

---

# UCLA Journal of Law & Technology

---

## **PROGRESS IN THE AIRCRAFT INDUSTRY AND THE ROLE OF PATENT POOLS AND CROSS-LICENSING AGREEMENTS**

**Dustin R. Szakalski**

*This paper explores the challenges that widely dispersed property rights—a so-called “tragedy of the anticommons”—has presented to the aircraft industry in the past and suggests that patent pools and cross-licensing agreements are appropriate private mechanisms the industry can use to resolve such challenges in the future. The Manufacturers Aircraft Association (“MAA”), a patent pool formed among aircraft manufacturers at the insistence of the Secretary of War prior to World War I, provides both the historical foundation for aircraft patent pools and a baseline model for the resolution of future obstacles facing the aircraft industry. This paper suggests that a properly structured modern-day aircraft patent pool should incorporate many of the features of the Manufacturers Aircraft Association—including open availability to all industry firms and a unanimously approved royalty-rate structure—in order to provide the broadest and most cost-efficient access to valuable aircraft patents while simultaneously encouraging the member firms to compete in the marketplace.*

I. THE WRIGHT BROTHERS AND AN EARLY PATENT WAR	3
II. PRO-COMPETITIVE EFFECTS OF THE MAA PATENT POOL	10
III. MODERN-DAY PATENT POOLS AND CROSS-LICENSING AGREEMENTS	12
IV. ANTITRUST ANALYSIS OF AIRCRAFT PATENT POOLS	24
<b>A. Pro-Competitive Benefits of Aircraft Patent Pools</b>	<b>25</b>
<b>B. Potential Anti-Competitive Effects of Aircraft Patent Pools</b>	<b>26</b>
1. After-Acquired Patents	27
2. Information Sharing Among Members of the Patent Pool	30
V. CONCLUSION	34

# PROGRESS IN THE AIRCRAFT INDUSTRY AND THE ROLE OF PATENT POOLS AND CROSS-LICENSING AGREEMENTS

Dustin R. Szakalski

---

The constitutionally mandated goal of the patent law regime is “[t]o promote the progress of science and the useful arts . . . .”<sup>1</sup> This goal is executed, in part, by granting to inventors for a limited time an exclusive property right in their inventions—a negative property right whereby inventors may prevent competitors from commercially exploiting their invention. Property rights are generally thought of as a good thing because they “will always tend to be allocated to the highest valued uses.”<sup>2</sup> In this way, property rights tend to promote technical progress both by rewarding inventors of new and useful inventions and by allowing inventions to be developed and commercially exploited by the highest valued user.<sup>3</sup> The goal of promoting the progress of science by granting

---

<sup>1</sup> U.S. CONST. art. I, cl. 8.

<sup>2</sup> Eirik G. Furubotn & Svetozar Pejovich, *Property Rights and Economic Theory: A Survey of the Recent Literature*, 10(4) J. ECON. LITERATURE 1137, 1141 (1972).

<sup>3</sup> This point is not uncontested. Some libertarians have disputed whether “patents really are necessary to encourage the production of . . . inventions” and have argued that “[i]t simply has not been shown that IP leads to net gains in wealth.” See N. Stephan Kinsella, *Against Intellectual Property*, 15 J. LIBERTARIAN STUD. 1, 13-14 (2001). Specifically, Kinsella argued that utilitarian justifications for patent law are unpersuasive because any incremental gains in innovation are outweighed by the immense costs of the patent system—including attorneys fees, patent office fees, and litigation expenses—and because these costs of the patent system could be more effectively allocated to R&D, which directly stimulates innovation. Kinsella’s arguments, however, appear to ignore the free-riding problem that would result if inventors were not given an exclusive property right in their inventions. Kinsella does not address how an inventor would be able to recoup his or her R&D costs if competitors, who had not invested in the R&D necessary to produce patentable inventions, were immediately free to enter the market and compete with the inventor. Without the protections afforded by the patent law system, investing in R&D would put inventors at a competitive disadvantage compared to free-riding competitors. Additionally, would-be inventors might be discouraged from developing inventions if they believed that the market would be flooded with competing products incorporating their inventions. Accordingly, it is difficult to accept Kinsella’s proposition that a twenty-year patent term does not substantially stimulate innovation. Ultimately, however, the causal link between patent law and technical innovation cannot be known without

monopolies of limited duration to inventors, however, can be frustrated when one patentee controls a technological development fundamental to the advancement of an entire industry or when the patents necessary to produce a product are owned by a large number of different parties—a so-called “tragedy of the anticommons.”<sup>4</sup> Granting “[m]ultiple, discrete rights [which] give many owners the right to exclude” will forestall technical innovation when bargaining failures prevent the coalescence of these fragmented property rights.<sup>5</sup>

This paper explores the challenges that the patent law regime, and more specifically patented fundamental inventions and widely dispersed property rights, has presented to the aircraft industry in the past and suggests that patent pools<sup>6</sup> and cross-licensing agreements are appropriate private mechanisms the industry can use to resolve such challenges in the future. The Manufacturers Aircraft Association, a patent pool formed among aircraft manufacturers at the insistence of the Secretary of War prior to World War I, provides both the historical foundation for aircraft patent pools and a baseline model for the resolution of future obstacles facing the aircraft industry.<sup>7</sup> I suggest that a properly structured modern-day aircraft patent pool should incorporate

---

reference to extensive empirical market analysis. Finally, Kinsella’s criticisms of the patent law regime, while valid in some respects, seem to support reform of the patent law system rather than its outright abolition.

<sup>4</sup> Michael Heller, *Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111(3) HARV. L. REV. 621, 624 (1998).

<sup>5</sup> See ROBERT P. MERGES, INSTITUTIONS FOR INTELLECTUAL PROPERTY TRANSACTIONS: THE CASE OF PATENT POOLS 8 (1999), [http://www.law.berkeley.edu/files/pools\(1\).pdf](http://www.law.berkeley.edu/files/pools(1).pdf).

<sup>6</sup> See Joel I. Klein, Address Before the American Intellectual Property Law Association: Cross-Licensing and Antitrust Law, n. 3 (May 2, 1997), available at <http://www.justice.gov/atr/public/speeches/1118.pdf> (defining a patent pool as “the aggregation of intellectual property rights which are the subject of cross-licensing, whether they are transferred directly by patentee to licensee or through some medium, such as a joint venture, set up specifically to administer the patent pool.”).

<sup>7</sup> See *Mfrs. Aircraft Ass'n v. United States.*, 77 Ct.Cl. 481 (1933) for an overview of the formation of the Manufacturers Aircraft Association.

many of the features of the Manufacturers Aircraft Association in order to provide the broadest and most cost-efficient access to valuable aircraft patents while simultaneously encouraging the member firms to compete in the marketplace. Moreover, I propose that a modern-day patent pool, based on the structure of the Manufacturers Aircraft Association, is desirable even though no modern aircraft patent is as fundamental as the Wright brothers' patent, which ultimately led to the formation of the Manufacturers Aircraft Association.

#### I. THE WRIGHT BROTHERS AND AN EARLY PATENT WAR

On May 22, 1906, the United States Patent and Trademark Office ("USPTO") issued U.S. Patent No. 821,393 ("the '393 Patent") for a "Flying Machine" to Orville and Wilbur Wright. The '393 Patent was directed to maintaining an aircraft's lateral balance in the face of fluctuating aerodynamic conditions that tended to disturb the airplane from its intended course. The '393 Patent granted the Wright brothers the right to exclude others from making, using, selling, or offering for sale an airplane employing wing technology to control the lateral movement (i.e. roll) of the aircraft.<sup>8</sup> The '393 Patent disclosed the "means for maintaining or restoring the equilibrium or lateral balance"<sup>9</sup> of the aircraft by using a rope and a series of guide-pulleys to twist the lateral portions of the wings (i.e. the wing tips) in opposite directions to generate a differential lifting force that

---

<sup>8</sup> Independent Claim 3, which is exemplary of the other claims, reads: "In a flying-machine, a normally flat aeroplane having lateral marginal portions capable of movement to different positions above or below the normal plane of the body of the aeroplane, such movement being about an axis transverse to the line of flight, whereby said lateral marginal portions may be moved to different angles relatively to the normal plane of the body of the aeroplane, and also to different angles relatively to each other, so as to present to the atmosphere different angles of incidence, and means for simultaneously imparting such movement to said lateral marginal portions, substantially as described."

<sup>9</sup> U.S. Patent No. 821,393

rolled the aircraft back to equilibrium.<sup>10</sup> In modern aerospace nomenclature, this technique for creating a differential lifting force in order to roll the aircraft would be described as “wing warping.” The ‘393 Patent also claimed “any construction whereby the angular relations of the lateral margins of the aeroplanes [i.e., wings] may be varied in opposite directions . . . .”<sup>11</sup>

Following the issuance of the ‘393 Patent, the Wright brothers vigorously defended the scope of their invention. For instance, in a letter dated January 20, 1910, Wilbur Wright wrote to Octave Chanute, an aviation engineer, and declared that “the world owes its almost universal use of our system of lateral control entirely to us. It is also our opinion that legally it owes it to us.”<sup>12</sup> The Wright brother took particular aim at Glenn Curtiss, an American aviator, who was one of the original members of the Aerial Experiment Association (AEA). Several planes designed and built by AEA—including the “White Wing,” the “June Bug,” and the “Silver Dart”—employed ailerons for lateral control.<sup>13</sup> The AEA later dissolved and Curtiss went on to form the Herring-Curtiss Company. Curtiss continued to design and build airplanes which employed ailerons for lateral control, and in 1916 the USPTO granted Glenn Curtiss a patent for a

---

<sup>10</sup> See, e.g., RICHARD S. SHEVELL, FUNDAMENTALS OF FLIGHT 57-58 (2d ed. 1988). The aerodynamic principle underlying the Wright Brothers’ lateral stability control technique can be seen from the basic lift equation for fixed-wing aircraft:  $L = \frac{1}{2} \rho V^2 C_{L, \alpha} S$ , where  $V$  is the airspeed,  $S$  is the wing planform area,  $\rho$  is the air density, and  $C_{L, \alpha}$  is the lift coefficient, which is a function of both the airfoil shape and the angle of attack,  $\alpha$ , of the wing. In order to restore the lateral equilibrium of the aircraft by rolling the aircraft to the left, for example, the Wright Brothers’ patented lateral stability control technique could be used to increase the angle of attack (also known as the “angle of incidence”) of the right wing while simultaneously decreasing the angle of attack of the left wing, which will cause the right wing to experience a higher lifting force than the left wing, and this differential lifting force will cause the aircraft to roll to the left.

<sup>11</sup> U.S. Patent No. 821,393 col.3 11.41-43 (filed Mar. 23, 1903).

<sup>12</sup> Letter from Wilbur Wright to Octave Chanute (Jan. 20, 1910) (on file with the Library of Congress), available at [http://invention.psychology.msstate.edu/inventors/i/Wrights/library/Chanute\\_Wright\\_correspond/1910/Jan20-1910.html](http://invention.psychology.msstate.edu/inventors/i/Wrights/library/Chanute_Wright_correspond/1910/Jan20-1910.html).

<sup>13</sup> See *Glenn Curtiss and the Wright Patent Battles*, U.S. CENTENNIAL OF FLIGHT COMM’N, [http://www.centennialofflight.gov/essay/Wright\\_Bros/Patent\\_Battles/WR12.htm](http://www.centennialofflight.gov/essay/Wright_Bros/Patent_Battles/WR12.htm).

“Hydroaeroplane.”<sup>14</sup> The Wright brothers then filed a patent infringement suit against Curtiss and the Herring-Curtiss Company alleging that the use of ailerons for lateral control infringed their ‘393 Patent.

In Wright Co. v. Herring-Curtiss Co., the District Court for the Western District of New York held that the ailerons employed in Herring-Curtiss’ aircraft infringed the Wright brothers’ ‘393 Patent because they “move at different angles relative to the aeroplane and to each other” and are “capable of restoring equilibrium in substantially the same way as [the Wright brothers’] machine.”<sup>15</sup> Under this broad construction, the ‘393 Patent covered not just the wing warping technique of lateral control but also the use of ailerons for lateral control. Accordingly, as the use of ailerons was quickly becoming the industry-standard technique for lateral control, the Wright brothers effectively controlled a key technology that was essential to the development and manufacture of any new aircraft.

In 1916, the Wright-Martin company paid \$1,000,000 for the rights to the ‘393 Patent. In an attempt to recoup its investment, Wright-Martin subsequently “notified other aircraft manufacturers that they would have to pay a royalty of five percent on each aircraft sold, with a minimum annual royalty of \$10,000 per manufacturer.”<sup>16</sup>

On the heels of the United States’ entrance into World War I, Congress became increasingly concerned with the financial barriers facing U.S. aircraft manufacturers.<sup>17</sup>

---

<sup>14</sup> Hydroaeroplane, U.S. Patent No. 1,203,550 (filed Aug. 22, 1911).

<sup>15</sup> Wright Co. v. Herring-Curtiss Co., 204 F. 597, 608, 614 (W.D.N.Y. 1913)

<sup>16</sup> 1 ALEX ROLAND, MODEL RESEARCH: THE NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS, 1915-1958, at 38 (NASA SP:4103, 1985), available at <http://history.nasa.gov/SP-4103/ch2.htm>.

<sup>17</sup> See generally Mfrs. Aircraft Ass'n v. United States., 77 Ct. Cl. 481 (1933) (describing Congress’ reaction to the state of the aerospace industry and the formation of the Manufacturers Aircraft Association); see also

Less than one month before the United States' declaration of War on April 6, 1917, Congress appropriated \$1,000,000 to enable the government "to secure by purchase, condemnation, donation, or otherwise such basic patent or patents as they may consider necessary to the manufacture and development of aircraft in the United States for governmental and civil purposes."

As Congress' concern continued to grow, the National Advisory Committee was formed in order to address the problems facing the aerospace industry. On January 13, 1917, the Secretary of the Navy, Franklin D. Roosevelt, reported to the National Advisory Committee that aircraft manufacturers had been unable to fulfill the Government's aircraft orders because they were fearful of infringing Wright-Martin's '393 Patent. In response to Roosevelt's report, and similar concerns expressed by the Secretary of War, the subcommittee on patents of the National Advisory Committee recommended "the formation of the Aircraft Manufacturers Association among all aircraft manufacturers and suggest[ed] the details of a cross-license agreement among its members."<sup>18</sup> Although Wright-Martin originally resisted, the Manufacturers Aircraft Association was incorporated in New York not long thereafter.

Membership in the Aircraft Manufacturers Association was open to current or prospective manufacturers of "airplanes, airplane engines, or parts and accessories used in airplanes . . . ; or a manufacturer to whom the Government has given a contract for the construction of ten or more complete airplanes or airplane engines."<sup>19</sup> Eleven aircraft

---

Harry T. Dykman, *Patent Licensing within the Manufacturer's Aircraft Association (MAA)*, 46 J. PAT. OFF. SOC'Y 646, 648-49 (1964).

<sup>18</sup> *Mfrs. Aircraft Ass'n*, 77 Ct. Cl. at 485.

<sup>19</sup> *Id.* at 486.

manufacturers, including the Wright-Martin Aircraft Corporation and the Curtiss-Burgess Airplane & Motor Corporation, ultimately entered the Association.<sup>20</sup>

Under the terms of the cross-licensing agreement and the bylaws of the Manufacturers Aircraft Association, each member licensed the use of all of its aircraft patents to all of the other members of the Association. Additionally, each member was required to pay a royalty fee of \$200 to the Association for every aircraft it sold. The Association retained \$25 (12.5%) to cover its administrative expenses, and of the \$175 remaining, \$135 (67.5%) was paid to the Wright-Martin Aircraft Corporation and \$40 (20%) was paid to the Curtiss-Burgess Airplane & Motor Corporation.<sup>21</sup> Clearly, the terms of the Association's cross-licensing agreement recognized that the Wright brothers' '393 Patent and Curtiss' '550 Patent, both of which covered lateral control technology, were fundamental aircraft inventions. The Wright-Martin Aircraft Corporation and the Curtiss-Burgess Airplane & Motor Corporation were to receive these royalty payments until they reached a maximum of \$2 million in royalty payments, or until their patents expired, whichever came first.<sup>22</sup>

The Association's cross-licensing agreement also governed so-called "after-acquired" patents—i.e., patents granted after the formation of the Manufacturers Aircraft Association. Under the terms of the cross-licensing agreement, an after-acquired patent was eligible for royalties from the other Association members only if it "secures the performance of a function not before known to the art or constitutes an adaptation for the first time to commercial use of an invention known to the industry to be desirable of use

---

<sup>20</sup> *Id.*

<sup>21</sup> *Id.* at 487; see also George Bittlingmayer, *Property Rights, Progress, and the Aircraft Patent Agreement*, 31 J.L. & Econ. 227, 232-33 (1988).

<sup>22</sup> Bittlingmayer, *supra* note 21, at 233.

but not used because of lack of adaptation, or is otherwise of striking character or constitutes a radical departure from previous practice, or if either the price paid therefore or the amount expended in developing the same is such as to justify such compensation.”<sup>23</sup> Notably, the requirements for royalty-eligible after-acquired patents deviated from the standard patentability requirements by compensating patents of a “striking” or “radical” character, and even patentable inventions that required sufficient “sweat of the brow.” A formal arbitration procedure and a 3-member board of arbitrators were established to determine which after-acquired patents qualified for a royalty and to set the appropriate royalty rate.<sup>24</sup> As addressed below, these royalty requirements may be tailored to encourage research and innovation among the members and to discourage potential anticompetitive effects such as free-riding.

Additionally, the Association’s members “could license their patents to nonmembers if the terms were no more favorable than to members” and any Association member could withdraw at any time, “but its patents in the pool at the time of withdrawal would remain there.”<sup>25</sup>

The legality of the Manufacturers Aircraft Association patent pool was challenged several times<sup>26</sup> on the ground that it constituted an “aircraft trust” in violation of the

---

<sup>23</sup> *Id.*; see also *Pooling of Patents: Hearings on H.R. 4523 Before the H. Comm. on Patents*, 74th Cong. 3065 (1936) [hereinafter *Pooling of Patents*].

<sup>24</sup> See MERGES, *supra* note 5, at 19-20, ([MAA members agreed to] submit claims for compensation in respect to airplane patents or patent rights hereafter acquired to a board of arbitrators consisting of one member appointed by the board of directors of the Association (Inc.), another by the subscriber making the claim, and a third by the other two, who shall determine the total amount of compensation, if any, to be paid for the same, and the rate of royalty to be paid toward such compensation by any subscriber desiring to take a license under such patent.”)

<sup>25</sup> Bittlingmayer, *supra* note 21, at 233.

<sup>26</sup> Commentators have claimed that the Manufacturers Aircraft Association was investigated, and cleared of any wrongdoing, “at least twenty times between 1917 and 1935.” See *id.* at 235 n.30; see also *Pooling of Patents*, *supra* note 23, at 2964 (statement of Frank H. Russell, President, Manufacturers Aircraft

Sherman Antitrust Act<sup>27</sup> and it was ultimately dissolved in 1975 under a consent decree.<sup>28</sup>

The Final Judgment entering the consent decree ordered the members of the Manufacturers Aircraft Association “to take appropriate steps to wind up the affairs, and to terminate the existence, of the defendant Manufacturers Aircraft Association,” including cancelling each license issued pursuant to the cross-licensing agreement, within ninety days.<sup>29</sup> In addition, the Final Judgment enjoined the members of the Manufacturers Aircraft Association from joining a future industry-wide aircraft patent pool by prohibiting the members from entering into a cross-licensing agreement covering all or substantially all of the domestic aircraft manufacturers and all or substantially all of “the existing and/or future airplane patents of primary significance.”<sup>30</sup>

Furthermore, the consent decree included a mandatory licensing provision under which the members of the Manufacturers Aircraft Association were required to grant “a nonexclusive, non-discriminatory license” to each person or entity that made a written application to use an aircraft patent that was previously subject to the cross-licensing agreement of the Manufacturers Aircraft Association on royalty terms “no less favorable

---

Association). Several high profile governmental investigations reveal how closely and extensively the Manufacturers Aircraft Association was scrutinized: the Attorney General cleared the Association of any antitrust violations in October of 1917; the Association was then later cleared by a presidential commission chaired by Charles Evans Hughes; a final report issued by the Lambert committee hearings of 1924 again cleared the Association of any anticompetitive behavior; and a presidential report in 1935 held that the Association was “the very antithesis of monopoly.” Bittlingmayer, *supra* note 21, at 235 n.30; *see also* U.S. FED. AVIATION COMM’N, MESSAGE FROM THE PRESIDENT OF THE U.S., S. Doc. No. 74-15, at 221 (1935).

<sup>27</sup> 15 U.S.C. §§ 1-2 (2006).

<sup>28</sup> Bittlingmayer, *supra* note 21, at 234.

<sup>29</sup> *United States v. Mfrs. Aircraft Ass’n, Inc.*, 1975 WL 814, at 2 (S.D.N.Y. Nov. 12, 1975).

<sup>30</sup> *Id.* at 2, 4. The injunction prohibiting the members of the Manufacturers Aircraft Association from joining a future industry-wide patent pool does not affect the viability of a modern-day aircraft patent pool. The injunction is only binding on the former members of the Manufacturers Aircraft Association—Aeromarine, Curtiss-Burgess, L.W.F. Engineering, Standard Aircraft, Sturdevant, Thomas-Morse, Wright-Martin, and Dayton Wright Company—and does not affect the largest aircraft companies in existence today, such as Boeing, Lockheed-Martin, Northrop Grumman, Airbus, Bombardier Aerospace, Embraer, General Electric, and Rolls-Royce.

to the licensee” than the royalty terms under the cross-licensing agreement of the Manufacturers Aircraft Association.<sup>31</sup> The consent decree also included a reciprocal licensing provision under which a person or entity licensing a member’s aircraft patent according to the mandatory licensing provision of the consent decree was required, “as a condition of receiving such a license,” to license any aircraft patents held by the licensee to the licensor member if the court determined that “it would be equitable or in the public interest to permit imposition of such condition.”<sup>32</sup>

Additionally, any person or entity exercising the right to license a member’s aircraft patents that were previously subject to the cross-licensing agree was permitted, within 5 years from the effective date of the Final Judgment, to request from the defendant member such technical information that “persons reasonably skilled in the art may need to practice the inventions claimed in the licensed patent by any mode used by the defendant in practicing such invention.”<sup>33</sup> The defendant member was then required to furnish such technical information upon the receipt of “reasonable and non-discriminatory royalties and/or other compensation.”<sup>34</sup>

## II. PRO-COMPETITIVE EFFECTS OF THE MAA PATENT POOL

The 58-year duration of the Manufacturers Aircraft Association and the fact that the cross-licensing agreement reduced the royalty fee Wright-Martin demanded from five percent per aircraft sold, with a \$10,000 minimum annual royalty, to a reasonable \$135 per aircraft sold suggest that the aircraft patent pool provided significant pro-competitive

---

<sup>31</sup> *Id.* at 2, 3.

<sup>32</sup> *Id.* at 3

<sup>33</sup> *Id.*

<sup>34</sup> *Id.*

benefits.<sup>35</sup> Additionally, commentators have suggested that the cross-licensing agreement between the members of the Manufacturing Aircraft Association did not hamper technological progress because the members were “free to compete for customers in other ways,” such as through non-price competition, and “competition in patentable aspects not covered by the agreement (nonstructural aspects of aircraft design).”<sup>36</sup>

Most importantly, Bittlingmayer points to the historical instability in market shares among aircraft manufacturers between 1932 and 1965 as evidence that the patent pool created by the Manufacturers Aircraft Association did not stifle competition.<sup>37</sup> For example, Bittlingmayer noted that between 1932 to 1965, a period during which the Manufacturers Aircraft Association cross-licensing agreement was in effect, Boeing’s market share<sup>38</sup> varied from a low of 0.4% in 1944 to a high of 36.2% in 1965, Lockheed’s market share fluctuated from 5.8% in 1947 to 24.5% in 1959, and Douglas captured 93.4% of the market just 12 years after the formation of the cross-licensing agreements, but by 1965 Douglas’ market share had dropped to just 26.8%.<sup>39</sup> If the patent pool created by the Manufacturers Aircraft Association was actually an instrument of collusion rather than a means of efficiently distributing royalties, economic theory would

---

<sup>35</sup> \$135 in 1917 had the equivalent purchasing power of approximately \$2,076 in 2010. See U.S. BUREAU OF LAB. STAT., CPI DETAILED REPORT: DATA FOR SEPTEMBER 2010 Table 24 (2010), <http://www.bls.gov/cpi/cpid0211.pdf>. I assert that \$135 is a “reasonable” royalty fee only because aircraft manufacturers would have had to pay significantly more under the royalty terms demanded by Wright-Martin. For example, the DH-4, the only U.S.-built aircraft to fly in combat during WWI, had a unit cost of \$11,250 and therefore, under the royalty terms demanded by Wright-Martin, the manufacturer of a DH-4 would have had to pay a royalty fee of \$562.50 (5%) per aircraft sold. This is more than a 300% increase over the royalty paid to Wright-Martin under the terms of the Manufacturers Aircraft Association cross-licensing agreement. See U.S. Air Force Fact Sheet: De Havilland DH-4, National Museum of the U.S. Air Force, <http://www.nationalmuseum.af.mil/factsheets/factsheet.asp?id=324>.

<sup>36</sup> Bittlingmayer, *supra* note 21, at 236.

<sup>37</sup> *Id.*

<sup>38</sup> In Bittlingmayer’s analysis, the size of each company’s aircraft fleet served as a proxy for the company’s market share. *Id.*

<sup>39</sup> *Id.*

suggest that the members' relative market shares would have stabilized after the cartellists agreed on a set price and a fixed level of output.<sup>40</sup>

### III. MODERN-DAY PATENT POOLS AND CROSS-LICENSING AGREEMENTS

The successful reduction of the patent licensing fees to a reasonable level, the longevity of the cross-licensing agreement, and the instability of aircraft manufacturers' market shares during the life of the Manufacturers Aircraft Association all suggest that it may provide a useful and instructive baseline model for modern-day aircraft patent pools.

I propose that many of the features of the cross-licensing agreement under the Manufacturers Aircraft Association may be applied to modern-day patent pools even though there is no modern-day analog which rivals the scope and fundamental-nature of the Wright brothers' wing-warping patent (i.e., no modern aircraft patent is as basic and fundamental as the Wright brothers' '393 Patent covering lateral control techniques).

Based in part on the terms of the Manufacturers Aircraft Association patent pool, I suggest that aircraft patent pools with the following features are likely to increase competition and innovation by reducing licensing transaction costs to a level such that

---

<sup>40</sup> See, e.g., Neil H. Jacoby, *The Relative Stability of Market Shares: A Theory and Evidence from Several Industries*, 12 J. INDUS. ECON. at 83, 83 (1964):

At least three structural characteristics of an industry are commonly held by economists to possess some evidential values in judging the effectiveness of competition. They are the number of firms in the industry, the relative concentration of output among the largest firms, and the relative stability of the proportions of the industry's market occupied by its largest members. A consistently small number of firms, a consistently high concentration of industry output, and temporal invariance in the market shares of individual firms do not *per se* constitute proof of monopolistic behavior. Yet if an industry exhibited these characteristics, especially in combination, it would be thought that there was an increased probability of collusion by its dominant members, or of a mutual recognition of their interdependence, resulting in an oligopolistic coordination of pricing and production policies adverse to the interest of consumers. Conversely, the presence of a large and increasing number of firms in an industry, a diminishing concentration ratio, and a high degree of variance in the market shares of the largest firms would tend to be regarded as presumptive evidence that competition was effective. (footnotes omitted).

disaggregate property rights may be efficiently<sup>41</sup> bundled: (1) the aircraft patent pool should be open to all firms in the industry for a fixed period of time and each firm should be provided reasonable notice of their eligibility to participate in the pool; (2) the royalty-rate structure of the cross-licensing agreement should be unanimously approved by the members of the association to ensure that the royalty-rate structure accurately reflects the value added by each patent;<sup>42</sup> (3) each member of the pool should have equal access to the pooled patents and on the same royalty terms as every other member; (4) either a separate royalty structure should apply to after-acquired patents or the members should agree that the patent pool does not cover after-acquired patents; (5) each member should be permitted to withdraw from the association at any time; and (6) the members should be free to license their patents to firms outside of the association on terms independently negotiated by the two parties and without undue influence from the members of the patent pool.

My first point—the openness of the aircraft patent pool to all firms in the industry—requires the most defense because it contemplates that a properly structured aircraft patent pool may contain improvement patents (including both one-way and two-way blocking patents), “complementary” patents, economically independent patents, and

---

<sup>41</sup> Specifically, I propose that a properly-structured modern aircraft patent pool is a Kaldor-Hicks efficient reallocation of property rights because the reduction in transaction costs and information costs incident to the formation of an aircraft patent pool is sufficient to offset any losses suffered by third party non-members, such as lost profits due to any anti-competitive effects of the aircraft patent pool. See Jules L. Coleman, *Efficiency, Utility, and Wealth Maximization*, 8 HOFSTRA L. REV. 509, 513 (1980) (“If a distribution is Kaldor-Hicks efficient then some individual has been made sufficiently better off so that he could—hypothetically at least—fully compensate those who have been made worse off.”).

<sup>42</sup> Although a unanimous voting rule increases decision-making costs, it is necessary to ensure that all the members of the patent pool receive adequate compensation for their patents. See JAMES M. BUCHANAN & GORDON TULLOCK, *THE CALCULUS OF CONSENT: LOGICAL FOUNDATIONS OF CONSTITUTIONAL DEMOCRACY* (Ann Arbor Paperbacks 1962) (arguing that a unanimous voting rule results in Pareto superior outcomes that are analogous to the reallocations achieved under free market exchange).

patents covering technologies that are market substitutes for each other, known as “competing” patents. The crucial distinction between these four types of patents centers on their economic relationship to each other: “[c]ompeting patents are patents that are viewed as substitutes for each other by the potential licensees in the marketplace”; “[c]omplementary patents are patents which cover technologies that complement each other in that the use of one makes use of the other more valuable”; blocking patents are patents which cover a patentable “improvement or variation of an invention patented by another”; and independent or “[u]nrelated patents are patents that bear no economic relationship to each other.”<sup>43</sup> Although initially counterintuitive, I suggest that competition may thrive among the members of the aircraft patent pool even if the members have equal access to competing patented technologies.

In contrast, the Department of Justice, commentators, and practitioners have proposed that patent pools should be limited only to “blocking” or “complementary” patents as opposed to independent patents and patents that are substitutes for each other. For example, James Kulbaski, an Ohio-based patent attorney, has argued that a “patent pool is the most cost effective and efficient way of collecting and distributing royalties for patents that are essential to an industry standard” and that a patent pool should be

---

<sup>43</sup> Roger B. Andewelt, *Analysis of Patent Pools Under the Antitrust Laws*, 53 ANTITRUST L.J. 611, 613-14 (1984); see also Richard J. Gilbert, *Antitrust for Patent Pools: A Century of Policy Evolution*, 1 STAN. TECH. L. REV.6 (2004) (“Patents ‘A’ and ‘B’ are in a blocking relationship if the practice of each patent would infringe the other in the absence of a license. Patents ‘A’ and ‘B’ are in a one-way blocking relationship if the practice of ‘B’ requires a license from ‘A,’ but ‘A’ does not infringe ‘B.’ This typically corresponds to a situation where ‘B’ improves ‘A’ in some capacity . . . Patents that are one-way or two-way blocking are complementary, in the sense that an increase in the price of one patent (or a reduction in its availability) reduces the value of the other patent . . . [P]atents ‘A’ and ‘B’ are substitutes for each other if they cover products or processes that can be made or exploited using either patented technology. Patents ‘A’ and ‘B’ are independent if they are neither substitutes nor complements.”) (footnotes omitted).

restricted to blocking patents or patents necessary to implement that industry standard.<sup>44</sup>

Specifically, Kulbaski suggested that patent pools and cross-licensing agreements are “very well suited” to patents necessary to implement a well-defined industry standard, such as those patents required for the MPEG-2<sup>45</sup> video coding standard. As Kulbaski rightly noted, an essential feature of the MPEG-2 patent pool which led to approval by the DOJ was that the pool employed “[a]n evaluator/independent expert to determine which patents are essential to the implementation of the standard, thereby defining a group of essential patent holders.” In a Business Review Letter approving the MPEG-2 patent pool, the Antitrust Division of the DOJ stressed that limiting the pool to “technically essential patents . . . reduce[d] the risk that the patent pool will be used to eliminate rivalry between potentially competing technologies.”<sup>46</sup>

Outside of this context, Kulbaski suggested that a patent pool may be improper and may present unacceptable anticompetitive potential if the relevant technology is not clearly defined by an industry standard and the pooled patents are not essential to the

---

<sup>44</sup> James J. Kulbaski, *Comments On Patent Pools and Standards For Federal Trade Commission Hearings Regarding Competition & Intellectual Property*, 1-2 (2002), [www.ftc.gov/opp/intellect/020417jamesjkulbaski.pdf](http://www.ftc.gov/opp/intellect/020417jamesjkulbaski.pdf) (suggesting that patent pools conforming to the following five features “should be approved and promoted by the government, industry, and the public [sic]”: “(1) A technology standard that is definite and well defined; (2) An evaluator/independent expert to determine which patents are essential to the implementation of the standard, thereby defining a group of essential patent holders; (3) A license drafted and approved by the essential patent holders that allows the technology to be licensed on a reasonable and nondiscriminatory basis; (4) A patent pool administrator appointed by the essential patent holders to handle administrative tasks such as signing up licensees, collecting royalties from the licensees, and distributing the royalties to the essential patent holders; and (5) The essential patent holders retaining the right to license the patents outside of the patent pool.”).

<sup>45</sup> MPEG stands for Moving Pictures Expert Group. INT’L ORG. FOR STANDARDIZATION & INT’L ELEC. CMTY., INFORMATION TECHNOLOGY - GENERIC CODING OF MOVING PICTURES AND ASSOCIATED AUDIO INFORMATION: VIDEO ISO/IEC 13818-2 at vi (2000), *available at* [webstore.iec.ch/preview/info\\_isoiec13818-2%7Bed2.0%7Den.pdf](http://webstore.iec.ch/preview/info_isoiec13818-2%7Bed2.0%7Den.pdf)(describing the MPEG-2 standard as “a generic coding method of moving pictures and of associated sound for various applications such as digital storage media, television broadcasting and communication.”).

<sup>46</sup> See MERGES, *supra* note 5, at 45; see also Letter from Joel I. Klein, Assistant Attorney Gen., Antitrust Div., Dep’t of Justice, to Garrard R. Beeney, Esq. (June 26, 1997), <http://www.justice.gov/atr/public/busreview/215742.htm>.

implementation of the relevant technology. As an example, Kulbaski asserted that a modern-day patent pool in the aircraft industry might raise antitrust concerns because “all basic patents on jet technology have expired” and therefore all current non-expired aircraft patents can be “designed around and avoided.”<sup>47</sup> Essentially, Kulbaski argued that an aircraft patent pool is not desirable because each aircraft firm can effectively compete in the downstream aircraft market by investing in the research and development necessary to design around the existing aircraft patents.

Additionally, Kulbaski’s argument reflects the concern that permitting patents for competing technologies to be pooled, as opposed to restricting the pool to blocking patents or complementary patents necessary for an integrated technology, will stifle innovation and competition.<sup>48</sup> That is, Kulbaski’s apprehension is that pooling competing patented technologies will enable or encourage the members to produce structurally and functionally homogeneous products, which is the antithesis of healthy competition. Kulbaski’s argument against pooling competing patented technologies seems to assume that all the members of a patent pool will similarly determine that one patent is superior to all substitutable patents and therefore the members will produce structurally and functionally indistinguishable products.

The Antitrust Guidelines promulgated by the Department of Justice and the Federal Trade Commission express a similar concern by recognizing the “procompetitive

---

<sup>47</sup> Kulbaski, *supra* note 44, at 3.

<sup>48</sup> See Sheila F. Anthony, *Antitrust and Intellectual Property Law: From Adversaries to Partners*, 28 AIPLA Q.J. 1, 14-15 (2000) (“[T]he pool included only complementary, not competing, patents, each of which was deemed essential to compliance with the MPEG-2 standards. The pooling agreement’s definition of ‘essential’ is particularly noteworthy in that it required (1) that there be no technical alternative to each patent that was included in the pool and (2) that the pooled patents be useful for MPEG products only in conjunction with each other. The patent-holders were not pooling competing technologies, but rather assembling complementary components of a single technology.”) (footnotes omitted).

benefits by integrating complementary technologies” but expressing concern that cross-licensing agreements among horizontal competitors may diminish competition.<sup>49</sup> The Antitrust Guidelines provide an example of a patent pool involving blocking patents that would be unlikely to be challenged on antitrust grounds. The example describes a situation where two leading consumer electronic products manufacturers pool together complementary blocking patents covering circuit designs. The patents pooled by each firm in this example are “not substitutable” because they could not “be used without infringing a patent owned by the other firm.”<sup>50</sup> The pooled patents were then licensed to other consumer products manufacturers according to set license royalties. The Antitrust Guidelines concluded that such a patent pool would “not adversely affect competition in the licensed technology among entities that would have been actual or likely potential competitors in the absence of the licensing arrangement.”<sup>51</sup> In contrast, if the two consumer electronic products manufacturers pooled together substitutable patents—i.e., competing patents that could be used without infringing the other firm’s patents—the Antitrust Guidelines conclude that such an arrangement would likely be challenged as an unlawful horizontal restraint of trade.<sup>52</sup> Accordingly, the Antitrust Guidelines are much more skeptical of patent pools containing “substitutable” or competing patents.

In my judgment, the argument presented by Kulbaski and the DOJ that patent pools should be limited to blocking or complementary patents essential to achieving compliance with an industry standard is problematic for several reasons, especially as

---

<sup>49</sup> U.S. DEP’T OF JUSTICE & FED. TRADE COMM’N., ANTITRUST GUIDELINES FOR THE LICENSING OF INTELLECTUAL PROPERTY §5.5 (1995), <http://www.justice.gov/atr/public/guidelines/0558.pdf>. [hereinafter ANTITRUST GUIDELINES].

<sup>50</sup> *Id.*

<sup>51</sup> *Id.*

<sup>52</sup> *Id.* § 5.1.

applied to aircraft patent pools. First, Kulbaski's suggestion that aircraft manufacturers can design around aircraft patents because all fundamental aircraft patents have expired fails to appreciate fully the fact that the number of parts and patented inventions on a modern aircraft may make it prohibitively expensive for small and medium-sized aircraft manufacturers to design around all of these technical innovations. As Kulbaski noted, "14 separate companies owning 75 U.S. patents . . . are essential to the MPEG-2 standard." In the modern aircraft industry, the number of separate companies holding commercially significant aircraft patents is almost certainly higher.<sup>53</sup> The aircraft industry appears to present a classic "anticommons," because the patents required to produce a single aircraft are held by a large number of aircraft manufacturers.<sup>54</sup> For example, a Boeing 747-400 has over 6 million parts.<sup>55</sup> If even a small proportion of these parts are patented, the costs to design around all of these patents may make it prohibitively expensive for a firm to enter the market and introduce a commercial jet capable of competing with the Boeing 747.

Second, the transaction costs associated with individually negotiating licensing arrangements with each patentee are wasteful and inefficient. These transaction costs likely present a significant barrier to entry into the aircraft industry. The benefit of a patent pool is that it represents a "one-stop shop" for patent licenses which reduces these

---

<sup>53</sup> For example, Boeing has roughly 50 supplier partners on its 787 Dreamliner aircraft, most notably including: Alenia Aeronautica; BAE Systems; Bridgestone; DuPont Aerospace Enterprise; Eaton Corporation; Fuji Heavy Industries; General Electric Company; GKN Aerospace; Goodrich Aerospace; Honeywell; PFW; Parker Hannifin; Pratt & Whitney; Rockwell Collins; Rolls-Royce; Saab Aerostructures; Spirit Aerosystems, Inc.; Vought Aircraft Industries; and 3M Aerospace and Aircraft Maintenance. See Boeing, *787 Dreamliner - International Team Facts*, <[http://www.boeing.com/commercial/787family/dev\\_team.html](http://www.boeing.com/commercial/787family/dev_team.html) (last visited Apr. 11, 2011).

<sup>54</sup> See MERGES, *supra* note 5, at 6.

<sup>55</sup> Boeing, *747 Fun Facts*, [http://www.boeing.com/commercial/747family/pf/pf\\_facts.html](http://www.boeing.com/commercial/747family/pf/pf_facts.html) (last visited Apr. 11, 2011).

wasteful transaction costs. This benefit accrues regardless of whether the patents are competing, complementary, blocking, improvement, or economically unrelated. Simply stated, the number of parties to a potential agreement is the most significant variable in the transaction costs calculus. The fact that one party holds a fundamental, blocking patent does not necessarily increase transaction costs.

My first two criticisms of Kulbaski's suggestion that patent pools should be limited to blocking and complementary patents can be more fully appreciated by considering the costs facing an aircraft manufacturer in the absence of an aircraft patent pool. In the absence of an aircraft patent pool, industry firms face a choice between three highly inefficient alternatives: (1) investing in the research and development necessary to design around all known relevant aircraft patents; (2) negotiating licensing agreements with all known relevant aircraft patentees or assignees; or (3) some combination of one and two. In addition to being inefficient, these alternatives fall short of eliminating the uncertainty that practicing in the aircraft market will not give rise to patent infringement litigation. Consequently, these alternatives require aircraft firms to absorb the information costs associated with discovering relevant aircraft patents by performing patent searches and analyzing them to determine their proper scope.<sup>56</sup>

Third, Kulbaski fails to appreciate that innovation and competition can thrive in the aircraft industry even if patents covering competing technologies are pooled because patents have broad scope and cover more than just one exemplary embodiment of the invention. The fact that patents have broad scope, and cover more than just the disclosed

---

<sup>56</sup> See, e.g., Christopher A. Cotropia, *Patent Claim Interpretation and Information Costs*, 9 LEWIS & CLARK L. REV. 57, 66 (2005) (recognizing that a patented invention's "lack of thingness" (i.e. its intangibility) generates information costs because potential competitors must expend "[s]ignificant amounts of time and energy . . . to obtain enough information about the invention to understand it[s]" scope).

best mode of the invention or any single exemplary embodiment, suggests that an aircraft patent pool is an unlikely instrument of collusion and is unlikely to yield structurally and functionally homogenous aircrafts. For example, the optimal embodiment of a patented invention will generally be different for a large commercial jet manufacturer and a manufacturer of military fighter jets. Additionally, as noted above, the Wright brothers' '393 covered not just wing-warping technology but also ailerons and presumably other conceivable forms of lateral control. The logical implication is that the various members of a patent pool may design and manufacture different embodiments of the same patented invention in order to tailor the patented invention to the needs of their particular submarket and customer base. Accordingly, even if we accept Kulbaski's premise that the members of a patent pool will systematically favor one patent over all other substitutable patents, the fact that a patent covers multiple application-optimal embodiments indicates that an aircraft patent pool is unlikely to reduce competition and technical innovation.

Furthermore, the best mode<sup>57</sup> that must be disclosed in the patent is the best mode known to the inventor at the time the patent application was filed, but subsequent discoveries of new uses of the patent or new methods of production of the patented technology may be concealed from the other members of the patent pool and protected by the law of trade secrets.<sup>58</sup> The fact that the members of a patent pool can conceal any newly discovered modes of operation from the other members indicates that members would likely be encouraged to invest in research and innovation in order to differentiate

---

<sup>57</sup> 35 U.S.C. §112 (2006) ("The specification . . . shall set forth the best mode contemplated by the inventor of carrying out his invention.").

<sup>58</sup> *See, e.g., Engel Indus., Inc. v. Lockformer Co.*, 946 F.2d 1528, 1534 (Fed. Cir. 1991) (holding that there is no obligation or opportunity to disclose the discovery of a new best mode of practicing the invention made subsequent to the filing of the patent application, because 35 U.S.C. §132 prohibits the introduction of "new matter" into the disclosure of the invention).

themselves from the other members. These considerations show that members of an aircraft patent pool are highly likely to produce heterogeneous products even though, by definition, each member has equal access to the pooled patents.

The wide range of aircraft models in existence today reveals that aircraft patent pools have not inhibited technical innovation and competition and that aircraft patent pools are unlikely to permit the kind of collusion prohibited under antitrust law. Modern commercial airplanes range from the long-range double-decker Airbus A380 to Piper Aircraft's single-engine PiperJet to dirigibles such as the Aeros 40D Sky Dragon. Modern military aircraft are similarly diverse, ranging from the long-range B-2 Bomber to Lockheed Martin's F-35 Lighting II, a multi-role fighter aircraft, to the Northrop Grumman RQ-4 Global Hawk, an unmanned aerial vehicle. Each of these aircrafts serves a distinct market even though each aircraft employs similar structural features. More importantly, these aircrafts share some of the same patented technologies. The Airbus A380 serves mainly international commercial travel between major international airports and competes with other long-range, high passenger capacity jets such as the Boeing 777, whereas the short-range PiperJet, a very light jet (VLJ)<sup>59</sup> designed to accommodate business travelers, competes with other low passenger capacity business jets such as the Eclipse Aviation 500 and the Cessna Citation Mustang. These examples suggest that the aircraft industry is divided into several application-specific submarkets—markets based on performance characteristics such as range, speed, and passenger capacity—in which there is healthy competition. Accordingly, even though the members of a patent pool

---

<sup>59</sup> Nat'l Bus. Aviation Ass'n, *Very Light Jet Training Guidelines*, <http://www.nbaa.org/ops/safety/vlj/> (last visited Apr. 24, 2011) (“[V]ery light jets are jet aircraft weighing 10,000 pounds or less (a distinction from the traditional definition of large aircraft as more than 12,500 pounds, and light aircraft as 12,500 pounds or less) and certificated for single pilot operations.”).

have the same access as every other member to the pooled patents, the members are likely to produce aircrafts with widely differing capabilities and therefore a patent pool enables technological innovation as the members create or expand into different aircraft submarkets. Moreover, this aircraft heterogeneity makes tacit collusion and coordination among the members of the patent pool impracticable. Even within these different aircraft submarkets, the various aircraft manufacturers are likely to compete “on the basis of operating efficiency, engineering integrity, configuration, and price.”<sup>60</sup>

I must also briefly dispose of one concern not raised by Kulbaski. An unavoidable consequence of opening the patent pool to all aircraft firms is that there is a high likelihood that non-value-added patents will be contributed to the pool. However, the existence of non-value-added patents in a properly structured aircraft patent pool is not problematic because the members of the pool are not obligated to license all of the pooled patents and the royalty rate negotiations incident to the formation of the aircraft patent pool will likely set a near-zero royalty rate for non-value-added patents. Accordingly, members holding non-value-added patents will still retain the benefit of reduced transaction costs associated with the one-stop-shop patent pool, while the other members of the pool will not be burdened with paying licensing fees for non-value-added patents.

Finally, I note that the Antitrust Guidelines, under certain circumstances, embrace the notion that patent pooling arrangements may properly be open to all firms in the relevant market. Specifically, the Antitrust Guidelines express concern that “exclusion from a pooling or cross-licensing arrangement among competing technologies” may raise antitrust concerns if “(1) excluded firms cannot effectively compete in the relevant

---

<sup>60</sup> Bittlingmayer, *supra* note 21, at 238 n.32

market for the good incorporating the licensed technologies and (2) the pool participants collectively possess market power in the relevant market.”<sup>61</sup> Opening the patent pool to all aircraft firms effectively eliminates this potential antitrust concern that the firms excluded from the pool will effectively be precluded from competing in the downstream product market.

In sum, even though there is no aircraft industry standard analogous to the MPEG-2 standard in the consumer audiovisual electronics industry, a carefully crafted aircraft patent pool can have net pro-competitive effects—i.e., cost-efficient technology transfers among industry competitors while still encouraging investments in technological innovations. Moreover, a properly structured aircraft patent pool can encourage competition and innovation even if the pooled patents cover technologies that are market substitutes because the aircraft industry is divided into several submarkets. Aircraft patents that cover market substitutes are unlikely to actually hinder competition and innovation because those patents may be employed on aircrafts in different and economically independent submarkets. That is, even though the aircraft patents in my hypothetical aircraft patent pool may technically be labeled “competing patents” because they can serve as market substitutes for each other, the aircrafts on which they are employed may serve economically unrelated markets, and therefore the patents are not truly competitive economically. Additionally, the fact that patents cover more than just the best mode disclosed or any single exemplary embodiment suggests that pooling competing aircraft patents is unlikely to result in structurally and functionally indistinguishable aircrafts. Most importantly, an aircraft patent pool open to all industry

---

<sup>61</sup> ANTITRUST GUIDELINES, *supra* note 49, §5.5..

firms is likely to encourage innovation and competition in the downstream product market by providing the broadest and most cost-effective access to aircraft patents.

#### IV. ANTITRUST ANALYSIS OF AIRCRAFT PATENT POOLS

Unless the effects of an aircraft patent pool are plainly anticompetitive, a patent pool's cross-licensing agreement challenged under the Sherman Act is subject to analysis under the Rule of Reason. Under the Rule of Reason, the inquiry "is whether [the challenged agreement or] the restraint imposed is such as merely regulates and perhaps thereby promotes competition or whether it is such as may suppress or even destroy competition."<sup>62</sup> The plaintiff bears the initial burden of proving that the challenged arrangement had an actual adverse effect on competition in the relevant market.<sup>63</sup> If the plaintiff meets that burden, the burden shifts to the defendants to supply evidence of the pro-competitive effects of the cross-licensing agreement.<sup>64</sup> The burden then shifts back to the plaintiff to prove that the "challenged restraint is not reasonably necessary to achieve the defendants' procompetitive justifications, or that those objectives may be achieved in a manner less restrictive of free competition."<sup>65</sup> Ultimately, if both the defendants and the plaintiff sustain their burdens, the legality of a challenged agreement hinges on a balancing of the procompetitive justifications against the anticompetitive effects of the arrangement.<sup>66</sup> Below, I will briefly outline several pro-competitive benefits of an aircraft

---

<sup>62</sup> Nat'l Soc'y of Prof'l Eng'rs v. United States, 435 U.S. 679, 691 (1978) (quoting City of Chi. B. of Trade v. United States, 246 U.S. 231, 238 (1918)).

<sup>63</sup> See, e.g., U.S. v. Visa U.S.A., Inc., 344 F.3d 229, 238 (2d Cir. 2003).

<sup>64</sup> *Id.*

<sup>65</sup> *Id.*

<sup>66</sup> See, e.g., Paladin Assocs., Inc. v. Mont. Power Co., 328 F.3d 1145, 1158 (9th Cir. 2003) (upholding the challenged arrangement because "any anticompetitive effects of [the challenged arrangements] were far

patent pool and then argue that two of the more forceful objections to aircraft patent pools may be avoided by properly structuring the patent pool. Thus, I will attempt to show that the pro-competitive benefits of a properly structured aircraft patent pool outweigh the potential anticompetitive effects.

**A. Pro-Competitive Benefits of Aircraft Patent Pools**

A properly structured aircraft patent pool has potential to produce the following pro-competitive effects: (1) reducing wasteful and inefficient transaction costs associated with negotiating patent licensing agreements individually with each relevant patent holder; (2) reducing the extent to which fear of patent infringement litigation presents a barrier to entry; and (3) promoting technical innovation and expansion into new aircraft submarkets by providing broader access to the pooled patents and permitting complementary patents to be integrated.<sup>67</sup> Together, the first and third pro-competitive justifications for patent pools can also be thought of as a way to mitigate the tragedy of the anticommons by permitting the integration of fragmented property rights.<sup>68</sup>

---

outweighed by their procompetitive benefits”); *see also* Michael A. Carrier, *The Rule of Reason: An Empirical Update for the 21st Century*, 16 GEO. MASON L. REV. 827, 837 (2009) (surveying recent rule of reason cases and concluding that courts have continued to follow the burden-shifting analytical framework).

<sup>67</sup> In addition to the three pro-competitive effects of a patent pool that I have identified, in *Patent Pooling: Uncorking a Technology Transfer Bottleneck and Creating Value in the Biomedical Research Field*, 9 J. COM. BIOTECH. 111, 111 (2003), Frank Grassler and Mary Ann Capria suggest that a fourth pro-competitive benefit of patent pools is “spreading the risks and benefits of technology implementation among the players in the field . . . .” I note only that this alleged pro-competitive benefit, stated in such broad form, also sounds remarkably similar to the suspension of competition among the members of the patent pool.

<sup>68</sup> *See* *Broad. Music, Inc. v. Colum. Broad. Sys., Inc.*, 441 U.S. 1, 20 (1979). In the context of a pool of copyrighted musical compositions, the Supreme Court recognized that such a pool reduces transaction costs associated with negotiating licensing fees. The antitrust analysis regarding the BMI copyright pool is relevant to an aircraft patent pool because in both the music industry and the aircraft industry property rights are held by a large number of different parties. Significantly, the Supreme Court recognized that the BMI copyright pool “was an obvious necessity if the thousands of individual negotiations, a virtual impossibility, were to be avoided.”

Related to the second pro-competitive benefit is the likelihood that a patent pool helps reduce the information costs associated with searching for existing aircraft patents and analyzing them to determine their proper scope. Information costs associated with discovering and analyzing all relevant aircraft patents represent a significant cost of competing in the aircraft industry. However, if an aircraft patent pool is open to all aircraft firms, and the pool actually attracts a substantial percentage of the relevant patentees or assignees, the costs associated with researching and analyzing patents in order to assuage fears of patent infringement litigation will be significantly reduced.

**B. Potential Anti-Competitive Effects of Aircraft Patent Pools**

Courts and commentators alike have long-recognized the inherent tension, or at least the inherent *potential* for tension,<sup>69</sup> between patent law and antitrust law. The court in SCM Corp. v. Xerox Corp., for example, recognized that this tension stems from the fact that patent law and antitrust law "were designed to achieve reciprocal goals. While the antitrust laws proscribe unreasonable restraints of competition, the patent laws reward the inventor with a temporary monopoly that insulates him from competitive exploitation of his patented art."<sup>70</sup> Similarly, Professor Robin Feldman has recognized that patent law and antitrust law, simply stated, "pose a natural contradiction."<sup>71</sup> Any tension between antitrust law and the monopoly power conferred by a patent, however, is eased by a

---

<sup>69</sup> See *Ill. Tool Works Inc. v. Indep. Ink, Inc.*, 547 U.S. 28, 31 (2006) (holding that the existence of the requisite market power to support a Sherman Act violation cannot be presumed by the mere fact that a product is patented). Accordingly, patent law and antitrust law are not necessarily at odds because there is no guarantee that a patent will confer market power in the relevant market. For example, improvement patents that cover a new use for an existing patented invention are an entire class of patents that do not necessarily confer any market power because the holder of the improvement patent must license the existing patented invention just to enter the market. Additionally, a patent may cover an invention for which there are many substitutes in the relevant market and therefore the patented invention may confer very little market power.

<sup>70</sup> *SCM Corp. v. Xerox Corp.*, 645 F.2d 1195, 1203 (2d Cir. 1981).

<sup>71</sup> Robin Feldman, *Patent and Antitrust: Differing Shades of Meaning*, 13 VA. J.L. & TECH. 1, 2 (2008).

properly structured patent pool and the terms of the associated cross-licensing agreement, which effectively suspend patent rights among the various members and promote technological innovation by reducing transaction costs and royalties.<sup>72</sup>

Nevertheless, commentators have expressed concern that patent pools present the possibility of having an anticompetitive effect on the relevant industry by retarding research and technical innovation by encouraging free-riding and by serving as a mechanism for restricting output and fixing prices. Specifically, commentators have argued that (1) patent pools which cover after-acquired patents hamper innovation by reducing a member's incentive to invest in patentable technological inventions; and (2) information sharing among the members of a patent pool has the potential to be an instrument of collusion and coordinated price fixing, output restraints, and territorial market divisions.<sup>73</sup> Below, I outline several features and restrictions that a properly structured aircraft patent pool must possess to avoid these anticompetitive effects.

#### 1. After-Acquired Patents

A patent pool arrangement under which each member has the right to use their competitors' patents, both current and after-acquired, might reduce each member's incentive to develop new patentable innovations. Clearly, the prospect of unremunerative transfers of after-developed intellectual property might dissuade the members of the patent pool from investing the resources necessary to develop patentable innovations and

---

<sup>72</sup> Bittlingmayer, *supra* note 21, at 248.

<sup>73</sup> See, e.g., Roger B. Andewelt, *Analysis of Patent Pools Under the Antitrust Laws*, 53 ANTITRUST L.J. 611, 617-19 (1984) (discussing several anticompetitive effects of patent pools, including (1) the potential for cross-licensing agreements covering after-acquired patents to "dull" the members' incentive to discover new inventions and to invest in research and development; (2) the possibility that patent pools "can provide certain valuable information to a patent owner about a licensee or otherwise facilitate collusion in the marketplace"; and (3) the potential that the terms of the pool may contain naked restraints or tying arrangements).

it might encourage free riding—i.e., each member secretly hopes that its competitor, another member of the patent pool, will invest the time and effort to develop a patentable innovation, which ultimately must be licensed to every other member of the patent pool. The Antitrust Guidelines express a similar concern that cross-licensing arrangements covering after-acquired innovations may “substantially reduce . . . incentives to engage in research and development and thereby limit rivalry in innovation markets.”<sup>74</sup>

A properly structured patent pool that sets a separate royalty rate structure for after-acquired patents and permits its members to withdraw from the patent pool at any time, however, partially addresses this concern by providing members a reward for innovating. As was the case with the Manufacturers Aircraft Association, a separate board could be established to determine the licensing rate for after-acquired patents that also meet certain desirable characteristics, such as patents that possess a “striking character” or which are a “radical departure from previous practice.” As a result, members will be encouraged to invest in technological innovation because the successful development of a new patentable technology will result in the member immediately receiving licensing royalties without having to incur the costs incident to negotiating with the relevant industry firms.

Moreover, a properly structured patent pool must distinguish between two types of after-acquired patents: (1) improvement patents based on a patented technology licensed by another member of the patent pool; and (2) patents unrelated to patented technologies licensed to the members of the patent pool. Members holding patents in the

---

<sup>74</sup> U.S. DEP’T JUST. & FED. TRADE COMM’N, ANTITRUST GUIDELINES FOR THE LICENSING OF INTELLECTUAL PROPERTY 30 (1995).

first category—after-acquired improvement patents—should be required to license those patents to the other members of the patent pool. That is, members who develop improvement patents based upon another member’s pooled patent should not be permitted to withdraw from the patent pool to avoid licensing their after-acquired improvement patent to the other members of the patent pool, and most importantly, to the member who holds the “basic” patent on which the improvement patent is based. This mandatory licensing requirement is “necessary to ensure that the licensor is not prevented from effectively competing because it is denied access to improvements developed with the aid of its own technology.”<sup>75</sup> Further, this requirement will encourage firms to enter the patent pool in the first place because it will preemptively eliminate blocking relationships among the members of the pool. Because patents in the second category do not present the possibility of creating a blocking relationship with another member of the pool, such after-acquired patents need not be subject to the mandatory licensing requirement. The holder of a non-blocking after-acquired patent should be free to withdraw from the pool without licensing these patents to the other members of the pool.

In sum, requiring after-acquired patents to be subject to a separate royalty rate structure and administrative procedure and requiring members to license their after-acquired improvement patents to the other members of the pool will help ensure that the aircraft patent pool does not eliminate the incentive to innovate.

---

<sup>75</sup> *Id.*

## 2. Information Sharing Among Members of the Patent Pool

An improperly structured patent pool has the potential to become an instrument of its cartel members and a means for output restriction, price fixing, and market division.<sup>76</sup> To be certain, the cross-licensing agreement of the Manufacturers Aircraft Association had some elements of a cartel. In particular, the cross-licensing agreement required each member to report to all other members “the number of airplanes (with or without engine), sold and delivered by it, together with the names of the purchasers, and the dates of delivery . . . during the three preceding calendar months.”<sup>77</sup> Although information regarding the number of airplanes sold was necessary to calculate the appropriate royalty payment due, detailed knowledge of a competitor’s customers and delivery dates has the potential to form the basis of a cartel. For example, such information would be essential to detecting and deterring cheating on a tacit agreement to restrict output, fix prices, or divide the market. Because each cartel member has an incentive to cheat on the cartel by increasing output and raising price above the agreed-upon level in order to capture a greater segment of the market and to obtain greater profits, the ability to detect and deter cheating on the cartel agreement is essential to the stability of the cartel.<sup>78</sup>

The Antitrust Guidelines<sup>79</sup> recognize that “the sharing of information related to a market in which the collaboration operates or in which the participants are actual or potential competitors may increase the likelihood of collusion on matters such as price,

---

<sup>76</sup> See, e.g., *Freedom Holdings, Inc. v. Spitzer*, 447 F. Supp. 2d 230, 251 (S.D.N.Y. 2004), *aff’d*, 408 F.3d 112 (2d Cir. 2005) (defining a cartel as a combination of competing firms that “replace independent decisions with an agreement on price, output, or related matters,” such as market division) (quoting PHILLIP E. AREEDA & HERBERT HOVENKAMP, *ANTITRUST LAW* ¶ 405(a), at 26 (2d ed. 2002)).

<sup>77</sup> *Mfrs. Aircraft Ass’n v. U.S.*, 77 Ct. Cl. 481, 485 (Ct. Cl. 1933).

<sup>78</sup> See D. K. Osborne, *Cartel Problems*, 66 AM. ECON. REV. 835, 836 (1976) (“a cartel is not inherently unstable internally unless the locating and detecting problems are inherently insoluble”).

<sup>79</sup> U.S. DEP’T JUST. & FED. TRADE COMM’N, *ANTITRUST GUIDELINES FOR COLLABORATIONS AMONG COMPETITORS* § 3.31(b), at 15 (2000).

output, or other competitively sensitive variables.” Specifically, the Antitrust Guidelines assert that three forms of information sharing are most likely to raise anticompetitive concerns: (1) “information relating to price, output, costs, or strategic planning”; (2) “information on current operating and future business plans” as distinct from historical operating and business plan information; and (3) “individual company data” as opposed to “aggregated data that does not permit recipients to identify individual firm data.”<sup>80</sup>

To help address the concerns raised by the Antitrust Guidelines, the information exchanged among the various members of a modern-day patent pool and cross-licensing agreement should not be so specific as to facilitate the enforcement of a cartel.<sup>81</sup> One way to avoid the transmission of overly specific information to the other members of the pool is to require each member to submit their sales data reports to a third party who would then verify the accuracy of the reports and remove any member-identifying information before submitting the reports to the other members of the pool. The absence of member-identifying information should help reduce fears that an aircraft pool is an instrument of a cartel because without such information the members would not have the information

---

<sup>80</sup> *Id.*

<sup>81</sup> Comparison of two famous antitrust cases, *Am. Column & Lumber Co. v. U.S. (The Hardwood Case)*, 257 U.S. 377 (1921) and *Maple Flooring Mfrs. Ass’n v. U.S.*, 268 U.S. 563 (1925), suggests that the specificity of the information shared among the members of an association may be critical in distinguishing cartels from pro-competitive associations. In *The Hardwood Case*, the Supreme Court found a Sherman Act §1 violation where the defendant members of the American Hardwood Manufacturers Association were required to prepare detailed reports to be distributed to the other members—including (1) a daily sales report of all orders taken each day; (2) a daily shipping report with invoices; (3) a monthly production report; (4) a monthly stock report; (5) a monthly price list; and (6) inspection reports—because the exchange of such detailed information, particularly the daily invoices, could have facilitated the enforcement of a cartel, such as by enabling the detection of cheating on the cartel’s agreed upon output restriction, and because the Association’s manager of statistics jawboned the members into restricting output. *The Hardwood Case*, 257 U.S. at 394-95, 397-99, 412. In contrast, the Supreme Court in *Maple Flooring* found no antitrust violation where the twenty-two defendant members of the Maple Flooring Association exchanged information regarding the quantity and kind of flooring sold, prices received, and the amount of stock on hand because such information was not specific enough to facilitate the enforcement of a cartel and because no association official encouraged members to curtail production. *Maple Flooring*, 268 U.S. at 573-74, 586.

necessary to identify and punish the specific members who might be cheating on the cartel arrangement. Without member-specific information relating to price and quantity, the members of the arrangement would be able to cheat with impunity on any tacit agreement, which would render the cartel unstable and would quickly lead to the dissolution of the cartel.

Additionally, a properly structured aircraft patent pool should prohibit members from sharing technical performance data (e.g. load bearing properties, aerodynamic performance characteristics, acoustic properties, etc.) relating to an aircraft-specific patented technology because an important means of competition among the members of the pool is the incentive to invest in independent research and development. That is, the members of the patent pool should be prohibited from sharing technical performance data beyond the information already disclosed in the relevant patent—information that I will refer to as “extra-patent technical data.” As noted above, one important mechanism of competition among the members of a patent pool is that each member is incentivized to research, design, and manufacture different embodiments of the same patented invention in order to tailor the patented invention to the particular needs of that member’s customer base. This incentive to invest in research and design might not exist if the members were permitted to share technical performance data beyond the information disclosed in the patent.

For example, assume that A and B are two members of an aircraft patent pool, and A is a large commercial aircraft manufacturer that holds the patent for an aileron and B is a regional business jet aircraft manufacturer that holds a patent for an aircraft tire. Firm A should be prohibited from sharing such “extra-patent technical data” relating to

its aileron patent as designed for use on its large commercial aircraft, such as a plot showing the aileron performance characteristics as a function of size, shape, air speed, atmospheric conditions, and angle of attack. The reason is that sharing such information might discourage firm B from investing in independent research and development to determine the optimal characteristics of an aileron most appropriate for use on a regional business jet as opposed to a large commercial aircraft.<sup>82</sup> For similar reasons, B should not be permitted to share technical performance data related to its patented tire.

The goal of this prohibition on sharing extra-patent technical data is different than the goal of the separate royalty rate structure for after-acquired patents and the ability of the members to withdraw from the pool at any time. The latter restriction is designed to encourage the members to develop new patentable innovations after joining the patent pool. In contrast, prohibiting the members from sharing extra-patent technical data is designed to encourage the members to develop different application-optimal embodiments of an existing patented invention after joining the pool.

In short, by limiting the information shared among the members to the minimum required to assess the appropriate royalty payment due from each member, a properly structured aircraft cross-licensing arrangement can avoid potential anticompetitive effects of an agreement among horizontal competitors while still providing a cost-effective and efficient method of pooling the patents essential to the aircraft industry.

---

<sup>82</sup> See, e.g., Fred E. Weick & Carl J. Wenzinger, *Wind-Tunnel Research Comparing Lateral Control Devices, Particularly at High Angles of Attack I—Ordinary Ailerons on Rectangular Wings*, REPORT NO. 419 NAT'L ADVISORY COMMITTEE FOR AERONAUTICS 357 (1933), available at [http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19930091493\\_1993091493.pdf](http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19930091493_1993091493.pdf). This report compares wind-tunnel test data for three different ailerons, with reference to the effect of the ailerons on lateral control, lateral stability, and three basic aircraft performance characteristics: (1) the maximum lift coefficient, "which is used as an indication of the wing area required for the desired landing speed"; (2) the ratio of the maximum lift coefficient to the minimum drag coefficient; and (3) the lift to drag ratio corresponding to a lift coefficient of 0.70.

## V. CONCLUSION

The increasing complexity of modern aircrafts and the number of aircraft patents held by different firms present challenges to existing aircraft manufacturers and represent a significant barrier to entry. Even though the Manufacturers Aircraft Association was formed under unique circumstances—namely, at the insistence of the Secretary of War in response to the U.S. Government’s need for the rapid production of aircrafts on the eve of the United States’ entrance into World War I—it can provide an instructive baseline model for modern-day aircraft patent pools. The wide variation in the aircraft manufacturers’ market shares during the 58-year period in which the Manufacturers Aircraft Association patent pool was in effect demonstrates that an aircraft patent pool can facilitate fierce competition in the aircraft industry.

A properly structured patent pool reduces the transaction costs associated with licensing aircraft patents and thereby increases access to widely dispersed property rights while still encouraging competition and innovation in the aircraft industry. The fact that the aircraft industry is divided into several application-specific submarkets indicates that a modern-day aircraft patent pool is an unlikely instrument of a cartel and a horizontal restraint of trade. Most importantly, the structure of the aircraft industry suggests that an aircraft patent pool should be open to all relevant aircraft patents, not just complementary and technically essential patents necessary for the implementation of an industry standard, in order to provide the broadest and most cost-efficient access to technical innovations.