favorable to some licensees. However, if lock-in is significant, a non-discrimination commitment is not likely to result in a large group of unserved customers. Licensees may have a low willingness-to-pay ex ante for a technology that is included in a standard. But ex post, if they are locked in, their willingness-to-pay is higher. The lock-in that allows a rights holder to engage in holdup also makes it less likely that a potential licensee will refuse a license ex post, even if the licensee had a low willingness-to-pay for the technology ex ante.<sup>62</sup>

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<sup>59</sup> A MFC commitment is not equivalent to non-discrimination because it does not necessarily apply to every customer and it does not prevent more advantageous terms for those customers that have a MFC commitment.

<sup>60</sup> See, e.g., Thomas E. Cooper, *Most-Favored-Customer Pricing and Tacit Collusion*, 17 RAND J. ECON. 377 (1986); Thomas E. Cooper & Timothy L. Fries, *The Most-Favored-Nation Pricing Policy and Negotiated Prices*, 9 INT'L J. INDUS. ORG. 209 (1991); Aaron S. Edlin, *Do Guaranteed-Low-Price Policies Guarantee High Prices, and Can Antitrust Rise to the Challenge?*, 111 HARV. L. REV. 528 (1997). MFC clauses do not necessarily prevent discriminatory outcomes even if applied to all licensees. See McAfee & Schwartz, *supra* note 48, at 210.

<sup>61</sup> No other uniform price would be more profitable.

<sup>62</sup> It does not follow that high royalties for locked-in licensees would create no deadweight loss in this example. While locked-in licensees would not refuse a license, the higher cost may be passed on to consumers and create a deadweight loss relative to lower prices. Furthermore, high royalties may discourage licensees from investing to add value to the licensed technologies.

A non-discrimination commitment can discourage the negotiation of licensing contracts at low royalties. This is a disadvantage of any licensing commitment with a non-discrimination requirement. It is also a disadvantage of ex ante joint negotiation, which likely would require similar treatment for similarly situated licensees.

#### E. DIVERSE PREFERENCES

Bilateral bargaining with a non-discrimination commitment does not necessarily balance the preferences of influential technology adopters against the preferences of potential licensees who have little or no influence on technology adoption decisions. Suppose most industry participants prefer technology X, but there is an adopter who strictly prefers technology Y and has sufficient influence within the SSO to cause the adoption of technology Y. The non-discrimination commitment would extend contractual protections negotiated by the pivotal adopter to other industry members, but this may provide little solace if technology Y is not their preferred technology.

This example presumes the existence of an influential adopter whose preferences determine the decision to include a technology in a standard. In practice, if an SSO governs by consensus and there is a better technology for which a consensus will emerge, the preferences of the majority of SSO members would dominate the preferences of a single adopter. Moreover, joint negotiation is not immune from the problem of balancing technology preferences. Influential SSO members may be able to force their preferences over those of others in joint negotiations with rights holders.<sup>63</sup>

### III. SUMMARY OF LIKELY OUTCOMES UNDER DIFFERENT BARGAINING ARRANGEMENTS

It is not possible to assign precise outcomes to different bargaining arrangements. Nonetheless, a non-discrimination constraint has clear implications for the balance of bargaining power between licensors and licensees. Table 1 summarizes the likely effects of these licensing regimes on royalty outcomes.

The first factor in Table 1 is the likely effect of different bargaining arrangements on the potential for ex post holdup. Ex ante joint negotiation is the most likely of the bargaining alternatives to constrain ex post holdup provided that technologies are disclosed and the negotiations take place prior to the determination of a standard, although the effects depend on the ability to com-

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<sup>63</sup> In particular, innovator firms, implementers, and vertically integrated firms are likely to have different preferences for alternative technologies. *See, e.g.*, Richard Schmalensee, *Standard-Setting, Innovation Specialists and Competition Policy*, 57 J. INDUS. ECON. 526, 543 (2009) (“[T]he different strategic positions of integrated firms and innovation specialists may lead to the selection of inferior standards.”)

TABLE 1: FACTORS THAT AFFECT LICENSING TERMS FOR DIFFERENT BARGAINING ARRANGEMENTS

|   | <b>Ex Ante Joint Negotiation</b>                          | <b>Bilateral Bargaining</b>   | <b>Bilateral Bargaining with Non-Discrimination</b>   |
|---|---|---|---|
| <b>Effects on potential ex post holdup</b>              | Depends on ability to commit to licensing terms over time | Potential for ex post holdup  | Depends on ex ante licensing and ability to commit to licensing terms over time   |
| <b>Threat of differential licensing</b>                 | No differential licensing                                 | Threat to license differentially  | No differential licensing   |
| <b>Threat to license an alternative technology</b>      | SSO can have credible threat                              | Difficult for individual firm to threaten to license alternative technology | Difficult for individual firm to threaten to license alternative technology   |
| <b>Overall effects on bargaining power of licensees</b> | Substantial bargaining power                              | Low bargaining power for licensees that negotiate ex post                   | Depends on influential licensees that negotiate ex ante. Non-discrimination can increase bargaining power of rights holder. |

mit to licensing terms that prevent the licensor from increasing royalties over time. The risk is that ex ante negotiation will go too far and suppress royalties to levels that deter innovation. Bilateral negotiation absent a clear non-discrimination requirement is the most likely of the three bargaining alternatives to enable ex post holdup, for the usual reasons.

The effectiveness of bilateral bargaining with a clear non-discrimination requirement depends on the existence of influential licensees who negotiate royalty terms prior to investments by firms and consumers that are specific to the standard. The ex ante negotiated royalties can constrain royalties ex post and avoid holdup. As with ex ante joint negotiation, the power of the constraint depends on the ability to commit to licensing terms that prevent the licensor from increasing royalties after firms and consumers have made investments that are specific to the standard.

The second effect in Table 1 is the ability of the rights holder to threaten to license her technology exclusively or on terms that provide a competitor with a lower royalty or a less-restrictive license. The ability to license exclusively or on differential terms can increase the bargaining power of the rights holder and result in higher royalties. Such strategic licensing would not occur with ex ante joint negotiation, as it would advantage some members of the SSO at the expense of others. It also would not be feasible under bilateral bargaining with a binding non-discrimination constraint.

The third factor in Table 1 is the ability of the potential licensee to threaten to adopt an alternative technology. This affects the firm's disagreement payoff and, therefore, its bargaining power. Such a threat is most effective under ex ante joint negotiation because the members of the SSO can coordinate to adopt a different technology if they are unsatisfied with licensing terms for a proprietary technology. There is little scope to threaten an alternative technology under bilateral bargaining after firms and consumers have made investments that are specific to a technology that is included in a standard. A non-discrimination requirement does not change this limitation per se. However, with a non-discrimination requirement, licenses negotiated ex ante, before a technology is included in a standard, protect licensees that adopt a technology after firms and consumers have made investments that are specific to the standard. The licenses negotiated ex ante would reflect some ability of the licensee to adopt an alternative technology if the licensee is influential in the technology adoption decision, although that ability may be constrained by difficulties of coordinating with other members of the SSO.

Overall, these factors suggest that bilateral negotiation with a clear non-discrimination requirement is likely to result in royalties that are higher than the royalties that would be negotiated under ex ante joint negotiation, in part because joint negotiation makes it easier for members of an SSO to threaten to adopt an alternative technology. Relative to bilateral bargaining without a non-discrimination requirement (or with a non-discrimination requirement that is weakly enforced), the non-discrimination requirement would reduce royalties for some licensees that adopt a technology after firms and consumers have made investments that are specific to a standard that includes the technology. Furthermore, a clear non-discrimination requirement would reduce royalties for all licensees if, absent such a requirement, rights holders would threaten to favor some licensees by offering exclusive licenses or more favorable licensing terms, which potential licensees would pay more to avoid.

#### IV. POLICY RECOMMENDATIONS

The federal antitrust enforcement agencies have adopted a rule of reason approach to ex ante joint negotiation by members of SSOs. The balancing that takes place under the rule of reason should compare the potential benefits from preventing ex post holdup after firms and consumers have made investments that are specific to the standard against the potential harm from ex ante holdup when innovators have made investments to create new technologies.<sup>64</sup>

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<sup>64</sup> Under the rule of reason, "The central question is whether the relevant agreement likely harms competition by increasing the ability or incentive profitably to raise price above or reduce output, quality, service, or innovation below what likely would prevail in the absence of the relevant agreement." Fed. Trade Comm'n & U.S. Dep't of Justice, Guidelines for Collaborations Among Competitors, *supra* note 11, § 1.2.

This balancing can be a daunting task, and SSOs engage in a very large number of standardization decisions.<sup>65</sup> Each technology has different potential risks for ex post and ex ante holdup, and each technology may compete in a different technology market with different competitive constraints from alternative technologies and downstream products.

The following roadmap for a rule of reason analysis of joint negotiation of licensing terms by members of a standard development organization provides guidance for this assessment. In addition to weighing costs and benefits of joint negotiation, a rule of reason analysis should consider less restrictive alternatives, such as bilateral bargaining with a clear non-discrimination commitment.

A. IS THERE A SIGNIFICANT RISK OF HOLDUP AFTER FIRMS AND CONSUMERS HAVE MADE INVESTMENTS THAT ARE SPECIFIC TO THE STANDARD?

If there is no significant risk of holdup after firms and consumers have made investments that are specific to the standard, then there is no procompetitive benefit from joint negotiation of licensing terms. The risk of ex post holdup could be minimal if switching costs from specific investments are small and there are no significant impediments to coordinate the adoption of an alternative technology. Investments that are specific to a standard are not sufficient to create concerns about ex post holdup because product market competition can mitigate holdup by making it unprofitable for an intellectual property rights holder to charge high royalties. For example, most digital media content providers and manufacturers of consumer audio/video products support audio technologies licensed by Dolby and DTS. It is unlikely that Dolby or DTS alone could engage in significant opportunistic pricing because the audio technologies are close substitutes and content providers, equipment manufacturers, and consumers can use either technology.

If the risk of ex post holdup is minimal, there should be a presumption that joint negotiation is unlawful because joint negotiation can harm innovation competition by suppressing royalties. A presumption of illegality does not extend to discussions of technology characteristics and other factors that are relevant to technology adoption decisions but do not impact the economic terms under which technologies are licensed. The presumption of illegality from joint negotiation of licensing terms can be overturned by demonstrating procompetitive benefits, such as a reduction in the transaction costs of licensing, that are likely to outweigh any competitive harm.

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<sup>65</sup> The IEEE alone has an active portfolio of nearly 1300 standards and projects under development. See *News & Events*, IEEE STANDARDS ASSOCIATION, <http://standards.ieee.org/announcements/index.html>.

Harm to innovation competition from joint negotiation may be unlikely if the interests of SSO members and innovators are aligned, perhaps because they meet frequently and would internalize any disincentives for innovation from licensing terms, or because technology innovators are influential members of the SSO and the governance rules of the SSO ensure that the interests of technology innovators are well represented. However, such alignment of incentives through frequent licensing negotiations also obviates the need for joint negotiations of licensing terms.

B. ARE THERE EX ANTE CLOSE SUBSTITUTES FOR THE TECHNOLOGIES BEING CONSIDERED FOR ADOPTION IN A STANDARD?

If the risk of ex post holdup is significant, the next step in the rule of reason analysis is to assess the potential for members of an SSO to exercise buyer market power through joint negotiation. The scope to exercise buyer market power is more limited if the technologies being considered for adoption in a standard have close substitutes, because the existence of close substitutes should constrain the competitive level of royalties in the absence of investments by firms and consumers that are specific to a standard. If the royalty is small absent lock-in, so is the scope for buyer market power to lower the royalty.

The larger the royalty that would exist in the absence of joint negotiation and investments that are specific to a standard (the “ex ante royalty”), the greater the risk that joint negotiation will harm innovation competition by suppressing the royalty, which serves as a signal of the profitability of invention for future innovators. Figures 1 and 2 illustrate two different examples. Figure 1 describes a situation in which the risk from coordinated negotiation is relatively low compared to the potential benefits. In this example, the ex

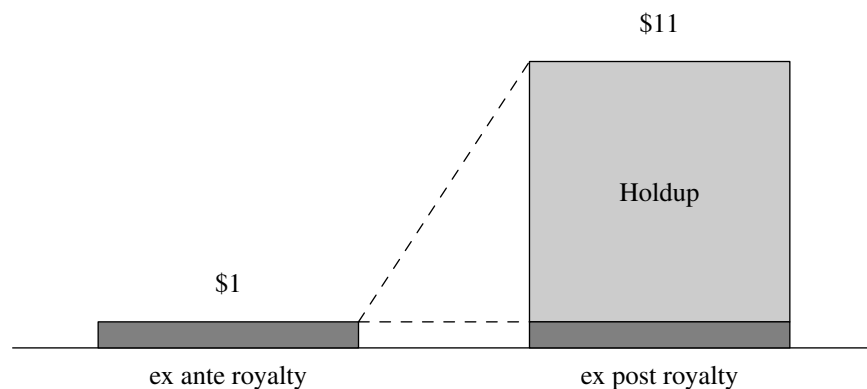


FIGURE 1: LOW EX ANTE ROYALTY AND HIGH HOLDUP RISK



ante royalty is small relative to the switching costs that are incurred after firms and consumers make investments that are specific to a standardized technology. These switching costs create the potential for ex post holdup, which is large compared to the ex ante royalty. Ex ante negotiation of royalty terms can limit the potential for holdup. The risk is that ex ante negotiation would harm innovation competition by suppressing royalties, but the risk is small in this example compared to the potential harm from ex post holdup.

Figure 2 describes a market in which the ex ante royalty is large and the risk of holdup is relatively small. In this example, the competitive risks of joint negotiation are likely to exceed the expected benefits. Ex ante negotiation could squeeze royalties far below the level that would exist in the absence of switching costs from investments that are specific to the standard. The benefit would be an avoidance of ex post holdup, but the risk of ex post holdup is small in this example.

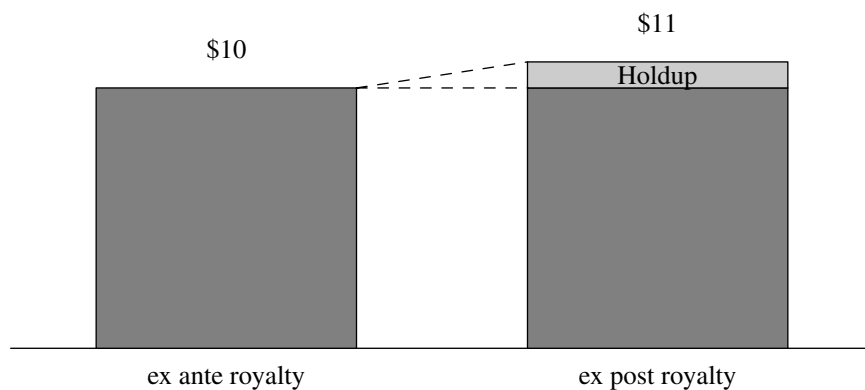


FIGURE 2: HIGH EX ANTE ROYALTY AND LOW HOLDUP RISK

C. ARE THERE ALTERNATIVE PATHS FOR COMMERCIALIZATION OF THE TECHNOLOGY BEING CONSIDERED FOR ADOPTION IN A STANDARD?

Members of an SSO are not likely to have substantial market power if the technology rights holder has alternative ways to promote the use of her technology that are close substitutes for the activities of the SSO. These alternatives may include other standard development organizations, influential firms or consumers that can start a bandwagon effect to promote use of the technology, or market forces that are likely to focus on the technology because it has clear benefits that overcome natural obstacles to coordination.

D. ARE THERE LESS-RESTRICTIVE ALTERNATIVES TO EX ANTE JOINT NEGOTIATION THAT CAN ACHIEVE SIMILAR BENEFITS?

Following the discussion in Section I, under some circumstances, the combination of bilateral bargaining and a clear non-discrimination commitment can limit ex post holdup with less risk of ex ante opportunistic conduct through the exercise of buyer market power from joint negotiation. This is more likely to be the case if there are influential members of the SSO that bargain with rights holders before firms and consumers make investments that are specific to a standard that may incorporate the proprietary technology, and if the non-discrimination commitment is defined clearly and enforced through a schedule of licensing terms.<sup>66</sup>

Given the competitive risks of ex ante joint negotiation by members of an SSO organization and the existence of less-restrictive alternatives in many circumstances, SSOs should exercise caution before entering into joint negotiations with intellectual property rights holders. The best case for procompetitive benefits from ex ante joint negotiation by an SSO is one in which there is a significant risk of holdup ex post and there is clear evidence that the SSO lacks meaningful market power because there are alternative paths to adopt and promote a technology or there are many technology alternatives that offer approximately equal performance and can be licensed at low or non-existent royalties absent investments that are specific to a standard. Even if these conditions apply, due consideration should be given first to allowing technology buyers to protect themselves from high royalties through less-restrictive alternatives, such as bilateral bargaining with a clear non-discrimination commitment.

## V. CONCLUSION

In many circumstances, the combination of ex ante bilateral bargaining and a clear non-discrimination commitment will provide protection from ex post opportunistic conduct without the risk of abuse of buyer market power that may occur with joint negotiation of licensing terms by members of an SSO. The non-discrimination commitment extends the bargaining power of influential technology adopters to other industry participants, including other members of an SSO and firms that may seek licenses after a standard issues and after firms and consumers make investments that are specific to the standard.

Antitrust enforcers should be vigilant to assure that ex ante joint royalty negotiations by an SSO is limited to those situations in which it is most likely

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<sup>66</sup> This roadmap is consistent with conclusions in the DOJ and FTC *IP Report*, with the additional emphasis on less-restrictive alternatives. U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, *IP REPORT*, *supra* note 2, at 53–56.

to enhance economic efficiency. The potential for anticompetitive outcomes from joint royalty negotiations with SSOs is particularly severe when alternative technologies are distant substitutes for the technology protected by proprietary intellectual property rights and there are no viable alternatives to the SSO for the adoption and promotion of the technology. A concern is that this is precisely the circumstance in which the members of an SSO may collectively exercise market power and would have an incentive to do so to obtain more advantageous licensing terms.