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Testing for Bias to Suppress Royalties for Standard-Essential Patents

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The Institute of Electrical and Electronics Engineers (IEEE) is a standards-setting organization (SSO). In 2015, it ratified amendments to its patent policy to mandate that a reasonable and nondiscriminatory (RAND) royalty for a standard-essential patent (SEP)—more precisely, an Essential Patent Claim for an IEEE standard—exclude any value attributable to the standard, and to deny an SEP holder the right to seek an injunction against an unlicensed implementer until appellate review is exhausted.[1] The amendments further say that the determination of a RAND royalty "should," without limitation, (1) be derived from the value of the smallest salable compliant implementation of an IEEE standard that practices an SEP; (2) comport with a reasonable aggregate royalty burden of the relevant standard; and (3) disregard comparable license agreements obtained under the implicit or explicit threat of an injunction.[2] Because the revisions place strict limitations on an SEP holder's ability to enforce its patent rights against infringers, they truncate the upper range of the distribution of bilaterally negotiated RAND royalties and thus unambiguously reduce the compensation that the SEP holder may obtain for its technological contributions to the IEEE standards. The IEEE's patent-policy revisions became effective in March 2015.[3]

The IEEE patent policy, contained within the IEEE Standards Board bylaws, specifies the conditions under which an SEP holder voluntarily

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1 Institute of Electrical and Electronics Engineers [IEEE], IEEE-SA Standards Board Bylaws, § 6.1, at 16 (Mar. 2015) [hereinafter IEEE Standards Board Bylaws], http://standards.ieee.org/develop/policies/bylaws/sb_bylaws.pdf.

2 *Id.*; IEEE, Understanding Patent Issues During IEEE Standards Development ¶¶ 43–45, at 12–13 (2015) [hereinafter IEEE Patent Policy FAQs], http://standards.ieee.org/faqs/patents.pdf.

3 IEEE Patent Policy FAQs, *supra* note 2, ¶ 84, at 21.

commits to license its SEPs on RAND terms.[4] The bylaws serve as the Standards Board's constitution and establish the consensus-driven process of developing and promulgating technical standards, including the popular 802.11 Wi-Fi standard.[5] Embedded in the bylaws, as well as in other IEEE governance documents, are comprehensive safeguards that discourage opportunistic, anticompetitive conduct within the IEEE. Members of the Standards Board may collectively amend any section of the bylaws, including the patent policy.[6]

One would expect the process whereby an SSO amends its bylaws to be consensus-driven and supported by no lesser protections than those that safeguard its standard setting. Yet, scrutiny of the process by which the IEEE amended its bylaws in 2015 reveals that there was *ex ante* intense dissent among a discrete subset of members of the Standards Board,[7] and there were *ex post* declarations by those same members that they would not adhere to certain new pricing rules embedded in the bylaw amendments.[8] Those members asserted that the process by which the IEEE amended its patent policy did not comply with the principles of openness, consensus, balance, due process, and right to appeal that are consistent with the IEEE's standard-setting process.[9] The 2015 bylaw amendments deviated from the safeguards that the IEEE had guaranteed its members in both the foundational documents of the IEEE and its history of consensus-driven policymaking.

The IEEE *ad hoc* drafting committee that was responsible for the 2015 patent-policy revisions did not conciliate this dissent. Instead, the committee maintained that the bylaw-amendment process accorded with the

4 IEEE Standards Board Bylaws, *supra* note 1, § 6, at 15–19.

5 *Id.* § 5, at 8–14.

6 *Id.* § 8, at 21.

7 *See* Don Clark, *Patent Holders Fear Weaker Tech Role*, Wall St. J. (Feb. 9, 2015), http://www.wsj.com/articles/patent-holders-fear-weaker-tech-role-1423442219; Ryan Davis, *Patent Owners Take Hit with Standard-Setting Body's Rule*, Law360 (Feb. 9, 2015), http://www.law360.com/competition/articles/619687; IEEE-USA, Motion Approved by the IEEE-USA Board of Directors (Nov. 21, 2014) [hereinafter IEEE-USA Approved Motion], http://www.ieeeusa.org/volunteers/committees/IPC/IEEEUSAPatentPolicyMotionNov14.pdf.

8 *See, e.g.*, Susan Decker & Ian King, *Qualcomm Says It Won't Follow New Wi-Fi Rules on Patents*, Bloomberg (Feb. 11, 2015), http://www.bloomberg.com/news/articles/2015-02-11/qualcomm-says-new-wi-fi-standard-rules-unfair-may-not-take-part; Richard Lloyd, *Ericsson and Nokia the Latest To Confirm That They Will Not License Under the New IEEE Patent Policy*, IAM (Apr. 10, 2015), http://www.iam-media.com/blog/Detail.aspx?g=d07d0bde-ebd6-495a-aa72-4eecb9dac67d; Letter from Lawrence F. Shay, Executive Vice President of Intellectual Property, InterDigital, Inc., to David Law, Patent Committee Chair, IEEE-SA Standards Board (Mar. 24, 2015), http://wpuploads.interdigital.com.s3.amazonaws.com/uploads/2015/03/Letter-to-IEEE-SA-PatCom.pdf.

9 Email from Fabian Gonell, VP of the Division Counsel, Qualcomm Inc., to John Kulick et al., Members of the IEEE-SA Standards Board (June 5, 2014, 9:15 AM), http://grouper.ieee.org/groups/pp-dialog/email/msg00281.html [hereinafter Four Company Letter]. The email was signed by Blackberry, Nokia, Nokia Solutions and Networks, and Qualcomm.

judicious principles that safeguard the IEEE standard-setting process, and it portrayed the revisions as unambiguously beneficial.[10]

I present here econometric analysis that reveals a biased treatment of substantive comments submitted to the IEEE by members opposed to the controversial revisions. That bias cannot be explained on the basis of a balanced consideration of the issues; instead, the bias suggests that decision making at the IEEE was controlled by parties that seek to devalue SEPs. The process for amending the IEEE's bylaws did not protect the interests of SEP holders that were disproportionately responsible for the technologies that the IEEE had incorporated into its standards.

In Part I, I analyze the role of consensus building and safeguards in an SSO's activities, and I examine commentators' allegations about the lack of such consensus and protection in the process by which the IEEE amended its patent policy in 2015. An SSO's safeguards preserve in the standard-setting process principles of openness, consensus, balance, due process, and right to appeal, which encourage SSO members to participate in standard setting and deter SSO members from engaging in anticompetitive conduct. Examination of the IEEE's bylaw-amendment process reveals a discrepancy between the safeguards that members are guaranteed in the standard-setting process and the safeguards present in the bylaw-amendment process.

In Part II, I analyze publicly available data from the IEEE. Sixteen companies submitted 680 comments on four drafts of the proposed amendments and two drafts of a supporting informational document that an *ad hoc* committee, which the Patent Committee (PatCom) entrusted with the drafting and development of the 2015 patent-policy revisions, released for public comment.[11] The *ad hoc* committee collected the comments after releasing each draft and responded to the suggested revisions in each comment, either accepting them and implementing them into the next draft, or rejecting them.[12] Of the sixteen companies that submitted comments, I identify whether each company opposed the proposed changes, favored the proposed changes, or was neutral toward the proposed changes based on publically available comments. I identify that the *ad hoc* committee at a substantially higher rate rejected comments by companies that opposed or were neutral toward the proposed changes.

In Part III, I test the hypothesis that implementers acted collectively to effect the IEEE's bylaw amendments. These data in the public domain are sufficient to support empirical analysis indicating a strong negative correlation between an IEEE member's status as an SEP holder and the

[10] Letter from Michael A. Lindsay, Esq., Dorsey & Whitney, L.L.P., to Hon. William J. Baer, Assistant Attorney General, U.S. Department of Justice 18–19 (Sept. 30, 2014) [hereinafter IEEE Business Review Letter Request], http://www.justice.gov/sites/default/files/atr/legacy/2015/02/17/311483.pdf.

[11] *Id.* at 14.

[12] *Id.*

IEEE's propensity to accommodate that member's input in the development of the patent-policy revisions. I also show that the *ad hoc* committee was significantly more likely to reject comments from SEP holders when those comments addressed certain controversial provisions of the bylaw amendments.

In Part IV, I address how the market positions of the IEEE's major members have evolved since the 1990s to create an environment in which a subset of members has the incentive to seize control over the IEEE's decision-making processes to advance the commercial interests of those particular members. In the early stages of standard setting for mobile wireless communications standards, most of the major SSOs' participants were vertically integrated, both manufacturing devices and developing new patentable technologies. Consequently, the members of SSOs, including the IEEE, developed rules in anticipation of a two-way flow of patent licensing among major participants. Put differently, a major participant might approach a licensing negotiation under a Rawlsian veil of ignorance, not knowing whether it will be a net licensor or a net licensee in a given period.[13] However, over time, the positions of the major players in the SSO have evolved. The veil of ignorance has been lifted. Some of the largest SEP holders do not manufacture standard-compliant devices. Some of the largest manufacturers of standard-compliant devices have relatively weak SEP portfolios. To those large implementers, it is now expedient to renege on the bargain of interpreting the RAND commitment in a manner that is neutral to both net licensors and net licensees. Those net licensees discovered a significant opportunity for a large redistribution of wealth.

I. Consensus Building and Safeguards at the IEEE

Standard setting is typically a consensus-driven process. Consensus standards emerge from formal (and sometime informal) organizations, such as SSOs, in which participants deliberate over alternative technologies and vote to adopt the best technologies into the standard.[14] An example of a consensus standard is the IEEE's 802.11 Wi-Fi standard.

An SSO's standard-setting process involves the coordination of a wide variety of market participants, including upstream firms that own patents

[13] J. Gregory Sidak, *The Meaning of FRAND, Part I: Royalties*, 9 J. Competition L. & Econ. 931, 931–32 (2013).

[14] U.S. Department of Justice & Federal Trade Commission, Antitrust Enforcement and Intellectual Property Rights: Promoting Innovation and Competition 33–34 (2007) [hereinafter DOJ & FTC IP Competition Report], https://www.ftc.gov/sites/default/files/documents/reports/antitrust-enforcement-and-intellectual-property-rights-promoting-innovation-and-competition-report.s.department-justice-and-federal-trade-commission/p040101promotinginnovationandcompetitionrpt0704.pdf.

but do not produce standard-complaint products, downstream firms that produce standard-compliant products but do not own patents, and vertically integrated firms that both own patents and produce standard-complaint products. To facilitate coordination among participants, who often have divergent economic incentives, and to ensure that standardization produces procompetitive outcomes, an SSO enacts bylaws that specify safeguards to encourage private-firm participation in the standard-setting process and to discourage anticompetitive conduct. An examination of the IEEE's own safeguards for its standard-setting process shows that they accord with the principles of openness, consensus, balance, due process, and right to appeal. However, an examination of the process by which IEEE's revised its patent policy in 2015 reveals no similar conformity with those judicious principles.

A. The Role of Consensus Building and Safeguards in SSOs

The SSO's bylaws specify safeguards that govern SSO member behavior to prevent and discourage anticompetitive conduct. How the SSO structures and enforces those rules determines the degree to which they effectively create incentives for firms to contribute to standard setting and prevent anticompetitive conduct. If the SSO fashions those protections optimally, two salutary outcomes result: (1) the SSO's conditions for participation satisfy each member's individual-rationality constraint and induce firms to participate in the standard-setting process, and (2) opportunities to abuse the standard-setting process to attain anticompetitive ends are diminished.

1. How Do Consensus Building and Safeguards Encourage Firms to Participate in Standard Setting and Discourage Anticompetitive Conduct?

Economists and lawyers have analyzed the effect of differences in safeguards between SSOs on the outcomes of and participation in the standard-setting process.[15] An empirical study by Timothy Simcoe showed that SSOs that allow more open participation of commercial interests in their standard-setting processes often take longer to reach consensus but might also develop higher-quality standards.[16] Safeguards also affect a firm's incentives to join an SSO. Intuitively, SSOs that adopt patent policies that preserve the intellectual

[15] *See, e.g.*, Mark A. Lemley, *Intellectual Property Rights and Standard-Setting Organizations*, 90 Calif. L. Rev. 1889 (2002); David J. Teece & Edward F. Sherry, *Standards Setting and Antitrust*, 87 Minn. L. Rev. 1913 (2003); Benjamin Chiao, Josh Lerner & Jean Tirole, *The Rules of Standard-Setting Organizations: An Empirical Analysis*, 38 RAND J. Econ. 905 (2007); Timothy Simcoe, *Standard Setting Committees: Consensus Governance for Shared Technology Platforms*, 102 Am. Econ. Rev. 305 (2012); Joseph Farrell & Timothy Simcoe, *Choosing the Rules for Consensus Standardization*, 43 RAND J. Econ. 235 (2012); Anne Layne-Farrar, Gerard Llobet & Jorge Padilla, *Payments and Participation: The Incentives to Join Cooperative Standard Setting Efforts*, 23 J. Econ. & Mgmt. Strategy 24 (2014).

[16] Simcoe, *supra* note 15, at 307.

property rights of its members might attract more high-quality patented technologies than SSOs that adopt patent policies that are hostile to patent holders.[17] In an empirical study of SSOs, Benjamin Chiao, Josh Lerner, and Jean Tirole found "the sponsor friendliness of the selected SSO to be positively associated with the quality of a standard."[18] Their findings suggest that the more protection an SSO's policies offer a prospective patent-holding member, the more valuable the technology that the SSO will attract. Thus, an SSO's bylaws can influence the standard-setting process and firms' incentives to contribute technology to the SSO.

In the same way that consensus building and safeguards can encourage good-faith participation in the standard-setting process, so too can they discourage anticompetitive conduct. Antitrust authorities acknowledge the significance of an SSO's formal rules and commitment to consensus building in curtailing threats of anticompetitive conduct. In its business review letter of the IEEE's 2015 patent-policy revisions, the Antitrust Division said that, "[i]f a standards-setting process is biased in favor of one set of interests, there is a danger of anticompetitive effects and antitrust liability."[19] The FTC has prosecuted trade associations, which can present antitrust concerns similar to those of an SSO, for establishing "anticompetitive restraints . . . under the guise of codes of ethical conduct."[20] A report published by the European Commission recognizes the significance of "standards organizations continu[ing] to ensure innovation-friendly policies including a balance between the interests of the users of standards and the rights of owners of intellectual property."[21] Furthermore, this "balance must also ensure compliance with relevant legal requirements, e.g. competition law, and respect the openness of the standardization process for the market participants."[22] Thus, antitrust authorities have identified ways in which the bylaws and rules of a collaborative organization, such as an SSO, might dispel antitrust concerns involving the conduct of its members.

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17 *See* Teece & Sherry, *supra* note 15, at 1944.

18 Chiao, Lerner & Tirole, *supra* note 15, at 927.

19 Business Review Letter from Hon. Renata B. Hesse, Acting Assistant Attorney General, U.S. Department of Justice, to Michael A. Lindsay, Esq., Dorsey & Whitney, L.L.P., at 7 (Feb. 2, 2015), http://www.justice.gov/sites/default/files/opa/press-releases/attachments/2015/02/02/ieee_business_review_letter.pdf; *see also* David A. Balto, Former Assistant Dir. of Policy & Evaluation, Fed. Trade Comm'n, Standard Setting in a Network Economy (Feb. 17, 2000), https://www.ftc.gov/public-statements/2000/02/standard-setting-network-economy ("Standard setting may adversely affect competition procedurally or substantively. . . . [T]he rules set by a standard setting organization could themselves have anticompetitive consequences.").

20 Fed. Trade Comm'n, Music Teachers National Association, Inc., File No. 131-0118 & California Association of Legal Support Professionals, File No. 131-0205 (Dec. 16, 2013), https://www.ftc.gov/sites/default/files/documents/cases/131216musicteachersstmt.pdf.

21 European Commission, Standardization for a Competitive and Innovative Europe: A Vision for 2020, at 18 (2010), http://www.cencenelec.eu/research/news/publications/Publications/exp_384_express_report_final_distrib_en.pdf.

22 *Id.*

Scholars in economics and law have confirmed the relevance of an SSO's safeguards in deterring anticompetitive conduct.[23] Although an individual member of an SSO chooses whether to engage in an anticompetitive act, members operate within and respond to a framework of incentives that the SSO's bylaws create. Therefore, any anticompetitive outcome that arises from an SSO's activities is as much a product of the SSO's structure of rules as it is of the members' bad act. Ultimately, firms that participate in SSOs have vested interests that might not align with the interests of either the SSO as a whole or consumers. Consensus building and safeguards can help to eliminate that discrepancy between an SSO member's individual incentives and society's interest.

Safeguards that uphold principles of openness, consensus, balance, due process, and right to appeal can encourage participation and discourage opportunism among members while promoting consumer welfare. For example, consensus-based standard setting requires repeated formal cooperation among members; it therefore increases the cost of engaging in opportunism as measured by damage to the member's reputation or expulsion from the SSO. Furthermore, the SSO and consumers benefit when the standard-setting process is structured to balance the competing interests of SSO members, so that the selection of standard-essential technologies depends on merit and does not cater to the vested interests of an individual member or group of members. Such a structure ensures that the SSO selects the highest-quality technologies that will contribute most effectively to the performance of the standard—and therefore its successful adoption—rather than lower-quality technologies that become part of the standard merely because one firm has more leverage than others in the SSO. When the standard-setting process is open to all interested parties, the level of participation expands to encompass more expertise, which might increase the SSO's competency in selecting the best technologies. Safeguards that preserve due process for voting (one member, one vote) and the right to appeal unfair decisions also mitigate the risk of opportunism in the standard-setting process. Those principles are recognized as providing the foundation for successful standardization. For example, in 2012, the European Parliament and Council of the European Union passed a regulation that emphasized, "European standardisation . . . is founded on principles recognised by the World Trade

[23] *See* Steven C. Salop & David T. Scheffman, *Raising Rivals' Costs*, 73 Am. Econ. Rev. 267, 268–69 (1983) (showing that a firm's dominance exerted over the selection process of a standard can raise the costs of a firm's rivals); James J. Anton & Dennis A. Yao, *Standard-Setting Consortia, Antitrust, and High-Technology Industries*, 64 Antitrust L.J. 247, 250 (1995) (arguing that a firm might abuse the standard-setting process to keep a competitor from fully participating in a market or to prevent firms from entering the market entirely).

Organisation . . . namely coherence, transparency, openness, consensus, voluntary application, independence from special interests and efficiency."[24]

Consensus building and safeguards are important not only in the context of standard setting, but also in the context of amending an SSO's bylaws.[25] For example, Herbert Hovenkamp, Mark Janis, Mark Lemley, and Christopher Leslie analyze the competitive impact of common provisions found in SSOs' patent policies, such as disclosure requirements for SEPs and royalty-free or compulsory-licensing requirements.[26] Although they assert that the procompetitive benefits of such provisions typically outweigh any anticompetitive harm, they still concede that SSOs "should be concerned about the antitrust consequences" of adopting some provisions, such as capping the total royalties that an implementer must pay to license all SEPs covering a standard.[27] An SSO's enforcement of safeguards—particularly those that promote openness, consensus, balance, due process, and right to appeal—is a significant part of deterring such behavior. Openness increases the likelihood that an SSO will detect any biased conduct of its members. By promoting consensus, balance, and due process in the standard-setting process, an SSO's bylaws can ensure that the interests of one member or a group of members does not dominate the selection of an SSO's policies. The right to appeal enables the SSO, upon notice of a concerned member's request, to monitor the outcomes of its amendment process to ensure that they are fair and procompetitive. Because an SSO's procedures help align a member firm's incentives with those of the SSO and consumers, the design of those procedures is crucial to the success of the SSO's activities.

2. Consensus Building and Safeguards in the IEEE's Standard-Setting Process

The IEEE describes itself as a forum for achieving industry consensus: "When new technologies and new products connect at the deepest levels, manufacturers, developers and end users around the world create possibilities no one imagined before. Before you can create products that fulfill this vision of consumer connectivity, you need a place where industry can build consensus."[28] The IEEE is that place, and the IEEE's governing documents enact safeguards that promote the principles of openness, consensus, balance, due process, and right to appeal to ensure that the IEEE remains such a place.

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[24] Regulation 1025/2012, 2012 O.J. (L 316) 2.

[25] *See* J. Gregory Sidak, *Patent Holdup and Oligopsonistic Collusion in Standard Setting Organization*, 5 J. Competition L. & Econ. 123, 149–51 (2009).

[26] 2 Herbert Hovenkamp, Mark D. Janis, Mark A. Lemley & Christopher R. Leslie, IP and Antitrust: An Analysis of Antitrust Principles Applied to Intellectual Property Law § 35.6c, at 35-64 to -72 (Aspen 2d ed. 2010).

[27] *Id.* § 35.6c3, at 35-72.

[28] *Enabling Consumer Connectivity Through Consensus Building*, IEEE-SA Standards Insight, http://standardsinsight.com/ieee_company_detail/consensus-building.

For example, the IEEE Standards Association (IEEE-SA), which oversees the activities of both the Board of Governors and the Standards Board, says that the "[a]pproval of a standard by the IEEE-SA signifies that the IEEE believes the document to be consistent with good engineering practice and that it represents *a consensus of representatives* from materially affected industries, governments, or public interests."[29] The IEEE-SA Board of Governors is responsible for "establish[ing] and maintain[ing] a constituency of IEEE-SA members representative of all basic interests," including industry-specific interests.[30] Similarly, the Standards Board, in developing standards, must "review them for consensus, due process, openness, and balance."[31]

During the drafting of a new standard, which occurs in small committees called working groups, members coordinate with each other and the public at large, "receiving and resolving comments" from both members and nonmembers of the IEEE.[32] Working groups strive "to narrow the differences among its members, through persuasion and compromise."[33] Once a working group has completed a draft standard but before the Standards Board adopts the standard, a round of "rigorous consensus balloting" occurs.[34] Sponsor balloting groups, which approve the standards before submission to the Standards Review Committee, must represent "all classes of interest" to "ensure balance prior to conducting a . . . ballot."[35] Finally, any individuals or entities with "directly and materially affected interests" who are harmed by the standard-development process or the outcome of that process "shall have the right to appeal procedural actions or inactions."[36] Those safeguards exist to achieve a standard that is based on technical merit and to limit the incentives and ability of participants to distort the development of standards for anticompetitive purposes.

In its request to the Antitrust Division for a business review letter regarding its 2015 patent-policy revisions, the IEEE reiterated that its standard-setting process seeks to preserve "due process, openness, consensus, balance, and right of appeal."[37]

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29 Institute of Electrical and Electronics Engineers Standards Association [IEEE-SA], IEEE Standards Association Operations Manual § 1.2, at 1 (2015) [hereinafter IEEE-SA Operations Manual] (emphasis added), http://standards.ieee.org/develop/policies/sa_opman/sa_om.pdf.

30 *Id.* § 4.1.1, at 5.

31 *Id.* § 5.1, at 15.

32 IEEE Business Review Letter Request, *supra* note 10, at 8.

33 *Id.* at 7.

34 Institute of Electrical and Electronics Engineers [IEEE], IEEE Policies § 10.0(B) (June 2015) [hereinafter IEEE Policies], http://www.ieee.org/documents/ieee_policies.pdf.

35 Institute of Electrical and Electronics Engineers Standards Association Standards Board [IEEE-SA Standards Board], IEEE-SA Standards Board Operations Manual § 5.4.1, at 22–23 (2015) , http://standards.ieee.org/develop/policies/sa_opman/sa_om.pdf.

36 IEEE Standards Board Bylaws, *supra* note 1, § 5.4, at 10.

37 IEEE Business Review Letter Request, *supra* note 10, at 2.

B. The Lack of Consensus Building and Safeguards in the IEEE's Process for Amending Its Standards Board Bylaws

Consensus building and safeguards should govern the process of amending an SSO's bylaws, particularly when those bylaws can directly affect the assets or property of an important subset of that SSO's members. Although the IEEE's standards-setting process adheres strictly to principles of consensus, openness, due process, balance, and right to appeal, the process for amending the Standards Board bylaws does not. Commentators, and even the IEEE itself, have acknowledged that discrepancy. Furthermore, evidence shows that the IEEE members that are responsible for the IEEE's amended patent policy exploited the lack of safeguards in the IEEE's bylaw-amendment process to introduce changes to the patent policy in 2015 with the effect of decreasing the price that those members pay to use SEPs.

1. The IEEE's Process for Amending the Standards Board Bylaws

Any amendment to the Standards Board bylaws begins with a formal proposal for modification, which then takes effect if approved by the Standards Board and the Board of Governors.[38] The Standards Board bylaws set as the minimum period for advance notice of proposed changes "at least 30 days before the IEEE-SA Standards Board meeting where the vote on these modifications shall be taken."[39] The Procedures Committee (ProCom) of the Standards Board may provide the initial review of each proposal.[40] However, the bylaws do not mandate that ProCom review all proposals,[41] and PatCom notably did not seek such review for the 2015 patent-policy revisions.[42] The bylaws specify that, to obtain the Standards Board's approval for a proposed amendment, "[t]wo-thirds of the voting Board members present at the meeting shall be required to approve any modifications."[43] If the Standards Board votes to approve the amendment, the standard for approval by the Board of Governors is generous: the Board of Governors "shall approve proposed changes to IEEE-SA Standards Board Bylaws unless there is a conflict with its governing documents."[44] Thus, the bylaws set forth only two explicit safeguards that an initiator of an amendment proposal must heed: (1) that the proposal obtain the two-thirds approval of the Standards Board, and (2) that the initiator of the amendment proposal give advance notice of at least 30 days to other members of the IEEE-SA that a vote will be held.

38 IEEE Standards Board Bylaws, *supra* note 1, § 8, at 21. *Id.* § 8, at 21.
39 *Id.*
40 *Id.*
41 *Id.*
42 IEEE Business Review Letter Request, *supra* note 10, at 3–4.
43 IEEE Standards Board Bylaws, *supra* note 1, § 8, at 21.
44 IEEE-SA Operations Manual, *supra* note 29, § 5.1, at 15 (emphasis omitted).

Thus, the process of amending the Standards Board bylaws is relatively vague and informal when compared with the rigorous and carefully monitored standards-setting process.

Because the IEEE's bylaw-amendment process is opaque and ill-defined, it effectively lacks any safeguards to uphold the principles of openness, consensus, balance, due process, and right to appeal. For example, the bylaws do not require that any meeting to formulate, discuss, or draft amendments to the bylaws remain open to all interested parties, or that a neutral and dispassionate report of the meeting's proceedings be available to all interested parties. There is no requirement that a committee entrusted with amending the bylaws must accurately represent the balance of competing interests among its members. The initiator of an amendment proposal has no obligation to report the purpose of the proposal or the specific problem that the proposal seeks to address. If a member disagrees with the substance of an amendment proposal, no formal mechanism exists for resolving the disagreement through compromise. Moreover, once an amendment has received the necessary approval of the Standards Board and the Board of Governors, members cannot appeal the decision or modify the amendment. Thus, the lack of consensus building and safeguards presents an opportunity for parties to amend the IEEE's procedures and bylaws in pursuit of anticompetitive ends—for example, to give effect to an agreement in restraint of trade. The IEEE's amendment of its patent policy in 2015 upheld none of the safeguards for the principles of openness, consensus, balance, due process, and right to appeal.

2. *The Evidence of Opportunistic Conduct in the IEEE's 2015 Patent-Policy Revisions*

At a meeting in March 2013, PatCom's members proposed the formation of an *ad hoc* committee to determine which, if any, of the Antitrust Division's recommendations on how SSOs could clarify their patent policies to mitigate risks of patent holdup and royalty stacking suited the IEEE.[45] At the next meeting, in June 2013, the *ad hoc* committee reported that some of the recommendations were applicable.[46] PatCom reinstated the *ad hoc* commit-

[45] IEEE Business Review Letter Request, *supra* note 10, at 13; Deputy Assistant Attorney General Renata Hesse communicated those recommendations in a speech to the International Telecommunications Union (ITU). Renata Hesse, Deputy Assistant Attorney Gen., U.S. Dep't of Justice, Six "Small" Proposals for SSOs Before Lunch: Remarks as Prepared for the ITU-T Patent Roundtable 5, 9–10 (Oct. 10, 2012), http://www.justice.gov/atr/public/speeches/287855.pdf. For a summary of these recommendations, see J. Gregory Sidak, *The Antitrust Division's Devaluation of Standard-Essential Patents*, 104 Geo. L.J. Online 48, 49–50 (2015), https://www.criterioneconomics.com/antitrust-divisions-devaluation-of-standard-essential-patents.html.

[46] IEEE Business Review Letter Request, *supra* note 10, at 13.

tee and oversaw the subsequent drafting and implementation of the changes to the IEEE's patent policy.[47]

Both the foundational documents of the IEEE and its history of consensus-driven standard setting demonstrate that the 2015 bylaw amendments constituted a deviation from the safeguards guaranteed to members of the IEEE-SA. Comments from IEEE members on the proposed patent policy and from other scholars and commentators with expertise on these issues have identified a number of defects and peculiarities in the development and approval of the patent-policy amendments.[48] Furthermore, the amendment process did not protect or consider the interests of members that disproportionately contribute technologies to the IEEE standards. Thus that process lacked consensus of any sort. Nor did the process comport with the principle of openness or establish a balanced and neutral committee for reviewing and recommending changes to the patent policy.

a. The Lack of Consensus Among All Materially Affected Parties

From the start of the amendment process, disagreement pitted the implementers of the standards (the buyers of the proprietary standard-essential technology) against the owners and sellers of that technology. My letter to the Antitrust Division on January 28, 2015 explained that the IEEE's amended bylaws could facilitate buyer collusion,[49] and major contributors of technology to the IEEE's standards expressed similar concerns. Ericsson told the IEEE that the proposed amendments "constitute[] the collective establishment of mandatory, uniform license terms . . . akin to a buyer's-side cartel."[50] Other major holders of patents essential to IEEE standards, including Qualcomm and Nokia, shared Ericsson's concern.[51]

On the other hand, large buyers of standard-essential technology and implementers of the IEEE standards expressed entirely different sentiments

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[47] *Id.*

[48] *See, e.g.*, Roy Hoffinger, *The 2015 DOJ IEEE Business Review Letter: The Triumph of Industrial Policy Preferences Over Law and Evidence*, Competition Pol'y Int'l: Antitrust Chron., Mar. 2015; Ron D. Katznelson, *Perilous Deviations from FRAND Harmony—Operational Pitfalls of the 2015 IEEE Patent*, 9 IEEE International Conference on Standardization and Innovation in Information Technology (SIIT), Oct. 2015, at 1; Memorandum from Ronald Katznelson, Member of the Intellectual Property Committee, IEEE-USA, to Gary Blank, President, IEEE-USA, & Thomas Tierney, VP Government Relations, IEEE-USA § 2.1, at 3 (Aug. 13, 2014) [hereinafter Katznelson Memorandum to IEEE-USA]; Four Company Letter, *supra* note 9.

[49] *See* Letter from J. Gregory Sidak, Chairman, Criterion Economics, L.L.C., to Hon. Renata Hesse, Deputy Assistant Attorney General, U.S. Department of Justice (Jan. 28, 2015) [hereinafter Sidak's Letter to Hesse], https://www.criterioneconomics.com/proposed-ieee-bylaw-amendments-affecting-frand-licensing-of-seps.html.

[50] IEEE-SA Standards Board Patent Committee, IEEE-SA Patent Policy: Draft Comments ID No. 38 (comments of Dina Kallay, Director for IP and Competition, Ericsson) (Mar. 4, 2014) [hereinafter IEEE-SA Patent Policy: Draft Comments, Second Round], http://grouper.ieee.org/groups/pp-dialog/drafts_comments/PatCom_sort_by_commentID_040314.pdf.

[51] *Id.* at ID Nos. 13, 38, 61 (comments of Daniel Hermele, Director of IPR and Licensing, Qualcomm; Dina Kallay, Director for IP and Competition, Ericsson; Jari Vaario, Head of Patent Licensing, Nokia).

in their public statements—one of which was jointly produced by a group of major implementers—about the merits of and need for the proposed amendments. In particular, one commentator dismissed the objections of the IEEE's major SEP holders, claiming that their "disapproval has a lot more to do with protecting their business models than it does with the proper role of antitrust enforcement" and that actual innovators overwhelmingly agreed with the substance of the amendments.[52] Other proponents sent a letter to the IEEE's leadership endorsing the proposed amendments.[53] In their joint letter, these implementers "urge[d] the IEEE Board to support the IEEE-SA's efforts" in revising the patent policy.[54] They claimed that the revisions would "protect[] companies that make, use and sell devices using IEEE standards from unfair licensing and litigation practices that can degrade the IEEE ecosystem."[55] However, the letter supports that assertion with no evidence besides a brief mention of litigation involving an SEP holder that "sought license fees of thousands of dollars per Wi-Fi chip against hotels and small retail businesses."[56] Such behavior was hardly the norm among members of the IEEE that were major contributors of its standard-essential technology.

This heavily publicized controversy about the short-run and long-run effects of the 2015 patent-policy revision confirms that there was little, perhaps no, consensus between the two groups of IEEE members most materially affected by that revision. PatCom and its *ad hoc* committee did little to address this disagreement between SEP holders and implementers, let alone attempt to reach consensus—as defined by the Standards Board bylaws—on the contentious issues that divided the two groups. The Standards Board bylaws state:

> Consensus is established when, in the judgment of the IEEE-SA Standards Board, substantial agreement has been reached by directly and materially affected interested categories. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.[57]

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[52] Henry Phillips, *Cisco Lawyer: Innovators Rightly Support IEEE Rules*, Global Competition Rev. (Apr. 15, 2015), http://globalcompetitionreview.com/usa/article/38404/cisco-lawyer-innovators-rightly-support-ieee-rules/.

[53] Letter from Ira Blumberg, Vice President of Intellectual Property, Lenovo Group Limited, *et al.* to Howard E. Michel, President & CEO, Institute of Electrical and Electronics Engineers, and Bruce Kraemer, President, IEEE-SA & Director, IEEE (Jan. 30, 2015) [hereinafter Implementers' Joint Letter to IEEE], http://comparativepatentremedies.blogspot.com/2015/02/letter-in-support-of-proposed-ieee-sa.html.

[54] *Id.*

[55] *Id.*

[56] *Id.* (emphasis omitted).

[57] IEEE Standards Board Bylaws, *supra* note 1, § 2.1, at 2.

In an email to the Standards Board members, some SEP holders observed that the *ad hoc* committee, in responding to comments from interested parties, "have not made a 'concerted effort' to resolve objections raised by the undersigned companies."[58] Another SEP holder sent a letter to the IEEE-SA on February 6, 2015, in which it asserted that the 2015 patent-policy revisions lacked consensus, because they resulted from "a number of companies sharing common interests and having dominant voting power at all levels in the IEEE decision-making process."[59] The *ad hoc* committee itself acknowledged that the bylaw-amendment process lacked such consensus: "Although achieving broad agreement among all interested constituencies is a laudable goal, adoption of the recommendations *does not require consensus of all materially affected parties*."[60]

b. The Bylaw-Amendment Process Lacked Openness and Balance

Both during and after the ratification of the 2015 patent-policy amendments, commentators criticized the lack of openness and balance in the process by which PatCom and its *ad hoc* committee drafted, revised, and approved the bylaw amendments.[61] With respect to the openness of the bylaw-amendment process, Dina Kallay, who represented Ericsson during the comment rounds, requested that PatCom, "at a minimum, open up the ad-hoc group process to all interested IEEE members to allow them to equally weigh into the process."[62] The *ad hoc* committee responded by reminding Kallay that "policy drafts are made public, comments on those drafts are invited and are made public, responses to those comments are developed and made public, . . . and the recommended text will be considered at public meetings of the IEEE-SA."[63] Nonetheless, that response does not address the concerns that SEP holders expressed in an email to the Standards Board that the *ad hoc* committee "shrouded its work in secrecy" by refusing to "openly attribute[] to any particular member of the Ad Hoc" committee the specific proposed changes to the IEEE patent policy.[64] Kallay also asserted that the *ad hoc* committee

[58] Four Company Letter, *supra* note 9.

[59] Letter from Valerie Hamelin, Orange, to IEEE-SA at 1 (Feb. 6, 2015), http://grouper.ieee.org/groups/pp-dialog/email/pdfLzkBsGmaJQ.pdf.

[60] IEEE-SA Patent Policy: Draft Comments, First Round, Comment ID No. 39 (response to comment of Daniel Hermele, Director of IPR and Licensing, Qualcomm (Sept. 23, 2013)), http://grouper.ieee.org/groups/pp-dialog/drafts_comments/PatCom_sort_by_commentID_141113.pdf (emphasis added).

[61] Hoffinger, *supra* note 48; Katznelson Memorandum to IEEE-USA, *supra* note 48; *see also* Lisa Kimmel, *Standards, Patent Policies, and Antitrust: A Critique of IEEE-II*, 29 Antitrust 18, 20 (2015) ("Opponents complained that the composition of the ad hoc committee did not reflect the interests of patent owners; they claimed that their comments were disregarded, and that the principles of due process and consensus that applied to the development of IEEE technical standards were missing from the development of the patent policy.").

[62] IEEE-SA Patent Policy: Draft Comments, Second Round, *supra* note 50, Comment ID 36 (comments of Dina Kallay, Director for IP and Competition, Ericsson).

[63] *Id.*

[64] Four Company Letter, *supra* note 9.

"meets in [sic] closed doors to consider far-reaching changes to the [IEEE's patent policy]."[65] This practice of closing the *ad hoc* committee's membership deviates from PatCom's past practices in forming *ad hoc* committees. For example, in June 2007, PatCom decided to form an *ad hoc* committee to address issues surrounding a member's submission of a letter of assurance (LOA), and PatCom allowed any IEEE member to join that committee who expressed interest in doing so.[66]

This concern regarding openness in the *ad hoc* committee dovetails with the similar concern regarding the unbalanced composition of that committee's membership during the 2015 process of revising the patent policy. Table 1 displays the composition of the *ad hoc* committee from 2013 to 2014 (the period over which the *ad hoc* committee drafted the amendments).

Table 1. Voting Members of PatCom's *Ad Hoc* Committee (2013–2014)

Name	Employer	Affiliation	Year Served	PatCom Member?
Phil Wennblom	Intel	Intel	2013, 2014	Yes
Jim Hughes	Microsoft	Microsoft	2013, 2014	Yes
David Law	Hewlett-Packard	Hewlett-Packard	2013, 2014	Yes
Wael Diab	Broadcomm	Broadcomm	2013	Yes
Alex Gelman	NETovations	NETovations	2013	Yes
Don Wright	Self/Retired	Apple	2013, 2014	No
Hung Ling	Alcatel-Lucent	Alcatel-Lucent	2014	Yes
Glenn Parsons	Ericsson	Ericsson	2014	Yes

Source: Ron D. Katznelson, Will New IEEE Standards Incorporate Patented Technologies Under the Proposed Patent Policy? 13 (Dec. 23, 2014), http://s3.amazonaws.com/sdieee/1824-1806-SD%2BSection-IEEE-Standards-Patent%2BPolicy%2BDec-23-2014v2.pdf; Four Company Letter, *supra* note 9.

Table 1 shows that in 2013 individuals affiliated with net implementers of SEPs held five of the six voting slots in the *ad hoc* committee, and four of the six voting slots in 2014. (In 2013, the five net implementers were Intel, Microsoft, Hewlett-Packard, Broadcomm, and Apple; in 2014, the four net implementers were those same companies less Broadcomm.) PatCom did not add any members affiliated with large SEP holders that were net licensors (Ericsson and Alcatel-Lucent) until 2014. In other words, PatCom failed to achieve the balancing of interests in its *ad hoc* committee that the IEEE-SA

[65] Email from Dina Kallay, Director of Intellectual Property & Competition, Ericsson, to Patent Policy Dialogue (June 6, 2014 18:48), http://grouper.ieee.org/groups/pp-dialog/email/msg00283.html.

[66] *See* Email from David Law, Patent Committee, IEEE-SA Standards Board, to Members of Standards Board, IEEE-SA (Aug. 11, 2007 19:20), http://grouper.ieee.org/groups/pp-dialog/email/msg00229.html.

demands in its standard-setting working groups and balloting groups. Before PatCom reconstituted the *ad hoc* committee's membership in 2014, an IBM representative urged PatCom to consider the merits of adding a "patent practitioner" to the *ad hoc* committee.[67] He analogized "[t]he dearth of patent practice experience on the patent policy drafting committee" to "lawyers drafting an IT standard with no technical people involved," and he urged PatCom to include in the *ad hoc* committee "at least one 'patent' person."[68]

One commentator has observed that "the outcome of the process designed and implemented by PatCom and the Ad Hoc [committee] was thoroughly in line with the public and litigation positions of major licensees with which the majority of their members was affiliated."[69] Indeed, the most controversial elements of the 2015 patent-policy revisions align almost identically with many implementers' public views on matters, such as the availability of an injunction to an SEP holder and the proper royalty base for an SEP. A Qualcomm representative noted in May 2014 that "it is very concerning that several proposed amendments . . . are directed to specific issues . . . in ongoing litigation and competition investigations involving certain companies which employ or have consultancy arrangements with certain members of the 2013 or 2014 Ad Hoc [committee] and who are in leadership positions in PatCom."[70] Even after members raised awareness of the *ad hoc* committee's disproportionate composition, PatCom rejected requests to reconstitute the committee's membership, and "[o]nly in 2014 did PatCom add to the Ad Hoc [committee] two individuals affiliated with companies critical of the [amendments]."[71] Thus, the two committees directly responsible for the creation and production of the patent-policy revisions primarily consisted of representatives from implementers, all of which shared the same incentive to depress the prices paid to use SEPs.

c. The IEEE's Defense of the Bylaw-Amendment Process

Aware of the concerns that members raised about the substance of the revisions and the process by which they were introduced, PatCom dodged its accountability, asserting that revision to the IEEE-SA's governance documents did not require adherence to the consensus building and safeguards of standards development. Critics of the amendments and the amendment

[67] Email from Marc Sandy Block, Intellectual Property & Standards Counsel, IBM, to Members of the Patent Committee, IEEE-SA (June 7, 2014 14:00 PST), http://grouper.ieee.org/groups/pp-dialog/email/msg00286.html.

[68] *Id.*

[69] Hoffinger, *supra* note 48, at 7.

[70] IEEE-SA Standards Board Patent Committee, IEEE-SA Patent Policy: Draft Comments ID No. 8 (comments of Daniel Hermele, Director of IPR and Licensing, Qualcomm) (May 10, 2014) [hereinafter IEEE-SA Patent Policy: Draft Comments, Third Round], http://grouper.ieee.org/groups/pp-dialog/drafts_comments/PatCom_sort_by_commentID_100514.pdf.

[71] Hoffinger, *supra* note 48, at 8.

process complained that PatCom and the *ad hoc* committee rejected most of their suggestions and refused to answer clearly most of their questions.[72] In response to one comment that the amendment process was not consensus-driven, the *ad hoc* committee replied that "[t]he review and updating of IEEE's patent policy is a governance function and it is not the same as the standards development process," by which PatCom implied that openness, consensus, balance, due process, and right to appeal were unnecessary for amending the patent policy.[73]

The IEEE further attempted to minimize the expressed concerns with its amendment process in its request for a business review letter from the Antitrust Division. The IEEE reassured the Division that the members of the IEEE-SA's Board of Governors, its Standards Board, and the Standard Board's committees (including PatCom) were "asked to disclose their employers or other affiliations" and that those members "serve[d] in their individual capacities, and not as representatives of their employers."[74] Furthermore, in January 2015 (almost four months after the IEEE sent its request for a business review letter), the Division asked the IEEE to furnish "documents supporting the proposition that members of the IEEE Board of Directors and of the IEEE-SA Board of Governors and IEEE-SA Standards Board have fiduciary duties to IEEE."[75] In response, the IEEE quoted the language of section 717(a) of the New York Not-For-Profit Corporation Law[76] that imposes fiduciary duties on IEEE members and attached "documentation," which consisted of a screenshot of the IEEE's "Governing Documents" webpage and a presentation by the IEEE and its outside law firm that explained the specific fiduciary duties of its members, which the IEEE shows to all of its members annually.[77] In the annual presentation attached to its response, the IEEE said that "[e]ach Standards Association participant serving on a governing board (e.g. [the Board of Governors], [the Standards Association Standards Board], and their committees) have [sic] fiduciary duties to the IEEE," including a "duty of care, duty of loyalty and duty of obedience."[78] In particular, the presentation stated that the fiduciary duty of loyalty requires that an IEEE member "act in the best interests of the IEEE, which includes protecting the IEEE

[72] *See id.* at 9; Katznelson Memorandum to IEEE-USA, *supra* note 48, § 2.3, at 8–9.

[73] IEEE-SA Patent Policy: Draft Comments, Third Round, *supra* note 70, Comment ID 8 (response to comments of Daniel Hermele, Director of IPR and Licensing, Qualcomm).

[74] IEEE Business Review Letter Request, *supra* note 10, at 4.

[75] Letter from Michael A. Lindsay, Esq., Dorsey & Whitney, L.L.P., to Frances Marshall, Esq., U.S. Department of Justice (Jan. 28, 2015), http://www.gtwassociates.com/answers/DOJ%20PDF/IEEEBRL2015/FidiciaryDutyIEEE_Bus_Review_Document_11_01282015.pdf.

[76] *Id.* (quoting N.Y. Not-For-Profit Corp. L. § 717(a)).

[77] *Id.* Exhibit B.

[78] *Id.*

from consequences resulting from unauthorized actions or inactions and/or unethical conduct by Standards Association participants."[79]

However, a recapitulation of the fiduciary duties of IEEE members is not a sufficient response to allegations of biased conduct in the IEEE's bylaw-amendment process. To suppose that the representatives of companies that would greatly benefit from a favorable rewriting of the IEEE's patent policy are neutral merely because they have a fiduciary duty to act in the general interests of the IEEE is facile. Furthermore, despite clarifying that the bylaw-amendment process need not adhere to the principles of openness, due process, balance, right to appeal, and consensus, the IEEE asserted that "[t]he process by which the policy has been developed has been transparent, as well as consistent with the established role that IEEE has fulfilled in the global standards development process."[80] Yet, the evidence from commentators, some of whom were familiar with the amendment process, indicates otherwise.

In fact, the deviation from the IEEE's safeguards compelled one of the IEEE's major boards—the IEEE-USA—to issue a formal statement in 2014 that questioned whether the IEEE's bylaw-amendment process should be refined to mirror the consensus-driven approach of the IEEE's standard-setting process.[81] In its statement, the IEEE-USA Board of Directors specifically questioned whether "the current non-consensus-based [Standards Board] governance" exposed the IEEE to potential liability arising from "third-party claims under US competition laws."[82] The Board of Directors also requested "[a] comparison of [the current Standards Board governance] to a potential alternative instrument whereby actions on the intellectual property policies of IEEE-SA are to be taken under consensus procedures as used for promulgating IEEE technical standards."[83] The IEEE-USA's underscoring of this discrepancy between the IEEE's bylaw-amendment process and its standard-setting process directly contradicted the IEEE-SA's assertion that its 2015 patent-policy revision was "consistent with the established role that IEEE has fulfilled in the global standards development process."[84]

Caught in this contradiction, the IEEE tells commentators that the extensive safeguards embedded in its standard-setting process do not apply to its bylaw-amendment process, even while claiming that the bylaw-amendment process is equally committed to those safeguards. The extreme disagreement over the substance of the patent-policy revisions and the outcry over the lack

79 *Id.*
80 IEEE Business Review Letter Request, *supra* note 10, at 19.
81 IEEE-USA Approved Motion, *supra* note 7.
82 *Id.*
83 *Id.*
84 IEEE Business Review Letter Request, *supra* note 10, at 19.

of transparency, balance, and consensus in the process are evidence that such safeguards were absent from the bylaw-amendment process.

II. Comments Submitted to the IEEE Patent Committee

Data in the public domain further reveals a strong negative relationship between an IEEE member's status as an SEP holder and the *ad hoc* committee's propensity to accommodate that member's input in the development of the 2015 patent-policy revisions. I collect and analyze comments that representatives of IEEE member firms submitted to the *ad hoc* committee during five public comment periods from 2013 to 2014. During the public comment periods, the *ad hoc* committee released a draft of the patent-policy revisions and the supporting "frequently asked questions" (FAQs) document. Parties who were not committee members were then permitted to submit suggestions and edits to the substance of the drafts, which the *ad hoc* committee would either accept and implement in the next iteration of the drafts, or reject. The *ad hoc* committee released four drafts of the patent-policy revisions and two drafts of the FAQs for comments. I identify the substantive provisions of the IEEE's patent-policy revisions on the basis of whether those provisions had the marginal effect of suppressing the level of RAND royalties for SEPs. I also identify which firms were SEP holders and which firms were SEP implementers on the basis of whether the firm in question publicly supported or publicly opposed the 2015 patent-policy revisions, or did neither (that is, remained publicly neutral). I use the data described here for the empirical analysis that I report in Part III.

A. Substantive Revisions That Might Decrease the Level of RAND Royalties

After analyzing every comment that the IEEE members submitted to the *ad hoc* committee, I indexed comments that related to one (or more) of four categories of substantive revisions: (1) Prohibitive Order; (2) Reasonable Rate; (3) Reciprocal Licensing; and (4) Compliant Implementation. Those four categories encompass the most controversial amendment provisions that the IEEE ultimately incorporated into its 2015 patent policy. In addition, I analyze how those substantive revisions, given the limitations that they place on SEP holders, might decrease the level of RAND royalties.

The revised patent policy defines a Prohibitive Order as "an interim or permanent injunction, exclusion order, or similar adjudicative directive that limits or prevents making, having made, using, selling, offering to sell, or importing" a standard-compliant implementation.[85] The revised patent

[85] IEEE Standards Board Bylaws, *supra* note 1, § 6.1, at 15.

policy requires an SEP holder to agree that it "shall neither seek nor seek to enforce a Prohibitive Order" with respect to its SEPs, unless the implementer refuses to comply with the adjudicated outcome of litigation or arbitration.[86] Limiting the SEP holder's ability to seek an injunction or exclusion order reduces the SEP holder's bargaining power in its negotiation with the implementer and would depress the level of RAND royalties for SEPs, in part by truncating the bargaining range for an SEP license in the implementer's favor.[87] I identify as substantive any comment directed at the Prohibition Order revision.

The revised patent policy mandates that a Reasonable Rate exclude "the value, if any, resulting from the inclusion of that [SEP] in the IEEE Standard."[88] To the extent that the adjudicator of a RAND royalty interprets this provision to mandate excluding from a RAND royalty *any* of the standard's value, this revision could further depress the level of RAND royalties. Only when a RAND royalty includes part of the standard's value to which an SEP contributes will that royalty properly compensate the SEP holder for its technological contribution to the standard.[89] The new policy also recommends that an SEP holder and an implementer should determine a Reasonable Rate for an SEP by considering (1) the value that the SEP contributes to the smallest saleable patent-practicing component of the standard-compliant product; (2) the degree to which a royalty for an SEP contributes to a reasonable aggregate royalty burden for implementing the relevant standard; and (3) comparable licenses that were *not* obtained under "the explicit or implicit threat of a Prohibitive Order."[90] I have written previously that calculating the RAND royalty on the basis of the value of the smallest saleable patent-practicing component would generally decrease the level of RAND royalties.[91] In addition, limiting the use of comparable licenses to determine a RAND royalty on the basis of vague concerns that the parties that executed those comparable licenses did so under the threat of a Prohibitive Order also decreases the SEP holder's bargaining power

[86] *Id.* § 6.2, 18.

[87] *See* J. Gregory Sidak, *The Meaning of FRAND, Part II: Injunctions*, 11 J. Competition L. & Econ. 201, 236 (2015); *see also* Joshua D. Wright, Comm'r, Fed. Trade Comm'n, Remarks at the Center for the Protection of Intellectual Property Inaugural Academic Conference: The Commercial Function of Patents in Today's Innovation Economy 28–29 (Sept. 12, 2013) [hereinafter 2013 Remarks of Commissioner Wright]; *see also* Certain Wireless Devices with 3G and/or 4G Capabilities and Components Thereof at 114, USITC Inv. No. 337-TA-868 (June 13, 2014) (initial determination).

[88] IEEE Standards Board Bylaws, *supra* note 1, § 6.1, at 16.

[89] *See* J. Gregory Sidak, *Apportionment, FRAND Royalties, and Comparable Licenses After* Ericsson v. D-Link, 2016 U. Ill. L. Rev. 1809.

[90] IEEE Standards Board Bylaws, *supra* note 1, § 6.1, at 16.

[91] *See* J. Gregory Sidak, *The Proper Royalty Base for Patent Damages*, 10 J. Competition L. & Econ. 989, 991 (2014) ("Using the price of the smallest salable patent-practicing component as the royalty base risks undercompensating the patent holder, because it ignores (1) the effects that the patented technology has on the value of the downstream product and (2) the value that synergies between complementary technologies create.").

in a license negotiation and truncates the upper portion of the bargaining range. I label as substantive those comments that relate to the Reasonable Rate revisions in the proposed amendments. I also distinguish as substantive those comments that address the Compliant Implementation revisions in the proposed amendments, because that term specifies royalty bases for calculating the Reasonable Rate that parties do not normally use in market-based transactions for licensing SEPs.[92]

Moreover, the revised bylaws obligate SEP holders to agree to Reciprocal Licensing to license other SEP holders.[93] That is, in a negotiation for a cross license between SEP holder *A* and SEP holder *B*, even if SEP holder *A* refuses to pay a RAND royalty for licensing SEP holder *B*'s SEPs, SEP holder *B* will not have the option to refuse to license its SEPs to SEP holder *A*. Consequently, an SEP holder with a weak SEP portfolio might be able to force an SEP holder with a strong SEP portfolio to execute a cross license on terms that do not adequately reflect the relative strengths of the parties' respective SEP portfolios. Put differently, that provision would strengthen the bargaining power of SEP holders with relatively weaker SEP portfolios in a negotiation for an SEP cross license and weaken the bargaining power of SEP holders with strong SEP portfolios. Such a change causes an arbitrary redistribution of wealth that reduces the likelihood that SEP holders that invested in research and development of standard-essential technologies will receive adequate compensation for their innovative contributions to the success of the IEEE's standards. Furthermore, the Reciprocal Licensing provision prevents an SEP holder from licensing on the condition (1) that the licensee agree to grant a license to any of the licensee's SEPs or (2) that the licensee also license the SEP holder's standard-*in*essential technology.[94] This provision limits the parties' flexibility in negotiating for an SEP cross license and would, all other things being equal, increase the cost of licensing. The IEEE's departure from its past policy of not limiting the parties' flexibility in SEP licensing would harm the holders of large SEP portfolios.[95] I iden-

[92] The full definition of Compliant Implementation in the revised patent policy is "any product (e.g., component, sub-assembly, or end-product) or service that conforms to any mandatory or optional portion of a normative clause of an IEEE Standard." IEEE Standards Board Bylaws, *supra* note 1, § 6.2. For a discussion of the royalty base on which most market-based transactions for the licensing of SEPs are based, see Sidak, *The Proper Royalty Base for Patent Damages*, *supra* note 91, at 996 ("Voluntary licenses negotiated for patented technologies implemented in multi-component products typically use the entire market value of the downstream product as a royalty base.") (citing Research in Motion, Response Concerning Call for Evidence by the Independent Review of Intellectual Property and Growth 6 (2011)).

[93] IEEE Standards Board Bylaws, *supra* note 1, § 6.2, at 17 ("[A] Submitter shall have no ability to exclude Affiliates if the Submitter has indicated Reciprocal Licensing on an Accepted Letter of Assurance.").

[94] *Id.*

[95] Other major SSOs maintain this policy of not interfering with their members' license negotiations. *See, e.g.*, International Telecommunication Union, Guidelines for Implementation of the Common Patent Policy for ITU-T/ITU-R/ISO/IEC, Annex 1, at 9 (June 26, 2015), https://www.itu.int/dms_pub/itu-t/oth/04/04/T04040000010004PDFE.pdf.

tify comments related to the Reciprocal Licensing revisions as substantive comments.

In sum, for purposes of my empirical analysis, I identify as substantive the comments that IEEE members submitted to the *ad hoc* committee that relate to the four identified revisions above. I find that, of the 670 comments in the dataset, 510 comments address substantive revisions.

B. IEEE Members That Submitted Comments Regarding the Proposed Bylaw Amendments

To analyze whether PatCom's *ad hoc* committee manifested bias in its acceptance and rejection of comments that companies submitted regarding the IEEE's 2015 patent-policy revisions, I subdivide the companies that submitted comments into three groups: (1) those that publicly opposed the proposed revisions, (2) those that publicly supported the proposed revisions, and (3) those that neither publicly opposed nor publicly supported the proposed revisions. Table 2 lists the IEEE members in each category.

Table 2. IEEE Members That Submitted Comments Regarding the Proposed Bylaw Amendments

Members That Publicly Opposed	Members That Publicly Supported	Members That Remained Publicly Neutral
Alcatel-Lucent	Apple	GTW Associates
Blackberry	Cisco	Huawei
Ericsson	Google	NTT Corp.
IBM	Intel	
Nokia	Microsoft	
Nokia Systems & Networks		
Orange		
Qualcomm		

Source: Author's analysis.

One would predict that a balanced bylaw-amendment process (and, by extension, the committee entrusted with accepting or rejecting comments to the proposed bylaw amendments) would incorporate, at approximately equal rates, comments from firms that opposed the proposed amendments and comments from firms that supported the proposed amendments. Table 3 reveals the respective rates at which the *ad hoc* committee rejected comments made by firms that (1) publicly opposed, (2) publicly supported, and (3) remained publicly neutral with respect to the proposed amendments.

Table 3. Rejection Rate of Comments Grouped by Opposing, Supporting, and Neutral IEEE Members

Public Stance	Total Comments	Comments Rejected	Percentage Rejected
Opposed	525	448	85.33%
Supported	110	51	46.36%
Neutral	35	30	85.71%
Total	670	529	78.96%

Note: I omit from the dataset one comment made by an individual who listed no company affiliation.

Table 3 clearly shows a significantly higher rejection rate of comments submitted by firms that opposed or were neutral toward the proposed bylaw amendments than for firms that supported the proposed changes. Table 4 contains summary statistics for each firm. My empirical analysis in Part III tests empirically whether the process by which the IEEE amended its bylaws adequately and equitably reflected the overall composition of the comments that its members submitted.

Table 4. Summary of Comment Data by Company

Company	Comments Submitted	Comments Rejected	Percentage Rejected	Member on *Ad Hoc* Committee in 2013 or 2014
Alcatel-Lucent	25	22	88%	Yes, 2014
Apple	23	12	52.17%	Yes, 2013–14
BlackBerry	44	42	95.45%	No
Cisco	23	7	30.43%	No
Ericsson	84	72	85.71%	Yes, 2014
GTW Associates	28	24	85.71%	No
Google	10	5	50%	No
Huawei	5	5	100%	No
IBM	37	26	70.27%	No
Intel	52	25	48.08%	Yes, 2013–14
Microsoft	2	2	100%	Yes, 2013–14
Nokia	50	42	84%	No
Nokia Systems & Networks	24	19	79.17%	No
NTT Corp.	2	1	50%	No
Orange	27	15	55.56%	No
Qualcomm	234	210	89.74%	No
Total	670	529	78.96%	

Many of the members that opposed the proposed bylaw amendments are companies that were early industry leaders in developing telecommunications standards. As I explain in Part IV, they invested heavily in developing mobile communications standards and consequently own large portfolios of SEPs. Their market positions in the manufacturing of mobile devices for consumers have declined, and by the time of the IEEE bylaw amendments these members derived a greater portion of their total revenue from licensing their SEP portfolios. Conversely, the members that supported the bylaw amendments include companies that chose to invest in product differentiation of mobile devices and the development of implementation patents. Consequently, those implementers have weaker SEP portfolios than the members that opposed the bylaw amendments. One might also characterize these two groups as consisting of net licensors and net licensees (or, equivalently, net implementers) of standard-essential technologies, respectively.

III. Empirical Analysis of Bias in the *Ad Hoc* Committee's Treatment of Comments During the Revision Process

In this Part, I report findings that the *ad hoc* committee was significantly more likely to reject a member's suggestion or edit to a substantive provision of the amended patent policy if the member was a holder of a large SEP portfolio (rather than an implementer). That empirical finding supports the inference that IEEE members with weaker SEP portfolios manipulated the bylaw-amendment process to redistribute in their favor the economic surplus created by standard setting.

During the period when the *ad hoc* committee and PatCom presented drafts of revisions to the IEEE Standards Board's bylaws and the FAQs associated with the bylaws, the *ad hoc* committee received comments on those proposed revisions from sixteen companies. After considering each comment, the *ad hoc* committee identified whether the comment was rejected, accepted in principle, or accepted in further revisions of the bylaws and FAQs. Many comments offered specific line edits or revisions to the proposed changes. Consequently, many more comments were "accepted in principle" than "accepted," which would indicate accepting the proposed edit versus merely acknowledging that an edit was necessary.

The *ad hoc* committee made the comments and the *ad hoc* committee's corresponding responses available to the public.[96] Each comment identifies its author, the author's affiliation, and the line ranges in the bylaws or FAQs to which the comment refers. As I explained in Part II.B, not every commenting firm supported the patent-policy revisions. Alcatel-Lucent, Blackberry, Ericsson, IBM, Nokia, NSN (a wholly owned subsidiary of Nokia), Orange, and Qualcomm opposed the revisions. Most of those firms hold relatively large SEP portfolios and typically receive positive net payments in an SEP cross license with other firms in the industry.[97] I find empirically that the committee's treatment of the comments exhibited a bias against those eight firms.

[96] IEEE-SA Standards Board Patent Committee, IEEE-SA Patent Policy: Draft Comments (Sept. 23, 2013), http://grouper.ieee.org/groups/pp-dialog/drafts_comments/PatCom_sort_by_commentID_141113.pdf; IEEE-SA Standards Board Patent Committee, IEEE-SA Patent Policy: Draft Comments (Mar. 4, 2014), http://grouper.ieee.org/groups/pp-dialog/drafts_comments/PatCom_sort_by_commentID_040314.pdf; IEEE-SA Standards Board Patent Committee, IEEE-SA Patent Policy: Draft Comments (May 10, 2014), http://grouper.ieee.org/groups/pp-dialog/drafts_comments/PatCom_sort_by_commentID_100514.pdf; IEEE-SA Standards Board Patent Committee, IEEE-SA PatCom FAQ Comments (Nov. 13, 2014), http://grouper.ieee.org/groups/pp-dialog/drafts_comments/PatCom_sort_by_CommentID_111114.pdf; IEEE-SA Standards Board Patent Committee, IEEE-SA PatCom FAQ Comments (Dec. 2, 2014), http://grouper.ieee.org/groups/pp-dialog/drafts_comments/PatCom_sort_by_comment_ID_0301214.pdf.

[97] *See, e.g.*, LM Ericsson Tel. Co., Annual Report (Form 20-F) at 34–35, 143–44 (Dec. 31, 2014); Nokia Corp., Annual Report (Form 20-F) at 34 (Dec. 31, 2014); Qualcomm Inc. (Form 10-K) at 7, 37 (Nov. 5, 2014).

To analyze the *ad hoc* committee's treatment of the patent-policy revisions, I examine the difference between the treatment of comments on the four substantive revisions identified in Part II.A to the IEEE's patent policy and the treatment of comments on less substantive changes. Using the line ranges and FAQ numbers listed in the comments, I classified comments related to those four topics as substantive and comments related to other topics as not substantive. (Note that my definition differs from the *ad hoc* committee's classification of comments as substantive versus editorial in the publicly available comment data.) Using those data, I create a model to estimate the probability that the *ad hoc* committee rejects a given comment on the basis of two characteristics of the commenter: (1) whether the firm opposed the revisions and (2) whether the firm had representation on the *ad hoc* committee when it addressed the firm's comment.

Because I lack sufficient data to compare the treatment of comments with past revisions of IEEE bylaws or with revisions by other SSOs, I analyze the difference in the treatment of comments on the basis of the identity of the commenting firm and whether the comments concerned substantive or nonsubstantive provisions of the amendments. If PatCom (or the *ad hoc* committee) was neutral in its treatment of comments, there should be no observable difference in its treatment of substantive comments and nonsubstantive comments across the two different groups of commenting firms (that is, those opposing the revisions and those supporting them). It is possible that comments are typically rejected at a high rate during the revision process for any SSO. Typically, a comment will identify an issue of disagreement with the revisions, because a non-committee member who did not help to draft the revisions is more likely than a committee member to have a position inconsistent with the drafted revisions. Thus, to identify bias, it would not suffice to show that the *ad hoc* committee rejected a high percentage of comments.

Similarly, as I explained in Part I.B.2.b, the composition of the *ad hoc* committee strongly favored net implementers. Consequently, it is plausible that a high rejection rate of comments made by net licensors (that is, those firms opposed to the revisions) reflected merely the composition of the committee, rather than a biased treatment of the comments by the *ad hoc* committee.[98] To control for that possibility, I include a variable indicating whether a firm had representation on the *ad hoc* committee at the time of each particular round of revisions.

[98] Even if that argument were true, unbiased treatment from the *ad hoc* committee does not preclude bias in its formation. If the *ad hoc* committee's priors prejudiced it against accepting the comments of certain firms, then the outcome is the same as if the *ad hoc* committee was biased against accepting the same comments purely based on the commenting firm's identity.

An *ad hoc* committee member will already have commented on the draft revisions during the drafting process itself. In contrast, a firm that did not have representation on the *ad hoc* committee might be more likely to submit a comment during the public-comment period that the committee did not previously consider. Consequently, there will be a selection bias in the comments that the committee received through the public-comment process. If an *ad hoc* committee member had no practical need for the formal comment process because the member was directly presenting his or her comments to the *ad hoc* committee, then that member's comments are more likely to have been directly incorporated into the revisions themselves. Consequently, any of that member's remaining comments submitted during the public-comment process will be more likely to be rejected, because the member has already had ample opportunity to present those comments to the *ad hoc* committee. Therefore, if the process by which the committee reviews comments were unbiased, and if there were a selection effect based on membership on the committee, then a committee member's comments would be more likely to have been rejected than a nonmember's comments. Thus, the fact that those opposed to the bylaw amendments were not members of the *ad hoc* committee makes it less likely that an unbiased *ad hoc* committee would reject a nonmember's comments.

Using dummy variables for whether a firm opposed the revisions, whether its comment related to substantive provisions, and whether the commenting firm was represented on the *ad hoc* committee, I use a probit model to estimate the probability that a given comment is rejected.[99] In this regression, I exclude from my dataset the comments that were submitted by publicly neutral firms.[100] The dependent variable in the regression is a binary variable indicating whether the *ad hoc* committee rejected a comment. Comments that the *ad hoc* committee rejected have a value of 1, and comments that the *ad hoc* committee accepted or accepted in principle have a value of 0. The first independent variable is a dummy variable indicating whether the submitted comment was substantive in nature: substantive comments receive a value of 1, and nonsubstantive comments receive a value of 0. Next, I include an independent variable for whether a firm publicly opposed the revision: opposing

[99] The results with the probit model are virtually identical to the results using a logit model.

[100] Neutral firms are those for which I could not identify a public stance either opposing or supporting the controversial substance of the 2015 IEEE patent-policy revisions. Thus, I exclude them from my regression here to avoid mislabeling the stance that those firms took on the revisions. To check the robustness of my results, I run the regression under different specifications reported in Appendix I—first, with the neutral firms included in the category of firms in support; second, with the neutral firms included in the category of firms opposed; and, third, with neutral firms included as a separate category—so as to compare the treatment of the neutral firms to the treatment of the opposing firms and the supporting firms. I report the regression results and the marginal effects for each specification in Appendix I. In all four regressions (including the one reported in this Part), I find a statistically significant bias in the *ad hoc* committee's treatment of a substantive comment submitted by a firm opposed to the revisions.

firms have a value of 1, and supporting firms have a value of 0. I also include a dummy variable indicating whether the commenting firm was represented on the *ad hoc* committee: represented firms receive a value of 1, and nonrepresented firms receive a value of 0.

Finally, I include an interaction term that takes the value of 1 only if the comment meets two conditions: (1) a firm opposed to the revisions made the comment and (2) the comment concerned a substantive revision. Otherwise, the term takes a value of 0. That term is the key to identifying bias in the *ad hoc* committee's treatment of the specific comment. If the treatment of comments is unbiased, then any unobserved firm-specific effects should be similar for all types of comments. Likewise, any unobserved comment-type specific effects—for example, whether substantive or nonsubstantive comments were inherently more likely to be rejected—should be similar for all firms. However, a significant difference in the treatment of substantive comments by firms opposed to the revisions compared with the treatment of their nonsubstantive comments would indicate a bias against those firms opposed to the patent-policy revisions. Table 5 reports the results of my regression model.

Table 5. Regression of Firm Characteristics on the Probability of Comment Rejection

Variable	Coefficient	Standard Error
Substantive Comment	−0.2364805	0.2423938
Opposed to Changes	0.4974265**	0.2382103
Substantive Comment *and* Opposed to Changes	1.058577***	0.2862281
Ad hoc Committee Member	0.1706506	0.1572847
Constant	−0.0829016	0.2160147
Number of Observations	635	

Notes: * indicates statistical significance at the 90-percent confidence level, ** indicates statistical significance at the 95-percent confidence level, and *** indicates statistical significance at the 99-percent confidence level.

Only the coefficients for the interaction term and the *Opposed to Changes* variable are statistically significant. As I explain above, these results (particularly the result for the interaction term) indicate bias against firms whose substantive comments opposed the changes.

However, because standard statistical inference can be inaccurate when applied to interaction terms in nonlinear models,[101] I also examine the

[101] *See* Chunrong Ai & Edward C. Norton, *Interaction Terms in Logit and Probit Models*, 80 Econ. Letters 123 (2003). For a discussion of the proper use of the Ai-Norton methodology, see William Greene, *Testing*

marginal effects of each variable on the probability of a comment's rejection in a manner that is robust to the use of interaction terms in nonlinear models. Table 6 reports these marginal-effects estimates.

Table 6. Marginal Effects of Firm Characteristics on the Probability of Comment Rejection

Variable	Marginal Effect	Standard Error
Substantive Comment	−0.0547406	0.0605840
Opposed to Changes	0.1431451**	0.0576449
Substantive Comment *and* Opposed to Changes	0.315833***	0.1073346
Ad Hoc Committee Member	0.0401441	0.0347509
Number of Observations	635	

Notes: * indicates statistical significance at the 90-percent confidence level, ** indicates statistical significance at the 95-percent confidence level, and *** indicates statistical significance at the 99-percent confidence level.

For each variable, the marginal effect estimates the mean increase in the probability that the *ad hoc* committee rejected a comment when that variable is changed from 0 to 1. For example, the marginal effect of the *Opposed to Changes* variable is 0.143, indicating that the *ad hoc* committee was 14.3 percent more likely to reject a nonsubstantive comment that a member opposed to the changes submitted than the *ad hoc* committee was to reject a nonsubstantive comment from a member that supported the changes. Likewise, the *ad hoc* committee was 45.9 percent (that is, 14.3 percent + 31.6 percent) more likely to reject a substantive comment that a member opposed to the changes submitted than the *ad hoc* committee was to reject a substantive comment from a member that supported the changes.

Once again, only the coefficients for the *Opposed to Changes* variable and the interaction term are statistically significant.[102] Those results rebut the argument that the treatment of the comments merely reflected how the *ad hoc* committee treated comments generally. Comments from firms that opposed the revisions were rejected at a higher rate than comments from firms that supported the revisions. Moreover, substantive comments from firms that opposed the revisions were rejected at a much higher rate than were nonsubstantive comments from those same firms. If the results reflected how the *ad hoc* committee treated comments generally, then one would expect the

Hypotheses about Interaction Terms in Nonlinear Models, 107 Econ. Letters 291, 295–96 (2010). *See also* William H. Greene, Econometric Analysis 239, 740 (Pearson 7th ed. 2012).

[102] For the methodology for estimating marginal effects and associated standard errors in nonlinear models with binary dependent variables, see Ai & Norton, *supra* note 101.

interaction term's marginal effect to be close to zero. Instead, that effect is more than double the marginal effect of the *Opposed to Changes* variable.[103]

Using my regression results and the estimated marginal effects, I estimate that, for comments by firms that supported the revisions, a comment on a substantive portion of the revisions was 5.5 percent less likely to have been rejected than a comment on a nonsubstantive portion. However, that result is not statistically significant. For all nonsubstantive comments, a comment by a firm that opposed the revisions was 14.3 percent more likely to have been rejected than a comment by a firm that supported the revisions. Finally, relative to a comment on a nonsubstantive portion of the revisions by a firm that supported the revisions, a comment on a substantive portion by a firm opposed to the revisions was 40.4 percent (that is, 14.3 percent + 31.6 percent – 5.5 percent) *more likely* to have been rejected. Only these last two results are statistically significant for both the regression and the marginal-effects estimation.

In sum, the *ad hoc* committee afforded similar treatment to substantive and nonsubstantive comments made by firms that favored the revisions. However, the *ad hoc* committee disproportionately rejected comments addressing a substantive portion of the revisions by a firm that opposed the revisions.

These empirical results indicate a bias against comments on the substantive revisions by firms that opposed the changes. There are two potential explanations for why the high rejection rate of comments from firms that opposed the revisions might not demonstrate bias. The first is that the high rejection rate occurs in all SSO bylaw revisions. The second is that the rejection rates indicate a selection bias—in other words, that parties not included on the committee are more likely to disagree with the committee. As I explained above, the empirical results rebut both arguments. If the first argument were true, then one would not observe a significant difference between the treatment of substantive comments and the treatment of nonsubstantive comments from firms that opposed the revisions. However, the interaction effect is highly significant. Likewise, if the second argument were true, one would observe some difference in the treatment of comments by members of the *ad hoc* committee relative to comments from firms that were not members of the *ad hoc* committee. However, the marginal effect of being on the committee is only 5.5 percent and is not statistically significant. The only conclusion that one can properly draw from analyzing the treatment of the

[103] In Appendix I, I conduct two pairwise regressions similar to the regression in this Part using different specifications. The first includes firms that were publicly neutral and firms that publicly supported the changes. The interaction term in that regression is not statistically significant. The second includes firms that were publicly neutral and firms that publicly opposed the changes. The interaction term in that regression is statistically significant. Thus, my empirical finding of bias is robust across an alternative specification.

comments by the *ad hoc* committee is that the *ad hoc* committee had a bias against the firms that opposed the revisions—primarily large SEP holders—and a bias in favor of revisions designed to devalue SEPs.[104]

IV. What Motivates the Bias in Amending the IEEE Patent Policy?

The empirical results of my model show a bias in the *ad hoc* committee's propensity to accept and reject comments from different SSO participants. What motivates that bias? Why would a rational firm voluntarily join an SSO unless safeguards existed to prevent the expropriation of the assets of a minority of members by a majority of members? It would be *ex ante* irrational for an SEP holder to enter into an agreement lacking such protections. In addition, why would the implementers that voted to amend the IEEE's patent policy in 2015 have agreed at the beginning to the original patent policy, which they later claimed to be so flawed? One answer is that, as the IEEE membership has evolved and adapted to new market conditions since its founding, uncertainty among members regarding their firm-specific interests has attenuated, such that members now discern which SSO policies will directly promote those interests.

The "veil of ignorance"—the thought experiment that political philosopher John Rawls described in *A Theory of Justice*[105]—is a useful analogy for framing how this greater certainty of a given IEEE member's future economic position (as either a net licensor or a net licensee of the standard) influences the fairness of rule making within the IEEE. Rawls proposed the veil of ignorance as a model of fairness in rule making that would "nullify the effects of specific contingencies"—that is, the specific circumstances, favorable or unfavorable, in which an individual or group finds itself.[106] Wearing the veil of ignorance, members of a group do not know their respective positions within that group.[107] Thus, when developing the rules to which that group must adhere, none of its members "is in a position to tailor principles to [its] advantage."[108] Rawls explained that, because a group member does not know how it will be positioned in the group—and therefore because it does not know what specific interests it will have—that member is unable to propose or develop rules that predictably favor certain interests over others. Rather, it is in each member's best interest to develop policies that are

104 In Appendix II, I conduct the same regression analysis that I present in Part III, but I exclude from my dataset the comments from Qualcomm in addition to the comments from neutral firms. My empirical finding of bias is robust with respect to this specification excluding Qualcomm's comments.

105 John Rawls, A Theory of Justice 118 (1971) (Harvard Univ. Press rev. ed. 1999).

106 *Id.*

107 *Id.*

108 *Id.* at 121.

predictably fair and would be acceptable irrespective of the member's eventual position in the group. The veil of ignorance enables a "genuine reconciliation of interests" among all the group members.[109]

In 1997, a major IEEE participant might have approached the establishment of the IEEE's licensing policies behind a Rawlsian veil of ignorance. In the early stages of standard setting for mobile communications, most of the major participants in standard setting were vertically integrated. They both manufactured devices and developed new patentable technologies. Most participants had a business model that incorporated both technology development and implementation to some degree. Because a standard undergoes multiple iterations and might adopt new technologies to replace outdated ones, the original positions of IEEE members would have changed across subsequent generations of a standard. Upon determination of the IEEE's original patent policy, an IEEE member would have been committed to adhering to that policy—whether it favored licensors, licensees, or neither—for multiple future negotiations. Thus, early in the life of an IEEE standard, IEEE members would have an incentive to act in a manner that favored neither licensors nor licensees.

Over time, the veil of ignorance falls away. In 2015, a SSO participant was more certain about whether it would be a net licensor or a net licensee in reasonably foreseeable iterations of standard setting. For example, some of the largest SEP holders in 2015, such as Nokia and Ericsson, no longer manufactured standard-compliant mobile devices. Conversely, some of the largest manufacturers of standard-compliant mobile devices in 2015 had relatively weak SEP portfolios. Consequently, IEEE members in 2015 had the incentive to revise IEEE policies in a manner that advanced their private economic interests. Once vertical separation of the telecommunications industry has occurred, a firm that has become a net implementer faces an incentive to reduce the prices that it pays for SEPs because it holds an SEP portfolio that is relatively weaker than the SEP portfolios held by the IEEE's major contributors of standard-essential technology. Because SEPs are an essential input for the implementer's production of its standard-complaint products, reducing the price that the implementer pays to use SEPs decreases its production costs and increases its profits.[110]

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[109] *Id.* at 122. Mark Lemley has invoked the veil of ignorance in his analysis of SSOs. *See* Lemley, *supra* note 15, at 1946 (citing Rawls, *supra* note 105, at 11; Dawn C. Nunziato, *Justice Between Authors*, 9 J. Intell. Prop. L. 219 (2002)). For an application of the veil of ignorance to RAND royalties for SEPs, see Sidak, *The Meaning of FRAND, Part I*, *supra* note 13, at 931–32. For more general economic analysis of the veil of ignorance, see Ken Binmore, Natural Justice 15 (Oxford Univ. Press 2005); William J. Baumol, Superfairness: Applications and Theory 9 (MIT Press 1986) ("Superfairness analysis . . . derives from . . . the games of fair division. Everyone knows the procedure that can be used to ensure that two people will divide a cake fairly: one of them cuts the cake into two parts and the other then chooses.").

[110] Even in a fully contestable market, where any cost savings are passed through entirely to consumers, the price reduction would increase the quantity demanded by consumers, and thus it would increase the

V. Conclusion

The IEEE's 2015 bylaw amendments are highly significant because each unambiguously reduces the compensation that an SEP holder can obtain for its technological contributions to the IEEE's standards. Throughout the development of those bylaw amendments, sixteen companies submitted 680 comments on four drafts of the proposed amendments and two drafts of a supporting informational document that an *ad hoc* drafting committee of the IEEE released for public comment. The *ad hoc* committee responded to the suggested revisions in each comment, either accepting them and implementing them into the next draft, accepting them in principle, or rejecting them. I find a strong negative correlation between the comment submitter's status as a firm initially opposed to the revisions (a group primarily consisting of net SEP licensors) and the *ad hoc* committee's incorporation of the submitter's proposed revision in the subsequently revised draft. The treatment of the comments by the *ad hoc* committee exhibits a statistically significant bias against the firms that opposed the bylaw amendments—primarily large SEP holders—and in favor of revisions designed to devalue SEPs.

Appendix I

Table 1.1. Regression of Firm Characteristics on the Probability of Comment Rejection (Including Neutral Firms in Group in Support)

Variable	Coefficient	Standard Error
Substantive Comment	−0.1551655	0.2139567
Opposed to Changes	0.181902	0.2161570
Substantive Comment *and* Opposed to Changes	0.9615291***	0.2625219
Ad hoc Committee Member	−0.089553	0.1398067
Constant	0.2855704	0.1854556
Number of Observations	670	

Notes: * indicates statistical significance at the 90-percent confidence level, ** indicates statistical significance at the 95-percent confidence level, and *** indicates statistical significance at the 99-percent confidence level.

manufacturer's profits. Where there is not complete pass through of the cost decrease, the increase in the manufacturer's profits would be even larger.

Table 1.2. Marginal Effects of Firm Characteristics on the Probability of Comment Rejection (Including Neutral Firms in Group in Support)

Variable	Marginal Effect	Standard Error
Substantive Comment	−0.0379183	0.0551528
Opposed to Changes	0.0486277	0.0540631
Substantive Comment *and* Opposed to Changes	0.2832679***	0.0972054
Ad Hoc Committee Member	−0.0231692	0.0373065
Number of Observations	670	

Notes: * indicates statistical significance at the 90-percent confidence level, ** indicates statistical significance at the 95-percent confidence level, and *** indicates statistical significance at the 99-percent confidence level.

Table 1.3. Regression of Firm Characteristics on the Probability of Comment Rejection (Including Neutral Firms in Group Opposed)

Variable	Coefficient	Standard Error
Substantive Comment	−0.2380775	0.2423481
Opposed to Changes	0.5589999**	0.2363089
Substantive Comment *and* Opposed to Changes	0.974014***	0.2831461
Ad hoc Committee Member	0.1592398	0.1562071
Constant	−0.0739944	0.2155012
Number of Observations	670	

Notes: * indicates statistical significance at the 90-percent confidence level, ** indicates statistical significance at the 95-percent confidence level, and *** indicates statistical significance at the 99-percent confidence level.

Table 1.4. Marginal Effects of Firm Characteristics on the Probability of Comment Rejection (Including Neutral Firms in Group Opposed)

Variable	Marginal Effect	Standard Error
Substantive Comment	−0.0552859	0.0609735
Opposed to Changes	0.1645363***	0.0570447
Substantive Comment *and* Opposed to Changes	0.2897526***	0.1058653
Ad Hoc Committee Member	0.0375626	0.0346812
Number of Observations	670	

Notes: * indicates statistical significance at the 90-percent confidence level, ** indicates statistical significance at the 95-percent confidence level, and *** indicates statistical significance at the 99-percent confidence level.

Table 1.5. Regression of Firm Characteristics on the Probability of Comment Rejection (Neutral and Supporting Firms Only)

Variable	Coefficient	Standard Error
Substantive Comment	−0.2145579	0.2447276
Neutral to Changes	1.5417***	0.5970959
Substantive Comment *and* Neutral to Changes	−0.1531982	0.6582395
Ad hoc Committee Member	0.328791	0.2682390
Constant	−0.2065218	0.2753888
Number of Observations	145	

Notes: * indicates statistical significance at the 90-percent confidence level, ** indicates statistical significance at the 95-percent confidence level, and *** indicates statistical significance at the 99-percent confidence level.

Table 1.6. Marginal Effects of Firm Characteristics on the Probability of Comment Rejection (Neutral and Supporting Firms Only)

Variable	Marginal Effect	Standard Error
Substantive Comment	−0.0748882	0.0860951
Neutral to Changes	0.476143***	0.0957989
Substantive Comment *and* Neutral to Changes	0.0217531	0.1342186
Ad Hoc Committee Member	0.1119927	0.0905009
Number of Observations	145	

Notes: * indicates statistical significance at the 90-percent confidence level, ** indicates statistical significance at the 95-percent confidence level, and *** indicates statistical significance at the 99-percent confidence level.

Table 1.7. Regression of Firm Characteristics on the Probability of Comment Rejection (Neutral and Opposed Firms Only)

Variable	Coefficient	Standard Error
Substantive Comment	−0.3677561	0.6110545
Opposed to Changes	−0.9041868*	0.5467420
Substantive Comment *and* Opposed to Changes	1.184505*	0.6301085
Ad hoc Committee Member	0.0883169	0.1913737
Constant	1.335178**	0.5297966
Number of Observations	560	

Notes: * indicates statistical significance at the 90-percent confidence level, ** indicates statistical significance at the 95-percent confidence level, and *** indicates statistical significance at the 99-percent confidence level.

Table 1.8. Marginal Effects of Firm Characteristics on the Probability of Comment Rejection (Neutral and Opposed Firms Only)

Variable	Marginal Effect	Standard Error
Substantive Comment	−0.0695105	0.1365904
Opposed to Changes	−0.1280531	0.1229133
Substantive Comment *and* Opposed to Changes	0.2993803**	0.1251378
Ad Hoc Committee Member	0.0184301	0.0381211
Number of Observations	560	

Notes: * indicates statistical significance at the 90-percent confidence level, ** indicates statistical significance at the 95-percent confidence level, and *** indicates statistical significance at the 99-percent confidence level.

Table 1.9. Regression of Firm Characteristics on the Probability of Comment Rejection

Variable	Coefficient	Standard Error
Substantive Comment	−0.2364805	0.2423938
Opposed to Changes	0.4974265**	0.2382103
Neutral to Changes	1.41808**	0.5721424
Substantive Comment *and* Opposed to Changes	1.058577***	0.2862281
Substantive Comment *and* Neutral to Changes	−0.1312759	0.6573754
Ad hoc Committee Member	0.1706507	0.1572847
Constant	−0.0829017	0.2160147
Number of Observations	670	

Notes: * indicates statistical significance at the 90-percent confidence level, ** indicates statistical significance at the 95-percent confidence level, and *** indicates statistical significance at the 99-percent confidence level.

Appendix II

Table 2.1. Regression of Firm Characteristics on the Probability of Comment Rejection (Excluding Neutral Firms and Qualcomm)

Variable	Coefficient	Standard Error
Substantive Comment	−0.2242946	0.2427232
Opposed to Changes	0.4538424*	0.2463509
Substantive Comment *and* Opposed to Changes	1.023539***	0.3049107
Ad hoc Committee Member	0.2582123	0.1623346
Constant	−0.1513068	0.2185806
Number of Observations	401	

Notes: * indicates statistical significance at the 90-percent confidence level, ** indicates statistical significance at the 95-percent confidence level, and *** indicates statistical significance at the 99-percent confidence level.

Table 2.2. Marginal Effects of Firm Characteristics on the Probability of Comment Rejection (Excluding Neutral Firms and Qualcomm)

Variable	Marginal Effect	Standard Error
Substantive Comment	−0.0615221	0.0700114
Opposed to Changes	0.1432632**	0.0688773
Substantive Comment *and* Opposed to Changes	0.315143***	0.1123279
Ad Hoc Committee Member	0.0713955*	0.0418227
Number of Observations	401	

Notes: * indicates statistical significance at the 90-percent confidence level, ** indicates statistical significance at the 95-percent confidence level, and *** indicates statistical significance at the 99-percent confidence level.