

CONTRACTUAL BUNDLES FOR INNOVATION

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ABSTRACT

The question of how contracts promote innovation has long attracted scholars' attention. This Article tackles this question by studying one contractual mechanism — bundling arrangements — that innovators frequently use to transfer other assets along with a patent license. It examines 400 patent licensing transactions that public companies filed with the Securities and Exchange Commission, and finds that 42.25% of them included bundling arrangements. In general, these arrangements enhance innovation, as the assets in the bundle can help the licensee deploy the licensed technology. It also finds that ex ante patent licensing transactions involved bundled asset transfers more frequently than ex post transactions did.

The findings have two important implications for law and policy. First, the efficiency-enhancing effect of these arrangements should serve as a justification for their use in the innovation marketplace. However, both the law of patent misuse and antitrust case law might find bundling arrangements illegal before their efficiency-enhancing effect have been fully assessed. This Article suggests that lawmakers incorporate an analysis of this effect into these laws, reducing patentees' concern about legal liabilities when they enter bundling arrangements that promote innovation. Second, for certain technology users, only ex ante patent licensing transactions can lead to efficient outcomes. The high transaction costs of detecting licensing opportunities can impede ex ante transactions. This Article suggests policymakers lower these costs by making relevant patent documents easier to locate and read, and link them to a platform that allows patentees to present information about the complementary assets that they are willing to transfer.

This Article then provides a detailed empirical account of the contractual bundles in patent licensing transactions. It also demonstrates how contracts can promote innovation by overcoming the limitations of the patent system.

DOI: <https://doi.org/10.15779/Z38639K631>

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TABLE OF CONTENTS

I.	INTRODUCTION	172
II.	CONTRACTUAL BUNDLES AS A COMPLEMENT TO PATENT DISCLOSURE.....	181
A.	PATENT DISCLOSURE AND ITS LIMITATIONS.....	181
B.	CONTRACTUAL SOLUTION: BUNDLED ASSET TRANSFERS	185
III.	CASE STUDY: 400 MATERIAL PATENT LICENSING TRANSACTIONS OF PUBLIC COMPANIES.....	189
A.	THE ASSETS IN THE BUNDLES.....	189
1.	<i>Intellectual Property</i>	190
a)	Proprietary Information	190
b)	Software	193
c)	Copyright	195
d)	Trademark	196
2.	<i>Property</i>	198
a)	Facilities	198
b)	Products	200
3.	<i>Labor</i>	201
a)	Technical Services	201
b)	R&D Services.....	204
B.	BUNDLED ASSET TRANSFERS IN EX ANTE AND EX POST PATENT LICENSING CONTEXTS.....	206
IV.	IMPLICATIONS.....	210
A.	ALLOW EFFICIENCY-ENHANCING BUNDLING ARRANGEMENTS.....	210
B.	FACILITATE BUNDLED ASSET TRANSFERS IN AN EX ANTE CONTEXT.....	218
V.	CONCLUSION	222
	APPENDIX. THE DATASET	223

I. INTRODUCTION

For over a generation, scholars have studied the question of how law promotes innovation.¹ They have explored the ways that different areas of law

1. Matthew Jennejohn, *The Private Order of Innovation Networks*, 68 STAN. L. REV. 281, 284 (2016).

– including intellectual property law,² tax law,³ antitrust law,⁴ labor law,⁵ insurance law,⁶ and tort law⁷ – foster it. Scholars have also examined how various areas of law and policy work together to provide innovation incentives to producers of knowledge goods and how they allocate the access to these goods among consumers.⁸

Contracts' role in promoting innovation has long attracted scholarly attention. The existing scholarship has revealed three important interrelated functions through which contracts do this. First, contracts facilitate collaborative innovation. By entering alliance contracts, technology firms “partially integrate [their] development capabilities” to pursue innovation

2. See, e.g., Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265 (1977); Robert P. Merges, *One Hundred Years of Solicitude: Intellectual Property Law, 1900-2000*, 88 CALIF. L. REV. 2187, 2190 (2000) (stating that “intellectual property law has generally adapted quite well to each successive wave of technological innovation”).

3. See, e.g., David Hasen, *Taxation and Innovation—A Sectorial Approach*, 2017 U. ILL. L. REV. 1043, 1044 (2017) (“The taxation of innovation generally, and of intellectual property specifically, has received a great deal of scholarly attention over the last twenty years.”); Michael J. Graetz & Rachael Doud, *Technological Innovation, International Competition, and the Challenges of International Income Taxation*, 113 COLUM. L. REV. 347, 434 (2013) (noting that tax rules can provide “incentives both [domestic] and abroad for R&D expenditures, innovation, and manufacturing”).

4. See, e.g., Jonathan B. Baker, *Beyond Schumpeter vs. Arrows: How Antitrust Fosters Innovation*, 74 ANTITRUST L.J. 575, 576 (2007) (noting that antitrust law “can systematically promote innovation competition and pre-innovation product market competition, which will encourage innovation”). *But see* Daniel F. Spulber, *Unlocking Technology: Antitrust and Innovation*, 4 J. COMP. L. & ECON. 915, 966 (2008) (identifying certain antitrust policies that damage innovation incentives).

5. See, e.g., Viral V. Acharya, Ramin P. Baghai & Krishnamurthy V. Subramanian, *Labor Laws and Innovation*, 56 J.L. & ECON. 997, 998 (2013) (examining how labor laws can enhance an employee’s innovative efforts and increase investment in innovation); Rachel Griffith & Gareth Macartney, *Employment Protection Legislation, Multinational Firms, and Innovation*, 96 REV. ECON. & STAT. 135, 135 (2014) (stating that the “optimal level of investment in incremental innovation increases with [employment protection legislation]”).

6. See, e.g., Rachel E. Sachs, *Prizing Insurance: Prescription Drug Insurance as Innovation Incentive*, 30 HARV. J. L. & TECH. 153, 208 (2016) (demonstrating that “prescription drug insurance can operate much like a prize in promoting incentives to innovate in many of the lacunae left behind by the structure of our existing patent law and FDA exclusivity systems”).

7. See, e.g., Benjamin H. Barton, *Tort Reform, Innovation, and Playground Design*, 58 FLA. L. REV. 265, 270-71 (2006) (claiming that tort liability can inspire manufacturers to take innovative efforts to produce safer and better products). *But see* Gideon Parchomovsky & Alex Stein, *Torts and Innovation*, 107 MICH. L. REV. 285, 285 (2008) (pointing out that tort liability for negligence, defective products, and medical malpractice can chill innovation and proposing two ways to reform tort law in order to facilitate it).

8. See Daniel J. Hemel & Lisa Larrimore Ouellette, *Innovation Policy Pluralism*, 128 YALE L. J. 544, 549-50 (2019) (discussing how to combine IP and non-IP mechanisms, including prizes, grants and tax preferences, in incentivizing the creation and distribution of knowledge products).

jointly.⁹ They establish contractual mechanisms that govern their collaboration and mitigate the potential hazards of collaboration.¹⁰ Second, contracts create collective right organizations, such as patent pools, that help economize the transaction costs of high-volume licensing of rights to technology.¹¹ Third and most fundamental, contracts realize the transfer of resources from the owners to the users who need those resources for innovation. Patent licensing is one typical example of this kind of contract. Patentees who are not “ideally situated to develop an invention” might license their patent to other firms.¹²

Conventional wisdom holds that a patent license agreement is merely an exchange of a monetary payment with “a promise by the licensor not to sue

9. Jennejohn, *supra* note 1, at 284-85; *see also* Ronald J. Gilson, Charles F. Sabel & Robert E. Scott, *Braiding: The Interaction of Formal and Informal Contracting in Theory, Practice, and Doctrine*, 110 COLUM. L. REV. 1377, 1382-83 (2010) (noting that technology firms use contracts to realize “collaborative innovation”).

10. *See* Ronald J. Gilson, Charles F. Sabel & Robert E. Scott, *Contracting for Innovation: Vertical Disintegration and Interfirm Collaboration*, 109 COLUM. L. REV. 431, 437 (2009) (“Collaborative innovation is not just a shift from hierarchy—the organization of transactions within firms—to contract. Rather, the unavoidable mutual vulnerabilities among collaborators motivate corresponding innovations in contractual governance to support the new transactional structure.”); Jennejohn, *supra* note 1, at 292-93 (finding that the firms designed a “management committee” through alliance contracts to address multiple hazards that might arise when they collaborate); D. Gordon Smith, *The Exit Structure of Strategic Alliances*, 2005 U. ILL. L. REV. 303, 303-05 (2005) (finding that the “management committee” that many alliance contracts create can mitigate opportunistic behaviors that might arise when firms collaborate).

11. *See* Robert P. Merges, *Contracting into Liability Rules: Intellectual Property Rights and Collective Rights Organizations*, 84 CALIF. L. REV. 1293, 1295-97 (1996); Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, 1 INNOVATION POLY & ECON. 119, 144 (2000); Jonathan M. Barnett, *The ‘License As Tax’ Fallacy* 14 (USC Law Legal Studies Paper No. 19-35), <https://ssrn.com/abstract=3503148> (noting that parties in the innovation marketplace “typically engineer transactional structures . . . while mitigating the IP-specific transaction costs”).

12. *See* Peter Lee, *Transcending the Tacit Dimension: Patents, Relationships, and Organizational Integration in Technology Transfer*, 100 CALIF. L. REV. 1503, 1515 (2012); *see also* Kitch, *supra* note 2, at 278 (noting that licensing could be “the most efficient and hence patent-value-optimizing way to exploit the invention”); ASHISH ARORA, ANDREA FOSFURI & ALFONSO GAMBARELLA, *MARKETS FOR TECHNOLOGY: THE ECONOMICS OF INNOVATION AND CORPORATE STRATEGY* 96 (2002) (“The producer of the knowledge may not have the necessary downstream assets to exploit it commercially. The producer may therefore find it profitable to license the technology or enter into cooperative agreements with other firms.”); *id.* at 175 (noting that a large successful company might prefer to license its technology to others when “the technology has application in markets in which the innovator does not typically operate”); Colleen V. Chien, *Software Patents as a Currency, Not Tax, on Innovation*, 31 BERKELEY TECH. L.J. 1669, 1675 (2016) (“A startup company’s ability to license or sell, rather than develop their technology, reduces its market risks and enhances innovation through its transfer of technology.”).

the licensee.”¹³ In actual licensing transactions, however, the agreement can be more complicated. Licensees might not only contract for a right to the patented technology but also for other assets, such as know-how, that facilitate the implementation of the technology.¹⁴ In other words, patent licensing transactions in the innovation marketplace might exchange a bundle of assets for monetary payment and/or other considerations.¹⁵

For example, in 2003, Applied Micro Circuits Corporation (AMCC), a supplier of integrated circuit products, obtained technology related to switch fabric devices from International Business Machines Corporation (IBM) to complement its existing portfolio.¹⁶ AMCC supplied these devices to big telecommunication firms such as Alcatel, Fujitsu, Huawei, Lucent, Mitsubishi, Motorola, and Siemens, who used them to “switch the information in the proper priority and to the proper destinations.”¹⁷ In its transaction with IBM, AMCC not only obtained a patent license to IBM’s technology, but also purchased a relevant product line, consisting of know-how, computer codes, copyright, and other assets.¹⁸ The asset bundle cost AMCC approximately \$50 million in total.¹⁹ AMCC believed that its practice of acquiring bundled assets allowed it to “reduce the time required to develop and bring to market new technologies and products.”²⁰

Empirical evidence suggests that bundled asset transfers occur relatively frequently in patent licensing transactions. According to Colleen Chien, most

13. Spindelfabrik Suessen-Schurr, Stahlecker & Grill GmbH v. Schubert & Salzer Maschinenfabrik Aktiengesellschaft, 829 F.2d 1075, 1081 (Fed. Cir. 1987); cf. Robin Feldman, *Patent Demands & Startup Companies: The View from the Venture Capital Community*, 16 YALE J.L. & TECH. 236, 247 (2014) (“A license, after all, is merely an agreement not to sue in return for a monetary payment, and the threat of a lawsuit is what drives companies to pay the licensing fee.”).

14. Mark A. Lemley & Robin Feldman, *Patent Licensing, Technology Transfer, and Innovation*, 106 AM. ECON. REV. 188, 188 (2016) [hereinafter Lemley & Feldman, *Patent Licensing*].

15. See U.S. DEP’T OF JUSTICE & FED. TRADE COMM’N, ANTI-TRUST ENFORCEMENT AND INTELLECTUAL PROPERTY RIGHTS: PROMOTING INNOVATION AND COMPETITION 114 (2007) (noting that bundling arrangements in patent licensing transactions are “ubiquitous”).

16. Applied Micro Circuits Corp., Annual Report (Form 10-K) 7 (Jun. 10, 2004), <https://www.sec.gov/Archives/edgar/data/711065/000119312504101745/d10k.htm>.

17. *Id.*

18. Applied Micro Circuits Corp., *supra* note 16, at 5; Applied Micro Circuits Corp. & Int’l Bus. Mach. Corp., License Agreement, 2003 WL 27353724; Applied Micro Circuits Corp., Asset Purchase Agreement (Form 10-Q, Exhibit-10.41) (Nov. 14, 2003), <https://www.sec.gov/Archives/edgar/data/711065/000119312503081530/dex1041.htm>; Applied Micro Circuits Corp., Intellectual Property Agreement (Form 10-Q, Exhibit-10.43) (Nov. 14, 2003), <https://www.sec.gov/Archives/edgar/data/711065/000119312503081530/dex1043.htm>.

19. Applied Micro Circuits Corp., *supra* note 16, at 5.

20. *Id.*

software patent licensing contracts bundle a patent license with know-how, trade secrets or code.²¹ The 2008 Berkeley Patent Survey showed that the majority of startups in the biotechnology and software industries expected to gain technical knowledge from the patentee when they took a patent license.²² Deepak Hegde found 41% of patent licenses in the pharmaceutical, biotechnology, and medical instrument and device industries were bundled with proprietary information; 18.6%, also included technical services.²³ In addition to know-how and services, Ashish Arora also found that firms acquire equipment along with patent licenses.²⁴ The frequent occurrence of bundling arrangements suggests that this contractual mechanism plays an important role in technology transfers.

Scholars have a favorable view of bundled asset transfers in patent licensing transactions. They are inclined to believe that these are efficiency-enhancing arrangements because bundling facilitates the implementation of technology. As Mark Lemley and Robin Feldman state, “in order to transfer ideas in a way that leads to commercialization, reading a patent alone is not enough. In general, one must also transfer things like know-how, complementary assets, and other peripheral disclosures.”²⁵ According to Michael Risch, the transfer of sufficient know-how along with the patent allows the licensees to “maximize [the patented technology’s] potential.”²⁶ In David Teece’s view, commercializing knowledge assets “frequently involves identifying and combining the relevant complementary assets”²⁷ because they can turn knowledge assets “into products or services to yield value.”²⁸

21. Chien, *supra* note 12, at 1679.

22. Stuart J. H. Graham, Robert P. Merges, Pam Samuelson & Ted Sichelman, *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey*, 24 BERKELEY TECH. L.J. 1255, 1317-18 (2009).

23. Deepak Hegde, *Tacit Knowledge And The Structure of License Contracts: Evidence from The Biomedical Industry*, 23 J. ECON. & MGMT. STRATEGY 568, 578-79 (2014).

24. Ashish Arora, *Contracting for Tacit Knowledge: The Provision of Technical Services in Technology Licensing Contracts*, 50 J. DEV. ECON. 233, 247 (1996) [hereinafter Arora, *Contracting for Tacit Knowledge*].

25. Lemley & Feldman, *Patent Licensing*, *supra* note 14, at 188.

26. Michael Risch, *Licensing Acquired Patents*, 21 GEO. MASON L. REV. 979, 983 (2014); see also MARK S. HOLMES, PATENT LICENSING AND SELLING: STRATEGY, NEGOTIATION, FORMS § 1:5.8 (2d ed. 2013) (“While the enablement and best mode requirements of the patent statute obligate the inventor to adequately teach how to make and use the invention, the complexity of the licensed technology may require further information from the licensor in order to optimally exploit the licensed rights.”).

27. DAVID J. TEECE, MANAGING INTELLECTUAL CAPITAL: ORGANIZATIONAL, STRATEGIC, AND POLICY DIMENSIONS 8 (2000).

28. *Id.* at 25.

Nevertheless, Congress and the courts regard these bundling arrangements skeptically,²⁹ concerned that bundling a patent license with other assets might have “anticompetitive consequences” on the markets for these assets.³⁰ In their view, bundling a patent license with unpatented assets used in conjunction with the technology might be an attempt to expand the “patent monopoly” that the Patent Act authorizes.³¹ If a court deems a bundling arrangement illegal under the law of patent misuse³² or antitrust law,³³ it can hold the patent at issue unenforceable under the law of patent misuse,³⁴ or impose federal antitrust liabilities on the patentee, including fines and imprisonment.³⁵ Lawyers in the innovation marketplace raise the concern that these laws are “potentially applicable to an enormous range” of bundling arrangements, including those that result from “harmless commercial decisions.”³⁶

These divergent views reflect the fact that the nature of bundling arrangements in patent licensing transactions is not yet well understood. Given the frequent occurrence of bundling arrangements in patent licensing transactions, it is worth knowing why these bundles exist, what they consist of, and whether they are, by their nature, efficiency-enhancing or anticompetitive. Although previous studies offer valuable empirical evidence indicating that licensing parties bundle patent licenses with other assets, they do not address these basic questions. They focus instead on whether parties transfer knowledge along with patent licenses,³⁷ and on the means by which

29. Barnett, *supra* note 11, at 3.

30. *See* *Ill. Tool Works Inc. v. Indep. Ink, Inc.*, 547 U.S. 28, 37 (2006); *see also* *Morton Salt Co. v. G. S. Suppiger Co.*, 314 U.S. 488, 491 (1942) (holding a bundling arrangement of patent license and unpatented supplies illegal because it allows the patentee to use “its patent monopoly to restrain competition in the marketing of unpatented articles”).

31. *See* *Motion Pictures Patents Co. v. Universal Film Mfg. Co.*, 243 U.S. 502, 517 (1917) (regarding the bundling arrangement of a patented projector and unpatented films as an attempt to extend the patentee’s power “wholly without the scope of the patent monopoly”); *Carbice Corp. of Am. v. Am. Patents Dev. Corp.*, 283 U.S. 27, 33 (1931) (regarding that bundling patented technology with unpatented materials is “beyond the scope of the patentee’s monopoly”); *see also* Herbert Hovenkamp, *The Intellectual Property-Antitrust Interface*, in 3 *ISSUES IN COMPETITION LAW AND POLICY* 1979, 1987 (2008).

32. 35 U.S.C. § 271 (d) (2012); *Morton Salt*, 314 U.S. at 491.

33. 15 U.S.C. § 1 (2012); *Ill. Tool Works*, 547 U.S. at 37.

34. 35 U.S.C. § 271 (d) (2012).

35. 15 U.S.C. § 1 (2012).

36. *See* U.S. DEP’T OF JUSTICE & FED. TRADE COMM’N, *supra* note 15, at 111-12 (internal quotation marks omitted).

37. *See* Chien, *supra* note 12, at 1679; Graham et al., *supra* note 22, at 1316; Robin C. Feldman & Mark A. Lemley, *Do Patent Licensing Demands Mean Innovation*, 101 *IOWA L. REV.* 137, 155 (2015) [hereinafter Feldman & Lemley, *Patent Licensing Demands*]; Robin C. Feldman

independent parties transfer knowledge through contracts.³⁸ Even when these studies find a transfer of non-informational assets, such as equipment, along with a patent license, they treat it as a means of knowledge transfer.³⁹ A study that reveals the nature of the bundling arrangements is absent in the existing scholarship.

This Article takes the first step toward revealing the nature of these bundling arrangements with regard to innovation and competition. In Part II, this Article explains why bundled asset transfers exist in patent licensing transactions by associating the bundle of assets with the disclosure function of the patent system. One important function of the patent system is disclosing technology to the public to facilitate innovation. Yet the information a patent discloses might not be detailed enough to allow potential users to grasp the relevant technology. And when they do disclose detailed information, users might still not be able to implement the patent due to the lack of other assets, such as facilities. To move beyond this impasse, the technology users acquire the assets — informational or non-informational — that they need for innovation from patentees, along with a patent license. This makes the patent licensing transaction an exchange of a bundle of assets for considerations.

To understand what kind of assets are in the bundles and their relationship to the patented technology, Part III provides an empirical study of the contracts in 400 patent licensing transactions⁴⁰ of public companies. These

& Mark A. Lemley, *The Sound and Fury of Patent Activity*, 103 MINN. L. REV. 1793, 1837 (2019) [hereinafter Feldman & Lemley, *Sound and Fury*].

38. See Ashish Arora, *Licensing Tacit Knowledge: Intellectual Property Rights and The Market for Know-How*, 4 ECON. INNOVATION & NEW TECH. 41, 42 (1995) [hereinafter Arora, *Licensing Tacit Knowledge*] (“Thus simple contracts involving patents can accomplish the transfer of know-how.”); Arora, *Contracting for Tacit Knowledge*, *supra* note 24, at 237 (noting that “if the licensor can tie the transfer and payment for know-how to a complementary input (whose transfer is easy to monitor) the transfer of know-how can be accomplished”); Hegde, *supra* note 23, at 569.

39. See Arora, *Contracting for Tacit Knowledge*, *supra* note 24, at 252-53; Hegde, *supra* note 23, at 579.

40. Each of the transactions consists of at least one contract. Parties might sign a single contract to finish patent licensing and the transfer of other assets. See, e.g., Annamed, Inc. & Dermin Sp. zo.o., Patent and Technology Development and License Agreement 2-3, 2016 WL 01469341. Sometimes, they use several contracts to finish the transaction. In this situation, they might sign other agreements, such as know-how transfer agreements, consulting service agreements, and research and development agreements, along with their patent licensing agreement. See, e.g., Pioneer Hi-Bred Int’l, Inc. & S&W Seed Co., Patent License Agreement §§ 1.3, 1.4 & 1.7, 2015 WL 6623061; S&W Seed Co., Know-How Transfer Agreement (Form 8-K, Exhibit 10.13) § 2 (Jan. 17, 2015), <https://www.sec.gov/Archives/edgar/data/1477246/000113626115000008/swexh10-13.htm>.

companies regard these contracts as “material contracts”⁴¹ upon which their businesses substantially depend. The companies attach the contracts to their annual, quarterly, or current reports as exhibits and file them with the U.S. Securities and Exchange Commission (SEC) to inform the public. The contracts reveal what kind of assets are transferred with the patent licenses. Since public companies’ business substantially depend on these contracts, they generally disclose the transactional background of the contracts in their reports in detail. This background information is important for readers to understand the content of the contracts, as sometimes the contracts do not contain the information necessary to understand the meaning of the key terms therein and the contracting parties’ intent behind these terms. Part III examines the contracts and the SEC reports together.

To be clear, this dataset represents only the material contracts of public firms; in general these contracts are substantial and are reported by relatively large companies. Hence the dataset might not represent the overall population of contracts in patent licensing transactions,⁴² especially contracts licensing trivial patents or contracts between small firms. Further, the dataset only contains 400 patent licensing transactions, which might be a small sample for all such transactions in the economy. Although it might be risky to draw statistical inferences based on this dataset, it still allows us to gain deeper understanding about the nature of bundling arrangements as well as the complementary relationship between patented technology and other assets and the relationship between patents and contracts.

Part III carefully examines the 400 patent licensing transactions and finds that 42.25% of them involve bundled asset transfer. Broadly, the assets in the bundles can be classified into three categories: intellectual property, property, and labor. The findings suggest that the licensees sought these assets to refine technologies, develop products, manufacture products, and facilitate the distribution of products in the marketplace. In general, the bundling arrangements in these transactions enhance efficiency because they transfer complementary assets to licensees in ways that help them more effectively implement the technology.

Part III also finds that the parties entered some of these patent licensing transactions in the context of patent litigations. We might deem these “ex post patent licensing transactions,” and those that did not involve litigation, “ex

41. Under 17 C.F.R. § 229.601(b)(10) (2018), “material contracts” are the contracts that are not made in the ordinary course of business and are material to the registrant.

42. See Chien, *supra* note 12, at 1696 (discussing the potential bias of using the material contracts filed with the SEC to infer the general characteristics of the overall population of the patent licensing transactions).

ante patent licensing transactions.” Only 5.88% of the ex post transactions involved bundled asset transfers; but of the ex ante ones, 47.56%. This finding confirms the proposition of existing literature that licensees are unlikely to obtain other assets in ex post patent licensing transactions but tend to obtain them in ex ante ones.⁴³ This Article claims that two factors explain the divergence of ex ante and ex post licensing transactions – the degree of the licensee’s dependence on the patentee, and the extent to which the licensee has completed its innovation process.

Part IV discusses two implications that the findings have for current law and policy. The first addresses the test that courts apply to determine whether a bundling arrangement is illegal. Antitrust case law and the law of patent misuse hold bundling arrangements illegal when the patentee conditions the patent license on the purchase of other assets, and when the patentee has market power in the relevant market for the patent. This Article demonstrates that, doctrinally, the bundling arrangements in this study are unlikely to be illegal because they do not include restrictive terms and seem to be based on the licensees’ efficiency concerns rather than on the patentees’ coercion. Normatively, the efficiency-enhancing effect of these arrangements should serve as a justification for their use in the innovation marketplace. Currently, courts only examine contested bundling arrangements for evidence of coercion and the patentee’s market power, but they do not weigh the efficiency-enhancing effect of the bundling arrangements against their potential anticompetitive effect. The lack of this third factor might make patentees reluctant to enter bundling arrangements that promote innovation because of the risk that a court might deem them illegal.⁴⁴

This Article recommends that Congress and the Supreme Court adopt a *rule of reason* approach to these bundling arrangements, incorporating this analysis into both bodies of law. This change would mitigate the risk of using these bundling arrangements to facilitate innovation.

The second implication is about the transaction costs of finding relevant assets. Ex ante patent licensing transactions can help users obtain patentees’ assets promptly when those are the most effective means by which to deploy the patented technology. If the users are unable to enter the transactions ex ante, they might suffer efficiency loss by having to rely on their own less effective assets to exploit the technology or they might have to abandon the technology altogether. The fact that ex post bundled asset transfers exist

43. See Feldman & Lemley, *Patent Licensing Demands*, *supra* note 37, at 139; Feldman & Lemley, *Sound and Fury*, *supra* note 37, at 1795, 1799.

44. See U.S. DEP’T OF JUSTICE & FED. TRADE COMM’N, *supra* note 15, at 111-12 (internal quotation marks omitted).

indicates the high transaction costs impeding ex ante transactions, leading to efficiency loss. To avoid efficiency loss, this Article suggests that policymakers reduce transaction costs by making it easier for potential users to detect both the transaction opportunities in a given technology and the associated complementary assets. Policymakers can make patent documents easier to read and locate, and link them to a platform that allows patentees to present information about the complementary assets they are willing to transfer with a patent license.

The Article concludes by pointing out that there are two complementary relationships imbedded in the innovation marketplace. In terms of *assets*, intellectual property, property, and labor are complementary to patented technology as they can help the licensee deploy that technology. In terms of *legal institutions*, contracts allow the patent system to achieve its ultimate goal — promoting innovation — by bundling complementary assets with the patent license and transferring them as a package to technology users. This facilitates the development and implementation of the technology that the patent system discloses.

II. CONTRACTUAL BUNDLES AS A COMPLEMENT TO PATENT DISCLOSURE

A. PATENT DISCLOSURE AND ITS LIMITATIONS

Section 8 of the U.S. Constitution set the primary goal of the patent system by granting Congress the power “[t]o promote the progress of science and useful arts.”⁴⁵ The patent system achieves this goal by (1) providing incentives to inventors to create inventions and (2) disclosing technology to the public.⁴⁶ According to the *incentive theory*, the patent system encourages inventors to innovate by granting them exclusive rights over their inventions.⁴⁷ This exclusive right allows inventors to prevent others from appropriating their

45. U.S. CONST. art. I, § 8, cl. 8; *Motion Picture Patents Co. v. Universal Film Mfg. Co.*, 243 U.S. 502, 511 (1917) (holding that “the primary purpose of our patent laws . . . is to promote the progress of science and useful arts” (internal quotation marks omitted)).

46. See Lisa Larrimore Ouellette, *Do Patents Disclose Useful Information*, 25 HARV. J. L. & TECH. 545, 554-57 (2012); Jeanne C. Fromer, *Patent Disclosure*, 94 IOWA L. REV. 539, 541 (2009) (“Patent law encourages this cumulative innovation, both by dangling the patent right before the inventor as an incentive to invent in the first instance and by requiring him to disclose his invention to the public so that science can progress by building on the divulged knowledge.”).

47. See Ouellette, *supra* note 46, at 554-55; Benjamin N. Roin, *The Disclosure Function of the Patent System (Or Lack Thereof)*, 118 HARV. L. REV. 2007, 2007 (2005) [hereinafter *Disclosure Function*] (“The most commonly offered economic justification for the patent system is that it preserves the incentive for inventors to create, develop, and commercialize new technologies and innovations.”).

invention.⁴⁸ It lets inventors choose whether to deploy an invention themselves to earn profits, or whether to license the patent rights to others in return for royalties or other considerations. The financial and/or non-financial gains that a patent brings about encourage innovators to create inventions, which drives innovation.

Under the *disclosure theory*, the patent system promotes innovation by requiring inventors to fully disclose their inventions to the public through patent documents when they apply for a patent to protect their inventions.⁴⁹ The Supreme Court regards this as a quid pro quo — the patent system grants inventors an exclusive right in exchange for the disclosure of how their technology works.⁵⁰ The disclosure “is assumed [to] stimulate ideas and the *eventual development* of further significant advances in the art.”⁵¹ In the Supreme Court’s view, the technical information that the patent disclosures disseminate will foster productive effort, which in turn will have “a positive effect on society through the introduction of new products and processes of manufacture into the economy.”⁵²

To this end, Section 112 of the Patent Act specifies three disclosure requirements that patent applicants must satisfy — written description,

48. See Ouellette, *supra* note 46, at 554 (“Under innovation incentive theories, patents encourage new inventions by preventing appropriation by competitors ...”).

49. See *Brenner v. Manson*, 383 U.S. 519, 533 (1966) (holding “one of the purposes of the patent system is to encourage dissemination of information concerning discoveries and inventions”); *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 151 (1989) (stating that “the ultimate goal of the patent system is to bring new designs and technologies into the public domain through disclosure”).

50. *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 736 (2002) (“[E]xclusive patent rights are given in exchange for disclosing the invention to the public.”); *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 480-81 (1974) (“In return for the right of exclusion—this ‘reward for inventions’—the patent laws impose upon the inventor a requirement of disclosure. To insure adequate and full disclosure so that upon the expiration of the 17-year period ‘the knowledge of the invention enures to the people, who are thus enabled without restriction to practice it and profit by its use,’ the patent laws require that the patent application shall include a full and clear description of the invention and ‘of the manner and process of making and using it’ so that any person skilled in the art may make and use the invention.” (citations omitted)); *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 63 (1998) (“[T]he patent system represents a carefully crafted bargain that encourages both the creation and the public disclosure of new and useful advances in technology, in return for an exclusive monopoly for a limited period of time.”); *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int’l, Inc.*, 534 U.S. 124, 142 (2001) (“The disclosure required by the Patent Act is ‘the quid pro quo of the right to exclude.’” (quoting *Kewanee Oil*, 416 U.S. at 484)); Jason Rantanen, *Peripheral Disclosure*, 74 U. PITT. L. REV. 1, 4 (2012) (noting that “the patent system has long been justified on the ground that it encourages the disclosure of information by requiring inventors to provide in the patent document, [sic] information about how their invention works”).

51. *Kewanee Oil*, 416 U.S. at 481 (emphasis added).

52. *Id.* at 480.

enablement, and best mode. First, patent applicants must provide a written description of the invention, presenting “the manner and process of making and using it, in such full, clear, concise, and exact terms.”⁵³ Second, the description should “enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same.”⁵⁴ Third, the disclosure “shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention.”⁵⁵ Ideally, the technical information that the patent document discloses will allow potential users to “gain full possession of the invention.”⁵⁶ Users should be able to “use it fruitfully”⁵⁷ and “build upon [it]”⁵⁸ when the patent expires⁵⁹ or during the patent term with a license from the patentee.

Yet patent disclosure might fail to lead to the actual implementation and development of the technology due to two impediments. The first is that the patent documents disclose inadequate information.⁶⁰ This can happen because “applicants have an incentive to provide information that meets [only] the minimum thresholds of patentability.”⁶¹ Many applicants deliberately withhold the information that is necessary to make and use the invention efficiently; they keep crucial bits of technical information secret.⁶² As Jason Rantanen has

53. 35 U.S.C. § 112 (2012).

54. *Id.*

55. *Id.*

56. Sean B. Seymore, *Symposium: The Disclosure Function of the Patent System: Introduction*, 69 VAND. L. REV. 1455, 1456 (2016).

57. *See* Fromer, *supra* note 46, at 541; *see also* *Disclosure Function*, *supra* note 47, at 2009.

58. *See* *Disclosure Function*, *supra* note 47, at 2010; Rantanen, *supra* note 50, at 5.

59. *Aronson v. Quick Point Pencil Co.*, 440 U.S. 257, 262 (1979) (stating that patent law “seeks to foster and reward invention” with the hope that patent disclosure will “stimulate further innovation and . . . permit the public to practice the invention once the patent expires”).

60. *See* Robert P. Merges, *A Transactional View of Property Rights*, 20 BERKELEY TECH. L.J. 1477, 1501 (2005) (“An issued patent usually does not disclose everything of value about an invention and the surrounding technology.”); Lee, *supra* note 12, at 1556 (“Patents do not disclose and licenses do not convey tacit knowledge of great value to licensees.”).

61. Rantanen, *supra* note 50, at 6.

62. *Id.* (noting that patent applicants “may disclose information about some aspects of their invention, but elect to maintain others as secrets”); *id.* at 13 (noting that patent applicants might “hold[] back crucial bits of technical information necessary to efficiently practice the invention”); Fromer, *supra* note 46, at 563 (noting that a patent document “does not contain some of the most pertinent technical information”); *Disclosure Function*, *supra* note 47, at 2023–24 (stating that “despite the statutory enablement requirements, many applicants deliberately fail to disclose the trade secrets and know-how necessary to recreate or use the invention efficiently”); Colleen V. Chien, *Contextualizing Patent Disclosure*, 69 VAND. L. REV. 1849, 1851 (2016) (noting that patent applicants tend to “withhold[] key information from patent applications”); Feldman & Lemley, *Sound and Fury*, *supra* note 37, at 1800 (noting that “technology often includes trade secrets and know-how beyond the to-be-patented technology

pointed out, disclosure tends to be “incomplete and opaque.”⁶³ Further, patent disclosure often “occurs . . . early in the process of innovation, at the time a patent is filed.”⁶⁴ Current patent law does not mandate follow-up disclosure. As a result, patent documents often do not include valuable information about the subsequent development of the technology.⁶⁵ As Jeanne Fromer notes, patent disclosure tends to be “early and static.”⁶⁶ Due to the inadequacy of the technical information that it discloses, some scholars criticize the patent system for “not achiev[ing] its objective of stimulating innovation.”⁶⁷

Some scholars’ believe that raising the disclosure requirements might remove this impediment.⁶⁸ Sean B. Seymore suggests that the Patent and Trademark Office (PTO) should require patent applicants to provide working examples of their inventions.⁶⁹ Lisa Larrimore Ouellette recommends that the PTO make patent documents subject to the peer review of scientists or require patentees to respond to questions from scientists concerning how the documents enable users to implement the invention⁷⁰ Jeanne Fromer proposes broadening the scope of disclosure to cover important information generated

itself”); *see, e.g.*, Anpath Group, Inc., Annual Report (Form 10-K) 12 (July, 15, 2014), <https://www.sec.gov/Archives/edgar/data/1310527/000101041214000124/f10kdraft7clean71414.htm> (“We do not believe that our business is dependent upon obtaining patents on our technology due to the existence of nondisclosure agreements and our maintenance of trade secrets. However, having patents on our technology would provide an addition level of protection in this regard.”).

63. Rantanen, *supra* note 50, at 6.

64. Jeanne C. Fromer, *Dynamic Patent Disclosure*, 69 VAND. L. REV. 1715, 1715-16 (2016); *see* Chien, *supra* note 62, at 1851-52 (pointing out that “the patents that are filed are often relatively poor tools of teaching. The patent system incents early disclosure by awarding those who are first to file their applications . . . as a result, disfavors mature, complete disclosure, as the invention is often still at the preliminary, pre-commercial stage at the time of filing”).

65. *See* Fromer, *supra* note 64, at 1716 (“Yet the law does not require disclosure of so much of this valuable information related to a patented invention.”).

66. *Id.* at 1715-16. (stating that “[s]o much of the innovation process, from refinement to prototyping to market research to mass production, has yet to occur at the moment of patent filing”).

67. *Id.*; *see also* Mark A. Lemley, *The Myth of the Sole Inventor*, 110 MICH. L. REV. 709, 747 (2012) (contending that “[t]he theory that patents are valuable for the information they disclose, then, doesn’t seem to describe the real world—at least, not enough so to stand alone as a justification for having a patent system”).

68. *See* Chien, *supra* note 62, at 1852 (“Academic proposals have centered, accordingly, on improving the patent document.”).

69. Sean B. Seymore, *The Teaching Function of Patents*, 85 NOTRE DAME L. REV. 621, 627 (2010) (proposing “that raising the standard of disclosure, by allowing the U.S. Patent and Trademark Office (Patent Office) to request working examples, will improve the teaching function of patents”).

70. *See* Ouellette, *supra* note 46, at 601.

after the filing of patent application, such as data concerning the commercialized products that they or their licensees make.⁷¹

Even when the patent document discloses adequate information for potential users to grasp the technology, the users might still be unable to implement it due to the second impediment – the lack of non-informational assets. As economics literature shows, to commercialize a technology successfully, users need not only the technical information concerning the technology but also “other capabilities or assets.”⁷² For example, the potential user of an automobile technology might be unable to commercialize the technology if it cannot gain access to relevant manufacturing and distribution facilities.⁷³ The lack of non-informational assets is an exogenous limitation to the patent system, one that changes to the patent system will not address. Another legal institution – contracts – can provide a solution to this impediment. In the innovation marketplace, contracts allow technology users to obtain non-informational assets from technology owners or third parties.⁷⁴

B. CONTRACTUAL SOLUTION: BUNDLED ASSET TRANSFERS

Conventional wisdom holds that a patent license agreement is an exchange of a monetary payment for the patentee’s promise not to sue the licensee.⁷⁵ In practice, this is not necessarily the case. As Peter Lee pointed out, “obtaining the bare legal right to practice some invention is rather empty unless the licensee actually understands the technology and can practice it.”⁷⁶ In actual licensing transactions, technology users obtain informational and non-

71. See Fromer, *supra* note 64, at 1716.

72. David J. Teece, *Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy*, 15 RES. POL’Y 285, 288 (1986) (“In almost all cases, the successful commercialization of an innovation requires that the know-how in question be utilized in conjunction with other capabilities or assets.”).

73. See TEECE, *supra* note 27, at 25 (“For instance, the design for a new automobile is of little value absent access to manufacturing and distribution facilities on competitive terms.”).

74. See *infra* Sections II.B, III.A; cf. Lemley & Feldman, *Patent Licensing*, *supra* note 14, at 188 (pointing out that in general technology owners “must also transfer things like know-how, complementary assets, and other peripheral disclosures” along with a patent license to make a technology transfer lead to commercialization).

75. *Spindelfabrik Suessen-Schurr, Stahlecker & Grill GmbH v. Schubert & Salzer Maschinenfabrik Aktiengesellschaft*, 829 F.2d 1075, 1081 (Fed. Cir. 1987) (“As a threshold matter, a patent license agreement is in essence nothing more than a promise by the licensor not to sue the licensee.”); cf. Feldman, *supra* note 13, at 247 (“A license, after all, is merely an agreement not to sue in return for a monetary payment, and the threat of a lawsuit is what drives companies to pay the licensing fee.”).

76. Lee, *supra* note 12, at 1516; see also Lemley & Feldman, *Patent Licensing*, *supra* note 14, at 188 (claiming that “if patents actually drive innovation by third parties, we would expect to see not just the transfer of a patent license, but also the transfer of other types of information assets”).

informational assets along with the right to patented technology by contracting with the owners. That is to say, contracts complement the patent system as they enable users to overcome the impediments that hinder the development and implementation of the technology that the patent system discloses.

Legal scholars and economists have found that in many patent licensing transactions, patent holders bundle patent licenses with informational assets such as know-how and trade secrets. Colleen Chien studied a dataset of 245 software patent licensing contracts and determined that “in most cases, when patents were licensed, so were know-how, trade secrets or code.”⁷⁷ When Stuart Graham *et al.* conducted the 2008 Berkeley Patent Survey, they found that the majority of startups in the biotechnology and software industries stated that when they acquired patent licenses, they intended to gain technical knowledge as well.⁷⁸ Deepak Hegde examined 505 patent licenses in the pharmaceutical, biotechnology, and medical instruments and devices industries.⁷⁹ He determined that 41% of the licenses required the patentee to transfer data, information, materials, and the like to the licensees.⁸⁰

In some studies, economists have found that licensees acquired non-informational assets from patentees. Hegde determined that 18.6% of the 505 patent licenses that he studied obligated the licensor to provide technical assistance to licensee.⁸¹ Ashish Arora examined a set of 144 technology agreements of Indian companies, which included 69 patent licenses.⁸² According to his findings, 81.2% of the patent licensing transactions included a transfer of technical training services while other technical services were transferred less frequently.⁸³ His findings also show that around 40% of the patent licensing transactions involved a transfer of equipment.⁸⁴ Arora believed that equipment is transferred as a “complementary input[]” to know-how.⁸⁵

Previous studies have also suggested that the timing of patent licensing transactions seems to affect the formation of bundling arrangements. Mark

77. Chien, *supra* note 12, at 1679.

78. Graham *et al.*, *supra* note 22, at 1317-18.

79. Hegde, *supra* note 23, at 574.

80. *Id.* at 578.

81. *Id.* at 579.

82. Arora, *Contracting for Tacit Knowledge*, *supra* note 24, at 239, 245.

83. *Id.* at 235, 239, 241-42 (showing that among the 69 patent licensing contracts, 23 (33.3%) included services to set up plants; 20 (29%) included services to set up research and development unit; 26 (37.7%) included quality control services).

84. *Id.* at 247 (showing that 26 (37.7%) of the 69 patent licensing transactions involved a transfer of equipment).

85. *Id.* at 252.

Lemley and Robin Feldman conducted two surveys of patent licensing transactions that resulted from patent litigation and licensing demands. These transactions tended to occur after the defendant-licensees developed and implemented the technology, which are regarded as ex post patent licensing transactions.⁸⁶ In both surveys, a high percentage of the firms responded that they are unlikely to acquire knowledge in ex post licensing transactions.⁸⁷ Nevertheless, Lemley and Feldman believe that the bundling arrangement of knowledge and patent license can happen “in the ex ante context,”⁸⁸ i.e., before the invention has been widely commercialized and before the occurrence of any patent litigation demands.⁸⁹ However, they did not provide empirical evidence concerning bundled asset transfers in ex ante patent licensing transactions like they did for the ex post ones.

Previous studies have provided valuable evidence concerning bundled asset transfers in patent licensing transactions, yet a more comprehensive study is needed to clarify what the bundles consist of and the effect that they have on innovation. Though legal scholars have recognized there might be different kinds of assets in a bundle,⁹⁰ they have primarily focused on one type of asset – knowledge. In their view, patent licensing transactions involving knowledge

86. Chien, *supra* note 12, at 1685 (“Patent licenses signed as the result of patent litigation are a highly selected part of the patent market, and because they are formed ex post, they also tend to take place after technology has been transferred or copied, or independently invented.”); Feldman & Lemley, *Sound and Fury*, *supra* note 37, at 1800 (“Patent litigation and licensing demands for existing patents, by contrast, tend to occur well after the defendant has developed and implemented the technology.”).

87. See Feldman & Lemley, *Patent Licensing Demands*, *supra* note 38, at 161-62 (showing that no less than 88% of the firms that patent license due to patent licensing demands reported that the frequency of obtaining knowledge in addition to the right to use the patented technology is 0%-10%); Feldman & Lemley, *Sound and Fury*, *supra* note 37, at 1837 (showing that 70% of the firms that take patent license due to patent licensing demands reported that such licenses “almost never” transfer any sort of knowledge); Risch, *supra* note 26, at 987 (“Post-implementation licensing merely allows commercial ‘innovators’ to continue using inventions that they were already using in the first place, but only after bearing the added cost of a licensing fee.”).

88. Feldman & Lemley, *Sound and Fury*, *supra* note 37, at 1799 (contending that “actual technology transfer happens within the patent system in the ex ante context”); see also Risch, *supra* note 26, at 983.

89. Feldman & Lemley, *Patent Licensing Demands*, *supra* note 37, at 177 (noting that an ex ante license “occurs when a product company initiates the approach to a patent holder seeking new technology”).

90. See Lemley & Feldman, *Patent Licensing*, *supra* note 14, at 188 (“Thus, if patents actually drive innovation by third parties, we would expect to see not just the transfer of a patent license, but also the transfer of other types of information assets.”).

transfer to the licensee are likely to promote innovation,⁹¹ while those not related to knowledge transfer are less likely to do so.⁹² The research has paid less attention to non-informational assets. Economists do examine both informational and non-informational assets in the bundles, but their focus is on the contractual design that firms use to transfer knowledge through arm's length contracts.⁹³ They tend to treat the transfer of non-informational assets as an indicator of knowledge transfer⁹⁴ or as a means to facilitate knowledge transfer.⁹⁵

This Article adds empirical evidence to the previous research by examining 400 patent licensing transactions that publicly traded companies filed with the SEC. As Part III will show, the assets that licensees obtain in these transactions are diverse, but, in general, they promote innovation by helping the licensee to deploy the licensed technology. Transmitting knowledge to the licensee is not the only way that these assets serve to promote innovation. As the findings show, assets that do not transfer knowledge to the licensee might still play an important role in innovation. Typical examples are trademark and maintenance support services that the patentee directly performs for end-users. The former does not by itself transfer knowledge to the licensee but can help promote the distribution of the patented products.⁹⁶ The latter might involve knowledge

91. See Chien, *supra* note 12, at 1678-79; Graham et al., *supra* note 22, at 1316; Risch, *supra* note 26, at 983 (claiming that the transfer of sufficient know-how is a way to “maximize [the patented technology’s] potential”); cf. Barnett, *supra* note 11, at 1 (noting that IP licensing transactions facilitate “value-creating exchanges of knowledge assets,” which “support a robust innovation ecosystem”).

92. See Feldman & Lemley, *Patent Licensing Demands*, *supra* note 37, at 176; see also Robert P. Merges, *The Trouble with Trolls: Innovation, Rent-Seeking, and Patent Law Reform*, 24 BERKELEY TECH. L.J. 1583, 1583 (2009) (distinguishing the “legitimate secondary market, in which patent rights are bought and sold in ways that compensate real innovators (and also often involve the transfer of information and/or technology, in addition to the legal right)” from “the more questionable market for the settlement of lawsuits involving weak, outdated or irrelevant patents”).

93. See, e.g., Arora, *Licensing Tacit Knowledge*, *supra* note 38, at 42 (“Thus simple contracts involving patents can accomplish the transfer of know-how.”); Arora, *Contracting for Tacit Knowledge*, *supra* note 24, at 237 (noting that “if the licensor can tie the transfer and payment for know-how to a complementary input (whose transfer is easy to monitor) the transfer of know-how can be accomplished”); Hegde, *supra* note 23, at 569.

94. See, e.g., Hegde, *supra* note 23, at 579 (regarding technical assistance as an indicator of the transfer of “tacit or noncontractible knowledge”); Arora, *Contracting for Tacit Knowledge*, *supra* note 24, at 239 (treating the transfer of services as an indicator of the transfer of know-how).

95. See, e.g., Hegde, *supra* note 23, at 252 (demonstrating that bundling know-how with equipment as it complementary input together in arm-length contract can mitigate the moral hazards in the process of know-how transfer).

96. See *infra* Section III.A.1.d.

transfer but the receivers are the end-users – the licensee’s customers – rather than the licensee itself.⁹⁷

Part III also adds evidence to the literature concerning the timing of patent licensing transactions and bundled asset transfers. It distinguishes *ex ante* and *ex post* patent licensing transactions by whether they result from patent litigation. The findings show that only 5.88% of the *ex post* licensing transactions involved bundled asset transfer; *ex ante* licensing, 47.56%. These findings confirm the theory that bundled asset transfers are more likely to happen in an *ex ante* licensing context than in an *ex post* one. They also suggest that although *ex ante* licensing transactions can involve bundled asset transfers, the majority of them (52.44%) are merely an exchange of the patentee’s promise not to sue the licensee for monetary payment and/or other considerations.

III. CASE STUDY: 400 MATERIAL PATENT LICENSING TRANSACTIONS OF PUBLIC COMPANIES

To understand what kind of assets are in the bundle and the relationship between the assets and the patented technology, this Section presents an analysis of 400 patent licensing transactions of public companies that filed with the SEC. It examines not only the four corners of each patent licensing agreement, but also the associated agreements that the companies signed, along with the licensing agreement, in the same transaction. It explores the background of each transaction by reviewing the annual, quarterly, and current reports to which the agreements were attached. However, the conclusions made in this Section might not be applicable to the overall population of the contracts that innovators sign in patent licensing transactions because the agreements this Article examines are material contracts on which public companies’ business depends: they are substantial, and are reported by relatively large companies.

A. THE ASSETS IN THE BUNDLES

Among the 400 patent licensing transactions, 169 involve bundled asset transfers (accounting for 42.25% of the total). We can classify the transferred assets into three groups — intellectual property, property, and labor. The licensees use the assets to deploy the licensed technologies at different stages of innovation — refinement of the technologies, development and manufacture of products, and distribution of the products in the marketplace. The findings confirm the idea that to commercialize a patented technology,

97. *See infra* note 186 and accompanying text.

reading the patent document alone might be not enough; other assets might be necessary in order to deploy it.⁹⁸ In general, the bundling arrangements in these transactions are efficiency-enhancing arrangements.⁹⁹

1. *Intellectual Property*

a) Proprietary Information

Of the relevant dataset, 144 of the transactions (or 36%) involve proprietary information, including know-how and trade secrets. In patent licensing transactions, the licensee might want proprietary information from patentees in order to maximize the value of the technology.¹⁰⁰ Occasionally, the licensees obtain commercial information, such as business processes and customer lists.¹⁰¹ This kind of information facilitates the commercialization of the licensed technology.¹⁰² In most cases, however, the information is technical and related directly to the implementation of the technology. Technical information can keep licensees from having to put money and effort into recreating the patentee's research and diminishes licensees' risk of technical failures.¹⁰³

Take the patent licensing transactions in the pharmaceutical industry for example. Firms here face a high risk of technical failure in the process of drug

98. Lemley & Feldman, *Patent Licensing*, *supra* note 14, at 188.

99. See U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, *supra* note 15, at 114 (noting that bundling arrangements in patent licensing transactions can often lead to efficiencies).

100. See HOLMES, *supra* note 26, § 1:5.8 (noting that "the complexity of the licensed technology may require further information from the licensor in order to optimally exploit the licensed rights"); Risch, *supra* note 26, at 983 (stating that the transfer of sufficient know-how is to "maximize [the patented technology's] potential"); 3 ROGER M. MILGRIM & ERIC E. BENSE, *MILGRIM ON LICENSING* § 19.00 (2006) ("If industrial or intellectual property is viewed as the bricks of successful licensing, then surely technical information and assistance are the mortar.").

101. See, e.g., Dexcom Inc. & SM Tech., LLC, Exclusive Patent License Agreement §§ 1.1.7, 2, 2005 WL 8063058 (transferring information concerning business processes); Visual Mgmt. Sys., Inc. & IDS Patent Holding, LLC, Exclusive Patent and Trade Secret License Agreement § 1.04 & Definition Appendix, 2008 WL 11104830 (transferring business data, customer lists, price lists); Hansen Med., Inc. & Koninklijke Philips Elecs. N.V., Patent and Technology License and Purchase Agreement §§ 1.21 & 2.1, 2011 WL 13022426 (transferring customer lists and supplier lists).

102. *Cf.* Merges, *supra* note 60, at 1501 (noting that "information about the business setting in which the technology may be employed, potential customers and their needs, and the like" is related to the implementation of patent).

103. *Cf.* Mycalex Corp. of Am. v. Pemco Corp., 64 F. Supp. 420, 425 (D. Md. 1946), *aff'd*, 159 F.2d 907 (4th Cir. 1947) (defining "know-how" as factual knowledge "acquired as the result of trial and error, gives to the one acquiring it an ability to produce something which he otherwise would not have known how to produce with the same accuracy or precision found necessary for commercial success").

development.¹⁰⁴ Licensees of a patented drug must pass the U.S. Food and Drug Administration's (FDA) regulatory hurdles before receiving approval to enter the market.¹⁰⁵ This process costs hundreds of millions to billions of U.S. dollars and takes approximately 7.5 years.¹⁰⁶ But only 9.6% of drugs pass the clinical trials and receive approval to enter the market.¹⁰⁷ Given that the stakes in commercializing a new drug are high, it is critical for licensees to have access to any data that will help them achieve technical success,¹⁰⁸ even though the access fees to the data can be high.¹⁰⁹ Proprietary information from the patentee can accelerate the speed of drug development, providing the licensee with a lead in the race to bring a drug to the market.¹¹⁰

Here is a typical pharmaceutical patent licensing transaction: Cerecor Inc. (Cerecor), a clinical-stage biopharmaceutical company, desired to develop and commercialize the compounds that Merck & Co., Inc. (Merck) had developed and patented to treat depression.¹¹¹ After Merck granted the license, Cerecor would need to develop the compounds in order to pass clinical trials that FDA

104. See Aimo Kannt & Thomas Wieland, *Managing Risks in Drug Discovery: Reproducibility of Published Findings*, 389 NAUNYN-SCHMEDEBERG'S ARCHIVES PHARMACOLOGY 353, 355 (2016) (noting that "more than 99% of all drug discovery projects will not result in an approved product").

105. U.S. Food & Drug Admin., *Development & Approval Process | Drugs*, <https://www.fda.gov/drugs/development-approval-process-drugs> (last visited July 17, 2020).

106. Aylin Sertkaya, Anna Birkenbach, Ayesha Berling & John Eyraud, EXAMINATION OF CLINICAL TRIAL COSTS AND BARRIERS FOR DRUG DEVELOPMENT §§ E3.1, E3.2 (2014) (showing that the total costs of bringing a new drug to market are somewhere between \$161 million and \$2 billion and the average length of time from the starting date of the clinical trial to the date of marketing the drug is 90.3 months—or approximately 7.5 years).

107. David W. Thomas, Justin Burns, John Audette, Adam Carroll, Corey Dow-Hygelund & Michael Hay, *Clinical Development Success Rates 2006–2015*, 1 BIO INDUS. ANALYSIS 1, 7 (2016).

108. See *Licensing Your 'Know-How' Holds Revenue Potential, But Seller Beware*, TECH TRANSFER CENTRAL, <https://techtransfercentral.com/reprints/ttt/1207-licensing-your-know-how/> (last visited July 30, 2020) (noting that in the biopharmaceutical industry, licensees are not only paying for a patent license but also for a body of knowledge and important details that leads to technical success).

109. See John P. Walsh, Ashish Arora & Wesley M. Cohen, *Effects of Research Tool Patents and Licensing on Biomedical Innovation*, in PATENTS IN THE KNOWLEDGE-BASED ECONOMY 285, 300-01 (Wesley M. Cohen & Stephen A. Merrill eds., 2003) (showing that biopharmaceutical firms pay tens of millions to hundreds of millions of U.S. dollars to gain access to proprietary data).

110. See Jeffrey P. Somers, *Biotech Patent Licensing: Key Considerations in Deal Negotiations*, 6 J. BIOLAW BUS. 11, 16-18 (2003).

111. Essex Chemie AG & Cerecor Inc., Exclusive Patent and Know-How License Agreement, 2015 WL 6606686; Cerecor Inc., Registration Statement (Form S-1) 95 (June 12, 2015), https://www.sec.gov/Archives/edgar/data/1534120/000104746915005421/a2224996zs-1.htm#bm12006_prospectus_summary.

requires for marketing approval.¹¹² Recognizing a risk of failure in the drug's development,¹¹³ Cerecor obtained, along with the patent license, the right to use "Merck Know-How," including medicinal chemistry data, medical data, pre-clinical data, toxicological data, and other documents.¹¹⁴ It acquired 127 data documents from Merck¹¹⁵ and used the data to obtain the FDA's marketing approval.¹¹⁶

Licensees in other technology fields also seek proprietary information from patentees to support the implementation of the licensed technology. This phenomenon not only occurs in high-tech industries such as pharmaceuticals and computer programming,¹¹⁷ but also in industries that we usually consider to be less technologically advanced, such as furniture manufacturing.¹¹⁸ Since the way in which the patented technology operates in each industry is specific, technical information that the licensee obtains from the patentee to complement the patented technology also appears to be specific¹¹⁹ For example, in the wind turbine industry, licensees obtain materials that relate to prototypes of turbine.¹²⁰ In the medical device industry, manufacturers acquire the licensed substance's stability and safety data,¹²¹ which is subject to the review by the FDA.

112. Cerecor Inc. Registration Statement, *supra* note 111, at 95-96.

113. *Id.* at 18.

114. Essex Chemie AG & Cerecor Inc., *supra* note 111, §§ 1.31, 2.01.

115. *Id.* at Schedule 1.31.

116. Cerecor Inc. Registration Statement, *supra* note 111, at F-22.

117. *See, e.g.*, Face2face Animation, Inc. & InMotion Biometrics, Inc., Patent and Technology License Agreement §§ 1.14 & 2.1, 2005 WL 8125156 (acquiring engineering notebooks, drawings, blueprints, flow charts, and diagrams from patentees); *see* Noela Jemutai Kipyegen & William P K Korir, *Importance of Software Documentation*, 10 INT'L J. COMPUTER SCI. ISSUES 223, 227 (2013) (discussing the importance of software documentation in computer programming); Isaac Nassi & Ben Shneiderman, *Flowchart Techniques for Structured Programming*, 8 ACM SIGPLAN NOTICES 12 (1973) (discussing the use of flowchart in computer programming).

118. *See, e.g.*, Li Jinliang & Shandong Caopu Arts & Crafts Co., Ltd., Exclusive Patent License Agreement § 4, 2010 WL 11346858.

119. For example, in the wind turbine industry, licensees obtained materials that relate to prototypes of turbine.

120. *See, e.g.*, The Ariz. Bd. of Regents on Behalf of the U. of Ariz. & Wildcap Energy, Inc., Exclusive Patent License Agreement § 1.11 (a), 2011 WL 13039236.

121. *See, e.g.*, Quick-Med Tech., Inc. & Biosara Corp., Patent and Technology License Agreement §§ 1.16, 1.31, 2.1, 2012 WL 12408967; NIMBUS®, QUICK-MED TECHNOLOGIES, INC., <https://www.quickmedtech.com/technology/nimbus> (last visited Jan. 20, 2019).

b) Software

As computer technology advances, more industries seek to automate the production of products and services.¹²² This trend has influenced patent licensing practices. Patent licensees often need a software license if the patented technology integrates with the software.¹²³ Among the 400 patent licensing transactions in this Article's dataset, 54 (or 13.5%) involved a software license. Generally speaking, there are three situations in which a licensee would obtain a software license from the patentee.

In the first situation, the licensed technology is itself a piece of patented software. A piece of software consists of three primary elements – source codes, object codes, and design documentation. Three areas of laws – patent, trade secret, and copyright – can simultaneously protect it.¹²⁴ A patent license only allows the licensees to implement the method that the software realizes. This does not mean that the licensee can gain access to the codes, which are the core of a piece of software.¹²⁵ A software license gives the licensee the access to codes, as well as the design documentation.¹²⁶

122. See generally Edward P. Ambinder, *A History of the Shift Toward Full Computerization of Medicine*, 1 J. ONCOLOGY PRAC. 54, 54-56 (2005) (noting that the medical industry began its shift toward full computerization starting in the 1960s); John Markoff, *Armies of Expensive Lawyers, Replaced by Cheaper Software*, N.Y. TIMES, Mar. 5, 2011, at A1 (noting that computer software is used to finish some tasks that conventionally are done by lawyers); Jamshed Iqbal, Zeashan Hameed Khan & Azfar Khalid, *Prospects of Robotics in Food Industry*, 37 FOOD SCI. TECH. 159, 159-64 (2017) (discussing how computers are used in the food processing industry).

123. See B. G. BRUNSVOLD, D. P. O'REILLEY & D. B. KACEDON, DRAFTING PATENT LICENSE AGREEMENTS 346 (2008).

124. A piece of software consists of three primary elements: source codes, object codes, and design documentation. Source code is the collection of codes that are written using human-readable language. Object code is a sequence of instructions to the computer in a computer language, usually in binary form. Trade secret is an important way to protect software. Section III.A.1.c will discuss the copyright protection of software.

125. Access to source code is necessary because it would allow licensees to program the licensed software by reading the source code. With source codes, licensees can enter the market earlier with the software. See *Licensing Your 'Know-How' Holds Revenue Potential, But Seller Beware*, TECH TRANSFER CENTRAL, <https://techtransfercentral.com/reprints/ttt/1207-licensing-your-know-how/> (last visited Oct. 30, 2018); see also Don Gilbert, *Bioinformatics Software Resources*, 5 BRIEFINGS BIOINFORMATICS 300, 300 (2004) (noting that, in the biotechnical industry, source codes of old bioinformatics software are widely read and referred to by bioinformaticians to develop new software).

126. See, e.g., Lenovo (Beijing) Ltd., Legend Holdings Ltd., Yu Bing & Wang Zheng, Patent, Copyright and Technology License Agreement §§ 2.1, Schedule 1.1, Schedule 2.1.3, 2004 WL 7297504; Face2face Animation, Inc. & InMotion Biometrics, Inc., Patent and Technology License Agreement §§ 1.14, 2.1, 2005 WL 8125156 (the licensed technology includes "software (in object and source code)"); Document Security Sys., Inc. & Ergonomic

In the second situation, licensees install the software in the patented product to realize particular functionalities. For example, certain medical software is intended for use in medical devices to help doctors diagnose diseases and determine treatment methods.¹²⁷ Licensees of the patented medical device might also obtain a license for the software that the device implements.¹²⁸ Products such as navigation devices and autopilot systems often require a piece of software that processes mapping data, performs route calculations, navigates a calculated route, and controls direction.¹²⁹

In the third situation, licensees might use software for research and development. Typically, software patent licensees sometimes obtain another piece of software — the software developers' tool — that will allow them to develop the patented software.¹³⁰ A licensee of a patented wind turbine

Group, Inc., Limited Exclusive Patent License Agreement §§ 1.17, 2.1, 2007 WL 9540382 (licensed intellectual property includes “computer software and programs, and related flow charts, programmer notes, documentation, updates, and data, whether in object or source code form”).

127. *The Increasing Importance of Software in Medical Devices*, ORTHOGONAL, <http://orthogonal.io/medical-software/the-increasing-importance-of-software-in-medical-devices.html/> (last visited Dec. 11, 2018).

128. For example, Nomos Corporation, a medical instruments manufacturer, obtained a patent license concerning a device and method for delivering radiation therapy, and it also obtained a license for software relating to the patented device and method, because the software element of the device “is deemed an essential element of the functionality of the product.” See N. Am. Sci., Inc., Annual Report (Form 10-K) 80 (Mar. 11, 2005), https://www.sec.gov/Archives/edgar/data/949876/000110465905010671/a05-2506_110k.htm; The Bd. of Regents of the U. of Tex. Sys. & Nomos Corp., Patent License Agreement, 2004 WL 7254648.

129. See, e.g., Tele Atlas N. Am., Inc. & Cobra Electronics Corp., Technology and Patent License Agreement §§ 2.1, 2.3, 2006 WL 8378719; Cobra Electronics Corp., Annual Report (Form 10-K) 1 (Mar. 30, 2007), https://www.sec.gov/Archives/edgar/data/30828/000119312507070237/d10k.htm#toc95660_1; Cobra Electronics Corp., Press Release (Form 8-K, Exhibit-99.1) 2 (Apr. 28, 2006), <https://www.sec.gov/Archives/edgar/data/30828/000119312506092094/dex991.htm> (portable mobile navigation device); see also, e.g., Drone Aviation Holding Corp. & Adaptive Flight, Inc., Non-Exclusive, Perpetual Intellectual Property and Patent License Agreement § 2.4, 3.1, 2015 WL 6602036; Drone Aviation Holding Corp., Annual Report (Form 10-K) 5 (Mar. 4, 2016), https://www.sec.gov/Archives/edgar/data/1178727/000101376216001358/f10k2015_droneaviation.htm (certain “flight simulation and fault tolerant flight control algorithms” for an autopilot system).

130. E.g., Avistar Systems Corp. is a videoconferencing solution provider. It delivers a suite of video, audio, and collaboration software to desktops in hundreds of locations. The software can facilitate interactive video calling, interactive broadcasts and presentations, the retrieval stored videos, and data sharing. See Avistar Comms. Corp., Annual Report (Form 10-K) 3, 6-9, F-27 (Mar. 31, 2008), https://www.sec.gov/Archives/edgar/data/1111632/000111163208000010/form10-k.htm#item1_business. Radvision grants Avistar a license to use its 3G-324M Toolkit. See, Avistar Sys. UK Ltd., Avistar Comms. Corp. & Radvision Ltd., Patent License Agreement § 1.12, 6.2, 2007 WL 9522911. The toolkit is a piece of software

technology might obtain software from the patentee allowing it to analyze the data of wind characteristics in different sites so as to install efficient turbines in the promising locations.¹³¹ Pharmaceutical patent licensees might seek proprietary bioinformatics software from patentees¹³² to help them analyze and manage biodata.¹³³ Although free bioinformatics software programs are available on the internet, “it is not always easy to find the relevant ones.”¹³⁴

c) Copyright

In 26 (or 6.5%) of the 400 patent licensing transactions, licensees also obtained a copyright license from patentees. The need for a copyright license can arise when licensees acquire patentees’ proprietary information or software, both of which are copyrightable subject matters.¹³⁵ If licensees make copies or derivative works of proprietary information or software without authorization, they are subject to copyright infringement lawsuits, by which copyright holders (patentees) can seek either actual damages or statutory damages.¹³⁶ Licensees can avoid the risk of these lawsuits by obtaining a copyright license.

To illustrate, copyright law automatically protects proprietary information if the information constitutes an original work of authorship and is fixed in a

for developers that includes a set of application programming interfaces to develop multimedia communication solutions for 3G servers and handsets. *See 3G-324M Toolkit*, SOFTIL, <https://www.softil.com/solutions/protocol-stacks-frameworks/3g-324m-toolkit/> (last visited Dec. 11, 2018).

131. *See, e.g.*, The Ariz. Bd. of Regents on Behalf of the U. of Ariz. & Wildcap Energy, Inc., Exclusive Patent License Agreement, 2011 WL 13039236; Wildcap Energy Inc., Registration Statement (Form S-1/A) 24-25 (Mar. 9, 2011), https://www.sec.gov/Archives/edgar/data/1499027/000143774911001397/wildcap_s1a2-030711.htm; *see also* SATHYAJITH MATHEW, WIND ENERGY: FUNDAMENTALS, RESOURCE ANALYSIS AND ECONOMICS VII (2006) (noting that in the wind energy industry software is an analysis tool for wind energy exploiters to “assess[] the energy potential and simulat[e] turbine performance at prospective sites”).

132. *See, e.g.*, Pharmacoepia Drug Discovery, Inc. & Pharmacoepia, Inc., Patent and Software License Agreement §§ 1.7, 1.8, 1.9, 4, 2004 WL 7268348 (licensing three pieces of software—TopKat, LibProp, and ADME Profiler—to the licensee; allowing the licensee to use, modify, enhance, adapt, and make derivative works from the source code of the software, but only for the development and manufacture of compounds and for drug discovery and development services for third parties).

133. *See* Gilbert, *supra* note 125, at 300; Sudhir Kumar & Joel Dudley, *Bioinformatics Software for Biologists in the Genomics Era*, 23 BIOINFORMATICS 1713, 1713 (2007).

134. Gilbert, *supra* note 125, at 300.

135. In each of these 24 transactions, the licensees obtained proprietary information or software from the patentees along with the patent license.

136. 17 U.S.C. § 504 (2012).

tangible medium of expression.¹³⁷ For example, copyright law protects proprietary information that appears in drawings, blueprints, flowcharts, and diagrams, if it satisfies the requirement of originality. Without a copyright license, licensees infringe the copyright if they make copies of proprietary information by, for example, downloading the information from a database.¹³⁸

Software, which consists of source codes, object codes, and documentation, is considered to be a literary work and is protected by trade secret law and copyright law under 17 U.S.C. § 102.¹³⁹ Copyright law restricts the unauthorized reproduction and distribution of copies as well as the unauthorized preparation of derivative works of copyrightable software,¹⁴⁰ so licensees of software patents or licensees that obtain software along with licensed technologies often obtain a copyright license from the patentees in order to avoid the risks of copyright infringement.¹⁴¹

d) Trademark

Licensees might obtain trademarks or other symbols from patentees because they depend on the patentees' goodwill and reputation to promote the sales of patented products.¹⁴² In 32 of the 400 patent licensing transactions (8%), the licensee obtained trademarks from the patentee.

Trademark licenses can benefit patentees. If patentees collect running royalties based on the sales of the patented product, the more products the

137. 17 U.S.C. § 102 (2012); *see* 2 ROGER M. MILGRIM & ERIC E. BENSON, MILGRIM ON LICENSING § 6.15 (2006).

138. *See, e.g.*, Analog Devices, Inc. & Ikanos Comms., Inc., Patent and Technology License Agreement §§ 1, 2.02, 2006 WL 8326192; Analog Devices, Inc. & Ikanos Comms., Inc., Assets Purchase Agreement (Form 10-K, Exhibit 2.2) §§ 1.1(ji), 2.1 (Feb. 27, 2006), https://www.sec.gov/Archives/edgar/data/1219210/000104746906002539/a2167797zex-2_2.htm, (obtaining a copyright license that covers “all databases and data collections”).

139. Under current practice, the Copyright Office accepts the registration of computer programs as literary works. COMPENDIUM OF U.S. COPYRIGHT OFFICE PRACTICES § 503.1(B) (3d ed. 2021).

140. 17 U.S.C. § 106 (2012); *see also* Mark A. Lemley, *Convergence in the Law of Software Copyright*, 10 HIGH TECH 1 (1995) (discussing how copyright law evolved to protect software).

141. *See, e.g.*, Lenovo (Beijing) Ltd. et al., Patent, Copyright and Technology License Agreement §§ 2.1, Schedule 1.1, Schedule 2.1.3, 2004 WL 7297504 (licensing software to operate the patented information systems with copyright licenses that cover the source codes, the object codes, and the design documentation); The Regents of the U. of Cal. & Innovation Econ. Corp., Exclusive Patent License and Non-Exclusive Copyright Agreement § 2, 2015 WL 8562911 (licensing a copyright covering a graphical user interface software that appears in one of embodiments of the patented invention); Violin Memory, Inc., Asset Purchase Agreement (Form 8-K, Exhibit 2.1) § 1.1(xx) (May 29, 2014), <https://www.sec.gov/Archives/edgar/data/1407190/000119312514217541/d735360dex21.htm>.

142. HOLMES, *supra* note 26, § 10:3 (noting that licensees obtain trademarks from patentees to help them promote the sales of patented products).

licensees sell, the more royalties they can earn. This is especially the case when the licensees are the exclusive distributors of the patented products.¹⁴³ In this situation, the patentees' earnings are completely subject to the licensees' market performance.

For example, along with a patent license concerning a specific biopolymer and implants, STAAR Surgical AG (the licensee) also acquired a trademark license covering a service mark and a trademark of the patentee, The Eye Microsurgery Intersectoral Research and Technology Complex.¹⁴⁴ These two companies share the same graphic “”,¹⁴⁵ indicating that the patentee is the origin of the technologies that the licensee used in the products.

In this transaction, the licensee is an exclusive distributor of the patentees' products in certain regions – the parties signed a supply and distribution agreement that put the licensee in this role.¹⁴⁶ Under the patent license agreement, the patentee collected a running royalty of 4.5% to 6.0% of the sales of the patented products from the licensee.¹⁴⁷ These two agreements tied the patentee's earnings to the licensee's sales' performance. The patentee can collect more royalties if its business goodwill associated with the licensed trademarks increases the licensee's sales of the patented products.

Though patentees can benefit from attaching their trademark to the licensees' sales of patented products, they risk damage to their reputations if the licensees sell poor quality products that taint the licensed brand. Patentees also risk a judicially declared abandonment of their trademark if they do not exercise sufficient quality control over the licensees' use of it.¹⁴⁸ To maintain their business reputations and avoid this judicial ruling, patentees often require the product bearing their trademark to meet certain standards, and they

143. *See, e.g.*, Samaritan Pharm. Ir. Inc. Ltd. & Taconic Farms, Inc., Patent and Trademark License Agreement § 3.1, 2008 WL 11135080; Samaritan Pharm., Inc., Annual Report (Form 10-K) 1 (June 19, 2009), https://www.sec.gov/Archives/edgar/data/1057377/000143774909000657/samaritan_10k-123108.htm (patentees grant exclusive license to the licensee to commercialize its research tool, a rat model, for studying new drugs in some specified regions).

144. The Eye Microsurgery Intersectoral Res. & Tech. Complex & STAAR Surgical AG, Patent License Agreement §§ 1.3, Appendix 3, 2001 WL 37100872.

145. Graphic trademark in the USA. Certificate No. 1.485.586, class 41; Graphic trademark in the USA. Certificate No. 1.298.658, class 10.

146. *See* STAAR Surgical Co., Annual Report (Form 10-K) 9-10 (Mar. 28, 1996), <https://www.sec.gov/Archives/edgar/data/718937/0000898430-96-001034.txt>.

147. The Eye Microsurgery Intersectoral Res. & Tech. Complex & STAAR Surgical AG, *supra* note 146, § 17.

148. *Freecycle Sunnyvale v. Freecycle Network*, 626 F.3d 509, 515-16 (9th Cir. 2010) (holding that the licensors' failure to exercise adequate quality control over their licensees' use of the trademark constituted “naked licensing,” which leads to abandonment of the trademark).

preserve the right to monitor the quality of the products.¹⁴⁹ Patentees also often incorporate complex governance mechanisms into trademark licenses to ensure the licensees' use of the trademark complies with trademark law.¹⁵⁰

2. *Property*

a) *Facilities*

Licensees sometimes need patentees' specialized facilities¹⁵¹ to implement patented technology.¹⁵² In these cases, licensees also obtain rights to gain access to these facilities.¹⁵³ In the innovation marketplace, building specialized facilities sometimes requires special knowledge that patentees have, but that both licensees and third parties lack.¹⁵⁴ Developing specialized facilities might incur significant irreversible investments; making such an investment can be too risky to be worthwhile for the licensees and third parties.¹⁵⁵ Therefore, licensees might lease or acquire these facilities from the patentee or third parties rather than building these themselves. Among the 400 transactions examined for this Article, 26 (or 6.5%) involved a transfer of facilities

Along with the patent license, licensees sometimes rent patentees' facilities through a lease agreement. For example, American Science and Technology Corporation (the patentee) had a patented technology concerning a process to

149. *See, e.g.*, Dexcom, Inc. & SM Tech., LLC, Exclusive Patent License Agreement § 11.4, 2005 WL 8063058 (“[The patentee] shall have the right to insure proper quality control is performed by [the licensee] in connection with all goods bearing the [*****]® trademark”); The Eye Microsurgery Intersectoral Res. & Tech. Complex & STAAR Surgical AG, *supra* note 146, § 8 (“The Licensee shall manufacture the products under license whose quality is the same as those manufactured by Licensor. . . . The Licensor has the right of quality monitoring so as to check if the products manufactured under license correspond to the quality established by the Agreement.”); *see* HOLMES, *supra* note 26, § 10:7.

150. *See, e.g.*, Dexcom, Inc. & SM Tech., LLC, *supra* note 149, § 11.4; Samaritan Pharm. Ir. Inc. Ltd. & Taconic Farms, Inc., Patent and Trademark License Agreement § 7.2, 2008 WL 11135080 (setting detailed rules to regulate the licensee's use of the licensed trademark).

151. “Facilities” here not only refers to physical plants but also to relevant hardware or machinery.

152. *See* 2 MILGRIM & BENSE, *supra* note 137, § 16.01 (noting that in some instances real property can be “intimately related to a licensing transaction”; for example, “the owner of the technology also owns the manufacturing facilities and essentially leases them to the licensee, which operates the facilities under the license”).

153. *Id.*

154. *Id.* § 16.07 (noting that licensors sometimes retain certain undisclosed technology in their equipment and lease it to licensees; such equipment is “not generally available and is necessary to practice the licensed technology”).

155. *See* Teece, *supra* note 27, at 119-20; Rosemarie Ham Ziedonis, *Don't Fence Me in: Fragmented Markets for Technology and the Patent Acquisition Strategies of Firms*, 50 MGMT. SCI. 804, 808 (2004) (discussing the technical difficulty, significant investments, and high risk of developing specialized facilities in the semiconductor industry).

“convert lignocellulosic biomass into high-value, bio-based chemicals and products.”¹⁵⁶ The patentee also had a facility “equipped with a wide range of biomass processing equipment” to implement the patented technology.¹⁵⁷ Meridian Waste Solutions, Inc. (the licensee) obtained a patent license from the patentee and rented its processing facility through a lease agreement.¹⁵⁸ With the patentee’s facility, the licensee believed that it could launch its business “immediately.”¹⁵⁹ It also believed that the facility was the “only existing production facility” for the licensees’ production operation, and that “significant and prolonged disruptions at the facility would have a material adverse effect on [its] business, financial condition and results of operations.”¹⁶⁰

Instead of leasing, licensees can acquire facilities from patentees by signing an asset purchase agreement.¹⁶¹ In particular, if a firm decides to enter an industry that is remote from the field in which it previously worked, it might need to take over an entire business segment from another entity, including patents, facilities, and other assets. In this situation, the asset purchase agreement is the core of the transaction, while the patent licensing agreement is ancillary to it. For example, Viking Systems, Inc. (the licensee) obtained a complete business segment relating to visualization technology from Vista

156. Meridian Waste Sols., Inc., Annual Report (Form 10-K) 6 (Apr. 16, 2018), https://www.sec.gov/Archives/edgar/data/949721/000121390018004538/f10k2017_meridianwaste.htm.

157. *Id.*

158. *Id.*; see also Am. Sci. & Tech. Corp. & Meridian Innovations, LLC., Exclusive Commercial Patent License Agreement, 2017 WL 05182776. For a description of the relation between the lease and the licensee, see Meridian Waste Sols., Inc., Current Report (Form 8-K) 3 (Nov. 9, 2017), https://www.sec.gov/Archives/edgar/data/949721/000121390017011682/f8k110717_meridianwaste.htm (“Pursuant to the Lease, effective January 1, 2018, AST will lease to Innovations the premises located at 6445 Packer Drive, Wausau, Wisconsin 54401 and all improvements located thereon and all equipment and fixtures located therein.”); Meridian Waste Sols., Inc., Commercial Lease Agreement (Form 8-K, Exhibit 10.5) § 1.07 (Nov. 9, 2017), https://www.sec.gov/Archives/edgar/data/949721/000121390017011682/f8k110717ex10-5_meridian.htm.

159. *Meridian Waste Solutions Attains Facility and Exclusive Licensing for Advanced Bio-Refining Technology*, AM. SCI. & TECH., <http://www.amsnt.com/news/2017/11/13/meridian-waste-solutions-attains-facility-and-exclusive-licensing-for-advanced-bio-refining-technology> (last visited Feb. 17, 2019).

160. Meridian Waste Sols., Inc., Annual Report (Form 10-K) 38 (Apr. 16, 2018), https://www.sec.gov/Archives/edgar/data/949721/000121390018004538/f10k2017_meridianwaste.htm.

161. See, e.g., Analog Devices, Inc. & Ikanos Comms., Inc., Patent and Technology License Agreement, 2006 WL 8326192; Ikanos Comms., Inc. Asset Purchase Agreement (Form 10-K, Exhibit 2.2) (Feb. 27, 2006), https://www.sec.gov/Archives/edgar/data/1219210/000104746906002539/a2167797zex-2_2.htm.

Medical Technologies, Inc. (the patentee). Their asset purchase agreement stated that the patentee would give the licensee a patent license and all the fixed assets and tangible personal property necessary for the operation of the business.¹⁶² The acquisition of the business segment helped the licensee, a software developer, enter the medical devices manufacture and sales business.¹⁶³

b) Products

In nine of the 400 patent licensing transactions in the dataset of this study (or 2.25%), the patentee manufactured final products or components for the licensee. A licensee's need for a continuous product supply from patentees arises when they lack the capacity to manufacture final products or related components on their own. Third party manufacturers might not be able to handle the production efficiently as the patentee does, as they lack the specialized techniques that are relevant to the patented technology.

For example, M-Systems Flash Disk Pioneers Ltd. (M-Systems) is a company that mainly designs and sells consumer electronics.¹⁶⁴ It established a strategic relationship with the Toshiba Corporation (Toshiba) for the purpose of jointly developing certain flash disk products.¹⁶⁵ Along with their patent license agreement, M-Systems also signed a "master purchase agreement" under which it agreed to purchase raw flash disk components and some of the final products from Toshiba.¹⁶⁶

In this case, M-Systems substantially depended on Toshiba's manufacturing capability for producing patented products for sale. In its annual report, M-Systems disclosed that Toshiba "will be the sole source of

162. Vista Med. Tech. & Viking Sys., Inc., Asset Purchase Agreement (Form 10-K, Exhibit 10.59) 5 (Mar. 30, 2004), https://www.sec.gov/Archives/edgar/data/1035181/000110465904008956/a04-3915_1ex10d59.htm; Vista Med. Tech., Inc. & Viking Sys., Inc., Patent and Technology License Agreement, 2004 WL 7268013; iVOW, Inc., Annual Report (Form 10-K) 3, 8 (Mar. 31, 2005), https://www.sec.gov/Archives/edgar/data/1035181/000110465905014437/a05-1980_110k.htm.

163. Viking Sys., Inc., Annual Report (Form 10-K) 30 (Apr. 15, 2009), https://www.sec.gov/Archives/edgar/data/1065754/000101968709001382/vkng_10k-123108.htm.

164. M-Systems Flash Disk Pioneers Ltd., Annual Report (Form 20-F) 30 (June 30, 2004), <https://www.sec.gov/Archives/edgar/data/895361/000089536104000028/msystems20f.htm>.

165. *Id.* at 15, 23.

166. Toshiba Corp. & M-Systems Flash Disk Pioneers Ltd., Patent License Agreement, 15-16, 2004 WL 7236004; Toshiba Am. Elec. Components, Inc. & M-Systems Flash Disk Pioneers Ltd., Master Purchase Agreement (Form 20-F/A, Exhibit 4 (A) 5) § 8 (Jan 13, 2004), https://www.sec.gov/Archives/edgar/data/895361/000089536104000004/msystems20faexhibit4a5mpa_2.htm.

supply” of these products and components.¹⁶⁷ If Toshiba breached the contract, M-Systems would lose the ability to fulfill customers’ orders in a timely fashion, “which would result in lost sales and significantly lower revenues.”¹⁶⁸ M-System also disclosed that it was seeking to cooperate with third parties to make products comparable to the one that Toshiba manufactured.¹⁶⁹ But it acknowledged that handing the manufacturing tasks to the third party would incur “additional hardware and software development,” and that there was no guarantee that development of comparable products would succeed, or that the third party products would be of “similar cost, quality and functionality.”¹⁷⁰

3. *Labor*

a) Technical Services

In 36 (or 9%) of the pool of 400 patent licensing transactions, licensees acquired technical services from the patentees. We can categorize these technical services into four types — training services, consulting services, quality control services, and maintenance support services. In general, patentee’s technical services have two functions: (1) they address unanticipated technical difficulties that arise in the implementation of the patented technology;¹⁷¹ and (2) they provide licensees with continuing access to the patentees’ “tacit knowledge.”¹⁷² Such knowledge can help them to implement the patented technologies but is hard to articulate and “tends to diffuse slowly and only with effort and the transfer of people.”¹⁷³

The first type of technical services is technical training, where the patentee teaches the licensee’s personnel how to implement the patent. After obtaining a patent license, licensees sometimes find that their employees are not well prepared to implement the patented technologies. When this happens,

167. M-Systems Flash Disk Pioneers Ltd., *supra* note 164, at 15.

168. *Id.*

169. *Id.*

170. *Id.*

171. See HOLMES, *supra* note 26, § 1:5.8.

172. See Lee, *supra* note 12, at 1571; see HOLMES, *supra* note 26, § 1:5.8.

173. DAVID J. TEECE, MANAGING INTELLECTUAL CAPITAL: ORGANIZATIONAL, STRATEGIC, AND POLICY DIMENSIONS 127 (2000); see also Richard R. Nelson, *What Is “Commercial” and What Is “Public” About Technology, and What Should Be?*, in TECHNOLOGY AND THE WEALTH OF NATIONS 57, 61-62 (Nathan Rosenberg, Ralph Landau & David C. Mowery eds., 1992) (noting that some complex techniques can be transferred to other parties only with teaching and learning); 3 MILGRIM & BENSON, *supra* note 100, § 19.04 (“Personal technical assistance is so important because words are imperfect, plans and drawings are imperfect, specifications and even formulas are imperfect.”).

licensees can ask patentees to train their personnel.¹⁷⁴ For example, Junning Ma (the patentee) granted Shenzhen ORB-Fortune New-Material Co., Ltd. (the licensee) a patent license relating to an adhesive composition and its related preparation method.¹⁷⁵ The licensee also needed the patentee to teach its techniques and train the licensee's personnel. The patent license agreement required the patentee to (1) teach the licensed technology, (2) answer the licensee's questions about how to use the technology, and (3) send a specialist to the licensee's factory to assist and train the licensee's personnel.¹⁷⁶ The agreement also allowed the licensee to send its personnel to the patentee's factory for technical training and guidance.¹⁷⁷

The second type of technical services is consulting. By consulting patentees, licensees can obtain technical information that they have not yet fully articulated. For example, along with a patent license concerning techniques for manufacturing mineral oil-based gels, SSL Americas, Inc. (the licensee) obtained consulting services from Applied Elastomerics, Inc. (the patentee).¹⁷⁸ The patentee agreed to provide consulting services relating to the performance of scientific or technical activities, demonstrations, wet or physical chemistry, experiments, etc.¹⁷⁹ When seeking consulting services, the licensee would need to make a request in writing and wait for the patentee's decision about whether it had the expertise and the ability to provide the requested services.¹⁸⁰

The third type of technical services is quality control. Quality control services ensure that the patented products are manufactured in a way that meets technical standards.¹⁸¹ Patentees might have better knowledge about

174. See HOLMES, *supra* note 26, § 12:8.2(B) (“Because the licensor usually is the party initially possessing the superior knowledge of the licensed product, the costs of introductory training of the licensee’s personnel are often borne by the licensor.”); 2 MILGRIM & BENSON, *supra* note 137, § 16.10 (“Personnel training can occur at other facilities of the licensor (or its other licensees). This offers the advantage of enabling the licensed operation to achieve the shortest learning curve when its own operations commence.”); see, e.g., Zhao Zifeng & Yinlips Dig. Tech. (Shenzhen) Co., Ltd., Patent License Agreement § 6, 2008 WL 11096485 (requiring the patentee to send qualified technical specialists to “provide on-the-spot technical guidance, and give training course” to the licensee’s technical staff and to ensure the staff mastered the patented technology).

175. Junning Ma & Shenzhen ORB-Fortune New-Material Co., Ltd., Patent License Agreement, 2010 WL 11349005.

176. *Id.* § 8.

177. *Id.*

178. Applied Elastomerics, Inc. and SSL Am., Inc., Patent License Agreement § 1.7(b), 2005 WL 8064279.

179. *Id.*

180. *Id.*

181. HOLMES, *supra* note 26, § 10:7.

how to manufacture those products, so, after obtaining a patent license and the manufacturing facilities from patentees, licensees might enter an agreement to require patentees to supervise the manufacturing process. For example, Uni-Pixel Displays, Inc. (the licensee) acquired a set of assets from Atmel Corporation (the patentee) that included the patents and facilities necessary for producing touch sensors.¹⁸² The parties also entered a transition services agreement under which the patentee agreed to provide (1) quality assurance and failure analysis services; (2) business data, email, and network and communication services; (3) facilities support services; (4) manufacturing execution system services; and (5) operations services.¹⁸³

The fourth type of technical services is maintenance support. Licensees might need patentees to maintain and enhance licensed technologies. The services might be conveyed to both the licensees and the licensees' customers. For example, Avistar Communications Corporation (the patentee) licensed its patent that relates to bandwidth management software to International Business Machines Corporation (the licensee).¹⁸⁴ The patentee also agreed to provide maintenance support services, including installment, subsequent updates, error corrections, and basic enhancement of the licensed software, to the licensee.¹⁸⁵ The services also included providing documentation for customers to enable developer tools to program the licensed software and providing documentation for end-users for the purposes of installing, configuring, and the performance of licensed software.¹⁸⁶

182. Uni-Pixel, Inc., Current Report (Form 8-K) 2-3 (Apr. 17, 2015), <https://www.sec.gov/Archives/edgar/data/1171012/000118518515000934/unipixel8k041615.htm>; Atmel Corp. & Uni-Pixel Displays, Inc., XSense Patent License Agreement, §§ 1.3, 1.4 2015 WL 8030164.

183. Uni-Pixel Displays, Inc, Transition Services Agreement (Form 8-K, Exhibit 10.4) § 2.1 (Apr. 17, 2015), <https://www.sec.gov/Archives/edgar/data/1171012/000118518515000934/ex10-4.htm>.

184. *See* Avistar Comms. Corp. & Int'l Bus. Mach. Corp., Patent License Agreement, 2008 WL 11084690; Avistar Comms. Corp., Quarterly Report (Form 10-Q) 9 (Nov. 14, 2008), https://www.sec.gov/Archives/edgar/data/1111632/000111163208000034/form_10q.htm.

185. Avistar Comms. Corp., Licensed Works Agreement (Form 10-Q, Exhibit 10.21) § 2.0 (Nov. 14, 2008), https://www.sec.gov/Archives/edgar/data/1111632/000111163208000034/exhibit_1021.htm; Avistar Comms. Corp., Licensed Works Agreement Statement of Work (Form 10-Q, Exhibit 10.22) §§ 1.0, 3.0, 5.0 (Nov. 14, 2008), https://www.sec.gov/Archives/edgar/data/1111632/000111163208000034/exhibit_1022.htm [hereinafter Avistar Comms. Corp., Licensed Works Agreement Statement of Work].

186. Avistar Comms. Corp., Licensed Works Agreement Statement of Work, *supra* note 185, § 3.1.1.

b) R&D Services

Licensees can acquire R&D services from patentees in cases where the licensed technologies are immature.¹⁸⁷ Patentees, as technology creators, have comparative advantages when it comes to making technological improvements.¹⁸⁸ So, licensees might hire patentees' inventors or technical personnel in order to improve the licensed technologies and to develop products.¹⁸⁹ Empirical evidence shows that engaging with inventors during the development process can increase the likelihood and extent of a firm's success at commercializing technology.¹⁹⁰ Among the 400 patent licensing transactions in the dataset of this Article, 16 transactions (or 4%) involved R&D services transfers.

Patentees' effective research tools can be a reason for licensees to acquire their R&D services in order to turn the patented technologies into final products. For example, Cue Biopharma, Inc. (the patentee) developed a technology relating to antigen-specific T cell-targeted biologics and licensed the technology to Merck Sharp & Dohme Corp. (the licensee).¹⁹¹ The licensed product candidates were immature and needed further development.¹⁹² The patentee had exclusive possession of a highly productive biologic drugs designing platform, which was critical to the discovery of the drug.¹⁹³ For this reason, the licensee obtained the patentee's R&D services for the drug's future development.¹⁹⁴ It financed the patentee's relevant R&D and agreed to pay

187. See BRUNSVOLD ET AL., *supra* note 123, at 356 (noting that most R&D collaboration agreements "involve promising but unproven technology that will require significant expense to develop, usually with a significant risk of failure").

188. See Lee, *supra* note 12, at 1556 (noting that "licensees actively seek relationships with the inventors whose patents they license" for their "technical knowledge" and their "side-by-side problem solving" that "addresses . . . specific technical need[s]").

189. For example, the University of Pennsylvania licensed its pharmaceutical patents concerning DNA vaccines to VGX Pharm., Inc. and agreed to collaborate on the development of the product candidates. See The Tr. of the U. of Pa. & VGX Pharm., Inc., Patent License Agreement, 2009 WL 10547085.

190. Ajay Agrawal, *Engaging the Inventor: Exploring Licensing Strategies for University Inventions and the Role of Latent Knowledge*, 27 STRATEGIC MGMT. J. 63, 77 (2006).

191. See Cue Biopharma, Inc., Registration Statement (Form S-1/A) 74 (Dec. 13, 2017), <https://www.sec.gov/Archives/edgar/data/1645460/000157104917008698/t1703167-s1a.htm>.

192. See *id.* at 56.

193. See *id.* at 54.

194. See *id.* at 1-3, 8; Cue Biopharma, Inc. & Merck Sharp & Dohme Corp., Exclusive Patent License and Research Collaboration Agreement § 2, 2017 WL06347621; see also Ben Adams, *Cue Biopharma in \$374M-plus Merck Immunotherapy Pact*, FIERCEBIOTECH (Nov. 16, 2017), <https://www.fiercebiotech.com/biotech/cue-biopharma-374m-plus-merck-immunotherapy-pact>; *Cue Biopharma Announces Strategic Research Collaboration and License*

considerations of \$101 million, \$120 million, and \$150 million upon the achievement of certain research, development, regulatory, and commercial milestones.¹⁹⁵

Patentees' deep knowledge in the relevant field of the licensed technology can be a reason for licensees to obtain their R&D services. For example, Daré Bioscience, Inc. (the licensee) obtained a patent license from Strategic Science & Technologies, LLC (the patentee) concerning a technology for treating female sexual arousal disorder.¹⁹⁶ But the product candidate was still in the clinical-stage and needed more development before it could pass the FDA's regulatory hurdles.¹⁹⁷ Since the patentee had "deep knowledge" of the targeted symptom, the licensee wanted its R&D services.¹⁹⁸ The licensee agreed to pay considerations "ranging from \$500,000 to \$150,000,000 contingent on achieving certain clinical, regulatory and commercial milestones."¹⁹⁹

Obtaining a patentee's R&D services does not mean that the patentee's research capability will outperform that of the licensees in every aspect. Their capabilities might have comparative advantages in different technology fields that are complementary to each other.²⁰⁰ For example, along with their patent license, Dow Chemical Company (the patentee) and Millennium Cell Inc. (the

Agreement with Merck, BUSINESS WIRE, <https://www.businesswire.com/news/home/20171116005197/en/Cue-Biopharma-Announces-Strategic-Research-Collaboration-License> (last visited Feb. 17, 2019).

195. Cue Biopharma, Inc., *supra* note 191, at 74.

196. Strategic Science & Technologies-D LLC. & Daré Bioscience, Inc., License and Collaboration Agreement at 1, 2018 WL 01516513 (showing recitals).

197. Daré Bioscience, Inc., *Enters into License and Collaboration Agreement for a Product with the Potential to Receive the First FDA Approval for Female Sexual Arousal Disorder* (Feb. 12, 2018), <https://darebioscience.gcs-web.com/news-releases/news-release-details/dare-bioscience-inc-enters-license-and-collaboration-agreement>.

198. *Id.*

199. Daré Bioscience, Inc., Annual Report (Form 10-K) 38 (Mar. 28, 2018), https://www.sec.gov/Archives/edgar/data/1401914/000156459018006989/dare-10k_20171231.htm; *see also* Strategic Science & Technologies-D LLC. & Daré Bioscience, Inc., License and Collaboration Agreement § 8, 2018 WL 01516513 (partly redacted due to confidential treatment).

200. *See* BRUNSVOLD ET AL., *supra* note 125, at 356 (stating that "companies with different market interests may join to develop a new technology-based product having application in both markets. Competitors may collaborate on costly research and development activities that neither could do alone"); *see also* Frank T. Rothaermel, *Incumbent's Advantage Through Exploiting Complementary Assets Via Interfirm Cooperation*, 22 STRATEGIC MGMT. J. 687, 690, 693, 696-97 (2001) (showing that new biotechnology firms collaborate with traditional pharmaceutical firms to research and develop new products, combining the former's advantage in technological expertise of and the latter's advantage in FDA regulatory management, and that 68.2% of the strategic alliances in the biopharmaceutical industry are established with the target to develop new products).

licensee) established a joint development project to work on a portable hydrogen battery.²⁰¹ The patentee was one of the leading companies in the field of innovative chemical and plastic products.²⁰² The licensee was a company that had a unique technology for storing and delivering hydrogen energy in small package.²⁰³ The licensee believed that the combination of the two companies' technical resources would help them both achieve their business goals.²⁰⁴

B. BUNDLED ASSET TRANSFERS IN EX ANTE AND EX POST PATENT LICENSING CONTEXTS

The relationship between patent licensing and innovation has been an issue of concern for scholars. Some contend that patent licensing merely transfers the legal right to use existing technological information from the patentee to the licensee.²⁰⁵ However, others argue that some patent licenses may promote innovation because in these licenses, the patentee transfers new knowledge to the licensee, which is a type of asset that complements patented technology in realizing its value.²⁰⁶

Lemley and Feldman's surveys of American companies reveal that whether a patent license involves the transfer of new knowledge may depend on the timing of the license. They believe that patent licenses entered into after a patent infringement dispute ("ex post patent licenses") might not promote innovation because they are unlikely to involve the transfer of new knowledge.²⁰⁷ Although their studies do not contain data on patent licenses

201. See *The Dow Chem. Co. & Millennium Cell Inc., Patent Assignment Agreement and License*, 2005 WL 8087484; *Millennium Cell Inc: Millennium Cell and The Dow Chemical Company Achieve Milestone 2*, BUSINESS WIRE (July 26, 2007, 9:00 AM), <https://www.marketscreener.com/quote/stock/MILLENNIUM-CELL-9974/news/Millennium-Cell-Inc-Millennium-Cell-and-The-Dow-Chemical-Company-Achieve-Milestone-2-394718/>

202. See *Millennium Cell Inc., Annual Report (Form 10-K) 2* (Mar. 29, 2006), <https://www.sec.gov/Archives/edgar/data/1114872/000111487206000006/form10k123105.htm>.

203. See *id.* at 1-2.

204. See *id.*

205. See *Spindelfabrik Suessen-Schurr, Stahlecker & Grill GmbH v. Schubert & Salzer Maschinenfabrik Aktiengesellschaft*, 829 F.2d 1075, 1081 (Fed. Cir. 1987) ("As a threshold matter, a patent license agreement is in essence nothing more than a promise by the licensor not to sue the licensee."); cf. Feldman *supra* note 13 ("A license, after all, is merely an agreement not to sue in return for a monetary payment, and the threat of a lawsuit is what drives companies to pay the licensing fee.")

206. See Chien, *supra* note 12, at 167-80; Graham et al., *supra* note 22, at 1316; Risch, *supra* note 26, at 983 (claiming that the transfer of sufficient know-how is a way to "maximize [the patented technology's] potential"); cf. Barnett, *supra* note 11, at 1 (noting that IP licensing transactions facilitate "value-creating exchanges of knowledge assets").

207. Feldman & Lemley, *Sound and Fury*, *supra* note 37, at 1795; Feldman & Lemley, *Patent Licensing Demands*, *supra* note 37, at 139.

entered into prior to a patent infringement dispute (“ex ante patent licenses”), they believe that ex ante patent licensing may contain the transfer of new technological information.²⁰⁸ If their view is consistent with reality, we can infer that patent licensing promotes innovation is likely to occur in ex ante context.

This Article argues that Lemley and Feldman limiting their observations of complementary assets to new knowledge might cause their studies to underestimate the role of patent licensing in promoting innovation. Although new knowledge is an important asset that facilitates licensees to implement the patented technology, other types of assets, such as equipment, can also play a role in enhancing the value of the technology. Focusing only on the transfer of new knowledge might risk regarding certain innovation-enhancing patent licenses as non-innovation-enhancing. This Article expands the scope of observation to other types of complementary assets to help scholars gain a better understanding of the role of patent licensing in promoting innovation. It also examines bundled asset transfer in ex ante patent licensing,²⁰⁹ filling the gap in Lemley and Feldman's studies for ex ante patent licensing data. Furthermore, this Article also explain the differences between ex ante and ex post patenting concerning bundled asset transfers.

349 of the 400 material patent licensing transactions (or 87.25%) did not reflect the goal of settling patent litigation. If this result is generalizable, it suggests that parties in the innovation marketplace tend to complete their important patent licensing transactions in an ex ante and voluntary way. 166 of the 349 ex ante patent licensing transactions involved bundled asset transfers, accounting for 47.56%. This confirms the theory of the existing literature that bundled asset transfers tend to happen in an ex ante context.²¹⁰

Nevertheless, it is also worth noting that even in an ex ante context, the majority of the material patent licensing transactions (52.44%) did not involve bundled asset transfers. The licensees in these transactions merely needed the patentee's promise not to file a patent infringement lawsuit against them. Their

208. Feldman & Lemley, *Sound and Fury*, *supra* note 37, at 1799-80; Feldman & Lemley, *Patent Licensing Demands*, *supra* note 37, at 139.

209. It distinguishes the licensing transactions that parties entered in the context of patent infringement litigation from those that occurred without that overt pressure by searching the dockets with the parties' names in the Bloomberg Law database. *See infra* Appendix for a description of the data collection.

210. Feldman & Lemley, *Sound and Fury*, *supra* note 37, at 1799; Feldman & Lemley, *Patent Licensing Demands*, *supra* note 37, at 139.

assets were no less effective or better than the assets of the patentees themselves with respect to implementation of the patented technology.²¹¹

51 of the 400 licensing transactions (12.75%) occurred in context of settling pending patent litigation.²¹² We can view these transactions as ex post patent licensing transactions because the patent licenses were granted after the licensee reduced the patent to practice by infringement. In an ex post context, parties need to deal with two issues in the same transaction – settling their pending patent disputes and figuring out the terms of a patent license for the future use of the relevant technology. Parties might complete the transaction with one contract, combining the settlement and the patent license in one document.²¹³ Sometimes, parties sign a settlement agreement to resolve all of the disputes in their litigation and sign a patent licensing agreement ancillary to it to govern the specific issues relating to patent licensing.²¹⁴

Among the transactions settling pending patent litigation, only three (or 5.88%) involved complementary asset transfer. In one example, Butamax filed eight complaints against Gevo, alleging that Gevo was infringing some of its patents.²¹⁵ These patents related to the production of isobutanol, a type of alcohol.²¹⁶ The parties decided to settle the pending cases and establish “a new relationship.”²¹⁷ Along with their settlement agreement, they entered a patent license agreement, under which each party licensed certain patents and patent applications to the other party.²¹⁸ Despite its right to the patents, Butamax also granted Gevo an option to obtain its “engineering package” to implement a

211. A technology owner might not have the necessary assets with which to implement its technology and earn profits. In this situation, it is profitable for it to license the technology to users who have these assets. *See* ARORA ET AL., *supra* note 12, at 96 (“[T]he producer of the knowledge may not have the necessary downstream assets to exploit it commercially. The producer may therefore find it profitable to license the technology or enter into cooperative agreements with other firms.”); *see also* BRUNSVOLD ET AL., *supra* note 123, at 355 (noting that small research-based companies or nonprofit organizations that do not have “significant manufacturing and marketing capabilities” might grant patent license to large firms with these capabilities in order to commercialize their inventions).

212. *See generally* Chien, *supra* note 12, at 1677 (noting that “licenses [are] often signed when cases are settled”).

213. *See, e.g.*, Thermage, Inc. & Syneron, Inc., Patent License and Settlement Agreement, 2006 WL 8385002.

214. *See, e.g.*, Beckman Coulter, Inc. & Applera Corp., Real-Time Instrument Patent License Agreement, 2008 WL 11065970 (stating that the patent license agreement was ancillary to a settlement agreement).

215. *See* Gevo, Inc., Annual Report (Form 10-K) 48 (Jun. 3, 2016), https://www.sec.gov/Archives/edgar/data/1392380/000156459016015604/gevo-10k_20151231.htm.

216. *Id.* at 7-8, 48.

217. *Id.* at 48.

218. Butamax Advanced Biofuels LLC & Gevo, Inc., Patent Cross-License Agreement §§ 2(a), (b), 2015 WL 8601900.

special technology for the production of isobutanol.²¹⁹ The parties believed that this transaction would allow them to “leverag[e] each other’s strengths and accelerat[e] development of competitive supply for bio-based isobutanol.”²²⁰

The findings reveal a divergence in ex ante and ex post patent licensing transactions with respect to bundled asset transfers. The percentage of transactions that involved bundled asset transfers in the group of ex post transactions is substantially lower than in the group of ex ante ones. The result supports the conclusion that Lemley and Feldman reached about the difference between ex post and ex ante transactions. Two factors might explain the divergence: (1) the degree of the licensee’s dependence on patentee, and (2) the extent to which the licensee has completed its innovation process.

First, the timing of the licensing transactions reflects the licensee’s dependence on the patentee’s assets. Some users do not have and cannot obtain from third parties the complementary assets that are necessary to deploy the patentee’s technology. Due to the absent necessary complementary assets, they are unable to implement the technology without the patentee’s permission, i.e., by infringement. Therefore, these users will not be the licensees in ex post licensing transaction, but would have to obtain complementary assets from the patentee ex ante their implementation of technology. The fact that a licensee can infringe a patent and enter ex post licensing transactions with the patentees indicates that it does not substantially depend on the patentee’s assets to implement the relevant technology. So, it should not be surprising to find that so few of the ex post transactions involved bundled asset transfers.²²¹

Second, in the ex post context, the licensees might already have finished the stage of innovation that relates to patentees’ assets. The process of innovation often consists of several stages: refinement of inventions, product development, product manufacture, and product distribution in the marketplace.²²² As Part II A shows, licensees obtain patentees’ assets to

219. *Id.* § 2(c); Gevo, Inc., *supra* note 215, at 7.

220. Gevo, Inc., Press Release (Form 8-K, Exhibit-99.1) 1 (Aug. 27, 2015), <https://www.sec.gov/Archives/edgar/data/1392380/000119312515304010/d71855dex991.htm>.

221. For more discussion, see Part IV.B.

222. See Rosanna Garcia & Roger Calantone, *A Critical Look at Technological Innovation Typology and Innovativeness Terminology: A Literature Review*, 19 J. PROD. INNOVATION MGMT. 110, 110-12 (2002) (claiming that “an invention does not become an innovation until it has processed through production and marketing tasks and is diffused into the marketplace”); Marianna Makri, Michael A. Hitt & Peter J. Lane, *Complementary Technologies, Knowledge Relatedness, and Invention Outcomes in High Technology Mergers and Acquisitions*, 31 STRATEGIC MGMT. J. 602, 604 (2010) (claiming that “innovation involves the exploitation of an invention

implement the patented technology in one or several stages.²²³ Patent litigation often happens after all of these stages or at least at a relatively late stage.²²⁴ By this time, the licensee's demand for the asset might have disappeared. For example, a patentee who has know-how that can help a licensee develop a product might no longer be able to sell the know-how to the licensee in the settlement if the licensee has completed the product development stage.²²⁵ In other words, the delay of the licensing transaction can diminish or eliminate the patentee's trading opportunities of its complementary assets.

IV. IMPLICATIONS

A. ALLOW EFFICIENCY-ENHANCING BUNDLING ARRANGEMENTS

As Part II of this Article notes, the technical information that the patent system discloses might not by itself lead to innovation. Before implementation of a patented technology, potential users might need information that the patent does not disclose in order to understand the technology fully. Even if they grasp the technology, they might be unable to implement it if they lack the related non-informational assets. These impediments keep the patent system from achieving its goal of promoting innovation. The findings in Part III show that patent licensing contracts with bundling arrangements help the patent system to achieve its goal – promoting innovation – by allocating

through product development, manufacturing, marketing, distribution, and after-sales service"); Teece, *supra* note 72, at 288 ("In order for such know-how to generate profits, it must be sold or utilized in some fashion in the market."); Feldman & Lemley, *Patent Licensing Demands*, *supra* note 37, at 138 (considering innovation as "the development and deployment of new technology into the world").

223. In the early stage of innovation, the licensee can employ a patentee's proprietary information, software, and R&D services to refine the invention and develop products. When the licensee enters the stage of product manufacture, the patentee's production facility, manufacture capacity, and quality control services can come into play. In the stage of product distribution, the patentee's trademark and trade secrets, such as sales information and customer lists, can help the licensee. Even after sale, the patentee can provide maintenance support services to the licensee and its customers.

224. Feldman & Lemley, *Sound and Fury*, *supra* note 37, at 1800 ("Patent litigation and licensing demands for existing patents, by contrast, tend to occur well after the defendant has developed and implemented the technology."); Chien, *supra* note 12, at 1685 ("Patent licenses signed as the result of patent litigation are a highly selected part of the patent market, and because they are formed ex post, they also tend to take place after technology has been transferred or copied, or independently invented.")

225. *Cf.* Feldman & Lemley, *Patent Licensing Demands*, *supra* note 37, at 156, 160 (determining that licensees rarely generate new products or services after they enter ex post patent licensing transactions).

“complementary assets”²²⁶ to licensees in order to deploy the technology that the patent discloses.²²⁷ Though the contracts that Part III examines represent only a subset of patent licensing transactions – transactions that are material to relatively large companies – the findings indicate that the bundling arrangements in technology transactions tend to be efficiency-enhancing arrangements.

The law of patent misuse and antitrust case law, however, regard bundling (or tying)²²⁸ arrangements in patent licensing as illegal solely on the basis of their potential anticompetitive effects, without regard to their efficiency-enhancing effects. Even if a bundling arrangement has efficiency-enhancing effects, a patentee cannot use this as a reason to avoid a court finding that the bundling arrangement is illegal. In other words, courts currently will not use the efficiency-enhancing effects of bundling arrangements to counterbalance their potentially anticompetitive effects. This Article argues that the offsetting of efficiency-enhancing effects against anticompetitive effects might be necessary because the former may outweigh the latter, resulting in a positive net effect on social welfare.

Potential anticompetitive effects are the sole consideration in the law of patent misuse and antitrust case law to determine the illegality of a bundling arrangement.²²⁹ A bundling arrangement would be held illegal if it is “coercive in nature”²³⁰—the patentee is forcing the licensee to purchase assets that it does

226. Economists use “complementary assets” to refer to the assets that technology users use to “package[] [the technology] into products or services to yield value.” TEECE, *supra* note 27, at 25; *see also* Petra Christmann, *Effects of “Best Practices” of Environmental Management on Cost Advantage: The Role of Complementary Assets*, 43 ACAD. MGMT. J. 663, 664 (2000) (claiming that complementary assets are the assets needed “to capture the benefits associated with a strategy, a technology, or an innovation”); *cf.* David J. Teece, *Firm Organization, Industrial Structure, and Technological Innovation*, 31 J. ECON. BEHAV. & ORG. 193, 196 (1996) (noting that successful innovation requires maintenance of the linkages to complementary assets).

227. TEECE, *supra* note 27, at 101 (stating that “the innovator could attempt to access [complementary] assets through straightforward contractual relationships”).

228. *See* U.S. DEP’T OF JUSTICE & FED. TRADE COMM’N, *supra* note 15, at 103 (noting that the case law in the United States sometimes uses “bundling” and “tying” interchangeably); *see, e.g.*, *United States v. Microsoft Corp.*, 253 F.3d 34, 95 (D.C. Cir. 2001).

229. *See* *Ill. Tool Works Inc. v. Indep. Ink, Inc.*, 547 U.S. 28, 37 (2006) (“Per se condemnation—condemnation without inquiry into actual market conditions—is only appropriate if the existence of forcing is probable. Thus, application of the per se rule focuses on the probability of anticompetitive consequences”); *see also* *Eastman Kodak Co. v. Image Tech. Servs., Inc.*, 504 U.S. 451, 464 (1992); 2 EARL W. KINTNER, JOSEPH P. BAUER, WILLIAM H. PAGE & JOHN E. LOPATKA, *FEDERAL ANTITRUST LAW* § 15.13 (2019) (“At a minimum, the plaintiff must show that the defendant had ‘sufficient market power’ in the tying product market to coerce the unwanted purchase of the tied product.”).

230. *See* KINTNER ET AL., *supra* note 229, § 15.13.

not want or that it would otherwise purchase from others on different terms.²³¹ Courts consider two factors to determine whether a bundling arrangement is illegal: (1) the patentee conditions the patent license on the purchase of other assets;²³² and (2) “the patent owner has market power in the relevant market for the patent....”²³³ If a court finds a bundling arrangement illegal under the law of patent misuse, it can hold patentee’s patent unenforceable.²³⁴ If it determines that a given arrangement violates Section 1 of the Sherman Act, it can impose federal antitrust liabilities, including fines and imprisonment, on the patentee.²³⁵

The approach to finding bundling arrangements in patent licensing illegal on the basis of potential anticompetitive effects has been generally consistent from the past to the present. In the past, the Supreme Court has adopted a *per se* rule against bundling arrangements.²³⁶ The *per se* rule regarded a bundling arrangement as an antitrust violation or as patent misuse if it is coercive. The Court presumed that a patent confers market power on the patentee,²³⁷ and that forcing the licensee to purchase unpatented goods has anticompetitive effects.²³⁸ In an early patent misuse case, *Motion Picture Patents Co. v. Universal Film Manufacturing Co.*, the patentee granted the licensee a license to manufacture and sell patented projectors, with a covenant that it sell them “under the restriction and condition” that the machines “shall be used solely” with certain films, which the patent did not cover.²³⁹ The Court held this

231. *Jefferson Par. Hosp. Dist. No. 2 v. Hyde*, 466 U.S. 2, 12 (1984) (“Our cases have concluded that the essential characteristic of an invalid tying arrangement lies in the seller’s exploitation of its control over the tying product to force the buyer into the purchase of a tied product that the buyer either did not want at all, or might have preferred to purchase elsewhere on different terms.”).

232. 35 U.S.C. § 271(d) (2012); *N. Pac. Ry. v. United States*, 356 U.S. 1, 5-6 (1958) (stating that “a tying arrangement may be defined as an agreement by a party to sell one product but only on the condition that the buyer also purchases a different (or tied) product, or at least agrees that he will not purchase that product from any other supplier”).

233. 35 U.S.C. § 271(d) (2012); *Ill. Tool Works*, 547 U.S. at 37.

234. 35 U.S.C. § 271(d) (2012); see *Morton Salt Co. v. G.S. Suppiger*, 314 U.S. 488, 494 (1942) (holding the plaintiff’s patent unenforceable on the ground that the plaintiff conditioned its patent license on the use of the product bundled with the license).

235. 15 U.S.C. § 1 (2012).

236. See U.S. DEPT OF JUSTICE & FED. TRADE COMM’N, *supra* note 15, at 104 (2007).

237. *Ill. Tool Works*, 547 U.S. at 38 (noting that in 1940s “[t]he presumption that a patent confers market power migrated from patent law to antitrust law”).

238. See *supra* note 255.

239. *Motion Pictures Patents Co. v. Universal Film Mfg. Co.*, 243 U.S. 502, 506 (1917) (internal quotation marks omitted).

restriction void, as it was “wholly without the scope and purpose of our patent laws” and because sustaining it would be against public interest.²⁴⁰

In *Carbice Corp. v. American Patents Development Corp.*, the licensor refused to license a patented technology unless the buyer purchased unpatented dry ice from it.²⁴¹ Though it did not formally grant licenses to buyers, it used the invoices of the sale of its dry ice to specify certain limitations, requiring the buyers to use the patented technology only with its dry ice.²⁴² The Court held that “it may not exact as the condition of a license that unpatented materials used in connection with the invention shall be purchased only from the licensor.”²⁴³ In *Morton Salt Co. v. G.S. Suppiger Co.*, the patentee leased its patented machine to commercial canners for depositing salt tablets “under licenses to use the machines upon condition and with the agreement of the licensees that only [its] subsidiary’s salt tablets be used with” the machine.²⁴⁴ The Court condemned this arrangement as it allowed the patentee to use “its patent monopoly to restrain competition in the marketing of unpatented articles.”²⁴⁵

Similarly, in a 1947 antitrust case, *International Salt Co. v. United States*, the patentee used restrictive clauses or other standard provisions to require those who leased its patented machines to also buy salt and salt tablets from them.²⁴⁶ The Court held that the patentee “engaged in a restraint of trade”²⁴⁷ as its “patents confer no right to restrain use of, or trade in, unpatented salt.”²⁴⁸ It held the bundling arrangement was held “unreasonable, per se,” as its purpose was “to foreclose competitors” from the market of unpatented salt.²⁴⁹ The Court condemned bundling a patent license with unpatented supplies, because “the tendency of the arrangement to accomplishment of monopoly seems obvious.”²⁵⁰

Currently, a market power analysis has become part of the application of the *per se* rule as Congress, the antitrust enforcement agencies, courts, and most economists have concluded that patents do not necessarily confer market

240. *Id.* at 508.

241. *Carbice Corp. v. Am. Patents Dev. Corp.*, 283 U.S. 27, 29-30 (1931).

242. *Id.* at 30.

243. *Id.* at 31.

244. *Morton Salt Co. v. G. S. Suppiger Co.*, 314 U.S. 488, 491 (1942).

245. *Id.*

246. *Int’l Salt Co. v. United States*, 332 U.S. 392, 394-95 (1947).

247. *Id.* at 395-96.

248. *Id.*

249. *Id.*

250. *Id.*

power on the patentee.²⁵¹ In 1988, Congress added Section 271 (d) to the Patent Act, under which conditioning a patent license on the purchase of a separate product would not constitute patent misuse unless “the patent owner has market power in the relevant market for the patent . . . on which the license . . . is conditioned.”²⁵² In a 2006 antitrust case, *Illinois Tool Works Inc. v. Independent Ink, Inc.*, the Supreme Court held that “[a]ny conclusion that an arrangement is unlawful must be supported by proof of power in the relevant market rather than by a mere presumption thereof”²⁵³ and that “a patent does not necessarily confer market power upon the patentee.”²⁵⁴ Since *Illinois Tool Works Inc.*, in all antitrust cases involving a bundling arrangement, the plaintiff must prove that the defendant has market power.

While the Supreme Court was primarily concerned with the anticompetitive effects of bundling arrangement,²⁵⁵ the impact of a bundling arrangement on social welfare might be far less certain than what the court expected. Even if a patentee with market power conditions its patent license on the purchase of its complementary assets, this would not necessarily diminish the positive impact that the bundling arrangement brings about on social welfare. The assets in the bundle will facilitate the use of the technology if they are complementary to it, regardless whether the patentee has forced the licensee to purchase them. End-user-consumers might benefit from the bundling arrangement, as the complementary assets might enable the licensee to deliver higher quality products.²⁵⁶ The efficiency-enhancing effects are

251. See *Ill. Tool Works Inc. v. Indep. Ink, Inc.*, 547 U.S. 28, 45-46 (2006) (“Congress, the antitrust enforcement agencies, and most economists have all reached the conclusion that a patent does not necessarily confer market power upon the patentee. Today, we reach the same conclusion.”); Barnett, *supra* note 11, at 9-14 (describing the changes of attitude toward bundling arrangement from the 1930s to 1980s); Herbert Hovenkamp, *The Rule of Reason and the Scope of the Patent*, 52 SAN DIEGO L. REV. 515, 519 (2015) (noting that in 1988 Congress made it clear that a unilateral refusal to license was not an unlawful patent abuse, and that a tying arrangement was only unlawful if the defendant had market power in the tying product).

252. 35 U.S.C. § 271(d) (2012); see Hovenkamp, *supra* note 31, at 1992 (providing the background of the legislation).

253. *Ill. Tool Works Inc.*, 547 U.S. at 29.

254. *Id.* at 46.

255. *Jefferson Par. Hosp. Dist. No. 2 v. Hyde*, 466 U.S. 2, 12 (1984) (“When such ‘forcing’ is present, competition on the merits in the market for the tied item is restrained and the Sherman Act is violated.”); *id.* at 14-16 (regarding that bundling arrangements “undermine competition on the merits” in other markets and allow “potentially inferior product[s] [to] be insulated from competitive pressures”); *Standard Oil Co. v. United States*, 337 U.S. 293, 305-06 (1949) (holding that bundling arrangements “serve hardly any purpose beyond the suppression of competition”); see KINTNER ET AL., *supra* note 229, § 15.13.

256. Patentees’ product quality control services, manufacturing support, and maintenance support services can improve the quality of the products that licensees deliver to end-user-

consistent with the goals that patent law and antitrust law pursue – “promoting innovation and enhancing consumer welfare.”²⁵⁷ Hence it is necessary to counterbalance bundling arrangements’ potential anticompetitive effects with their efficiency-enhancing effects to determine the impact of bundling arrangements on social welfare.

Under the current *per se* rule, however, courts do not weigh the efficiency-enhancing effects of bundling arrangements against their potential anticompetitive effect before holding them illegal.²⁵⁸ Given the added efficiency that bundling arrangements bring about and their frequent occurrence in patent licensing transactions,²⁵⁹ this Article suggests that Congress and the Supreme Court should switch the current *per se* rule to a *rule of reason* approach.²⁶⁰ The *rule of reason* approach adds a third prong to the coercion and market power aspects of the current *per se* rule – an analysis balancing the efficiency-enhancing effect against the potential anticompetitive effect of the relevant bundling arrangement.²⁶¹ This approach would ensure that courts examine the actual impact that bundling arrangements have on the innovation market and on the markets for other assets. In doing its analysis, if a court finds that the efficiency-enhancing effect of a bundling arrangement outweighs the anticompetitive effect, the courts should not hold it illegal. In fact, some lower courts and the antitrust enforcement agencies have already applied the *rule of reason* approach when analyzing bundling arrangements.²⁶²

consumers. See David S. Evans & Michael Salinger, *Why Do Firms Bundle and Tie—Evidence from Competitive Markets and Implications for Tying Law*, 22 YALE J. ON REG. 37, 41 (2005).

257. U.S. DEP’T OF JUSTICE & FED. TRADE COMM’N, ANITRUST GUIDELINES FOR THE LICENSING OF INTELLECTUAL PROPERTY 2 (1995), <http://www.usdoj.gov/atr/public/guidelines/0558.pdf>; see also Hovenkamp, *supra* note 31, at 1981 (stating that antitrust law “has become much more focused on protecting consumer welfare”).

258. See *United States v. Microsoft Corp.*, 253 F.3d 34, 94 (D.C. Cir. 2001) (noting that there might be “a number of efficiencies” that bundling arrangements bring about but “have been ignored in the calculations underlying the adoption of a *per se* rule”).

259. See U.S. DEP’T OF JUSTICE & FED. TRADE COMM’N, *supra* note 15, at 114 (noting that bundling arrangements in patent licensing transactions are “ubiquitous,” can “often entail” efficiencies, and “usually are not anticompetitive”).

260. See *Microsoft Corp.*, 253 F.3d at 89-90 (stating that applying the current *per se* rule to bundling arrangements “creates undue risks of error and of deterring welfare-enhancing innovation”); Evans & Salinger, *supra* note 256, at 37 (concluding that efficiency which bundling arrangements entail supports the abandonment of the *per se* rule).

261. See Hovenkamp, *supra* note 251, at 516.

262. See, e.g., *Microsoft Corp.*, 253 F.3d at 84 (applying the rule of reason to examine the bundling of operating systems and applications software); *Suture Express, Inc. v. Owens & Minor Distrib.*, 2016 U.S. Dist. LEXIS 47421, at *90-103 (D. Kan. Apr. 7, 2016) (applying the rule of reason to examine the defendants’ bundling of medical supplies), *aff’d*, 851 F.3d 1029 (10th Cir. 2017). The Department of Justice and the Federal Trade Commission have incorporated an examination that weighs the efficiency justification of bundling arrangements

As for the patent licensing transactions in the dataset, this Article does not find within the four corners of the contracts any restrictive clauses conditioning a patent licensing on purchase of complementary assets. None of the contracts stated that the licensee could use the licensed technology only if it agreed to purchase other assets from the patentee. If only the text of the contracts is analyzed, the patentees of these transactions seem to sell multiple assets in one deal. In most of the transactions, the patentees simply added clauses to the “grant of rights” section of the patent license agreement as a way to transfer the rights to their other assets to the licensees.²⁶³ In the rest of the transactions, the parties signed one or several separate agreements, such as a know-how transfer agreement, to transfer the complementary assets along with the patent license.²⁶⁴

Through licensees’ reports filed with the SEC, this Article can identify a number of bundling arrangements are made based on the licensee’s preference, not the patentee’s coercion.²⁶⁵ For example, in some transactions, licensees explicitly stated that they were acquiring assets from the patentees based on efficiency concerns, such as accelerating development of products.²⁶⁶ In a transaction, the licensee acknowledged that it was considering obtaining complementary assets from third parties, while recognizing that the assets of

against their anticompetitive effects before challenging them since 1995, though this examination is recommended rather than mandatory. *See* U.S. DEP’T OF JUSTICE & FED. TRADE COMM’N, *supra* note 15, at 26.

263. *See, e.g.*, Annamed, Inc. & Dermin Sp. zo.o., Patent and Technology Development and License Agreement 2-3, 2016 WL 01469341 (adding a clause to grant “Technology Rights” to the licensee, with “Technology Rights” including the rights to proprietary information, know-how, or data that is necessary for implementing the licensed patent); *see also, e.g.*, Cambridge Enter. Ltd. & Psynova Neurotech Ltd., Exclusive Patent and Non-Exclusive Know-How Licence Agreement § 2.1, 2010 WL 11300071.

264. *See, e.g.*, Pioneer Hi-Bred Int’l, Inc. & S&W Seed Co., Patent License Agreement §§ 1.3, 1.4, 1.7, 2015 WL 6623061 (licensing patents related to seed coatings to the licensee); Pioneer Hi-Bred Int’l, Inc. & S&W Seed Co., Know-How Transfer Agreement (Form 8-K, Exhibit 10.13) § 2 (Jan. 17, 2015), <https://www.sec.gov/Archives/edgar/data/1477246/000113626115000008/swexh10-13.htm> (transferring know-how along with the license).

265. *See* U.S. DEP’T OF JUSTICE & FED. TRADE COMM’N, *supra* note 15, at 114 (stating that bundling arrangements in patent licensing transactions can often lead to efficiencies and “usually are not anticompetitive”).

266. *See, e.g., supra* notes 20, 219 and accompanying texts; Millennium Cell Inc., Annual Report (Form 10-K) 2 (Mar. 29, 2006), <https://www.sec.gov/Archives/edgar/data/1114872/000111487206000006/form10k123105.htm> (stating that the licensee cooperated with the patentee to “accelerate the path towards product commercialization”); *see also* Ill. Tool Works Inc. v. Indep. Ink, Inc., 547 U.S. 28, 45 (2006) (acknowledging that many bundling arrangements “are fully consistent with a free, competitive market”).

the patentee would outperform those of third parties.²⁶⁷ In an extreme example, the patentee's technology is critical to the use of the patented technology and an alternative supplier for the complementary assets did not exist in the innovation marketplace at all.²⁶⁸

However, this Article cannot completely rule out the possibility that in some of the transactions the patentee had market power in the patent licensing market and conditioned the license on licensee's purchase of complementary assets. Adding restrictive clauses to the contract is not the only way to force a licensee to purchase complementary assets. For example, it is possible that in some of the transactions a patentee with market power forced the licensee to purchase complementary assets from it but did not incorporate any restrictive clauses in the contracts.

While this Article cannot conclude that in the dataset there are illegal bundling arrangements under the current *per se* rule, the proposal to shift it to the *rule of reason* approach is meaningful because allowing efficiency-enhancing effects to counterbalance potentially anticompetitive effects will affect patentees' design of licensing arrangement in general. The current *per se* rule has raised concerns among lawyers, as it is "potentially applicable to an enormous range" of bundling arrangements, including those that result from "harmless commercial decisions."²⁶⁹ As they felt the need to give cautious advice to clients not to bundle intellectual property with other assets because the risk of litigation is "too great,"²⁷⁰ a shift to the *rule of reason* approach would allow innovators to enter into bundling arrangements that enhance efficiency with less concern about the potential legal liabilities.

267. See *supra* notes 169-70 and accompanying text. In the innovation marketplace, it is not surprising that licensees obtain complementary assets from patentees rather than from third parties. Patentees often have complementary assets that are "specialized" for the implementation of the patented technology. See TEECE, *supra* note 27, at 99-100.

268. Meridian Waste Sols., Inc., Annual Report (Form 10-K) 38 (Apr. 16, 2018), https://www.sec.gov/Archives/edgar/data/949721/000121390018004538/f10k2017_meridianwaste.htm (The licensee explicitly stated that patentee's facility is the "only existing production facility" for the relevant technology); see also TEECE, *supra* note 27, at 101 (noting that "successful commercialization of the innovation may depend critically on a bottleneck asset which has only one possible supplier").

269. See U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, *supra* note 15, at 111-12 (internal quotation marks omitted).

270. See *id.* at 111 (internal quotation marks omitted); see also *id.* at 112 (noting that "it's per se malpractice to fail to advise a client who is considering an intellectual property infringement suit that he must be prepared to litigate any manner of crazy antitrust or misuse counterclaim – or misuse defense" (internal quotation marks omitted)).

B. FACILITATE BUNDLED ASSET TRANSFERS IN AN EX ANTE CONTEXT

Lemley and Feldman’s surveys show that ex post licensing transactions are unlikely to involve bundled asset transfers.²⁷¹ But they believe that the bundling arrangement of a patent license and informational assets can exist in an ex ante licensing context.²⁷² This Article adds new evidence to support this supposition. The findings show that in material patent licensing transactions, there is indeed a divergence between ex ante and ex post licensing transactions with respect to bundled asset transfers. This Article finds that whereas only 5.88% of the ex post licensing transactions involved bundled asset transfers, 47.56% of the ex ante licensing transactions included them.

This Article demonstrates that, for certain technology users, contracting with the patentee in an ex ante context can lead to efficient allocation of assets, while contracting with the patentee in an ex post context might incur an efficiency loss. This echoes Lemley and Feldman’s view that ex post licensing transactions “seem less promising.”²⁷³ For the purpose of demonstration, this Article classifies technology users into three categories – independent users, quasi-independent users, and dependent users. This chart presents a visual description of the analysis that follows. The shaded area refers to the situations where efficiency loss might occur.

Table 1: Bundled Asset Transfers in Ex Ante/Ex Post Licensing Contexts by User Types

User Types	Bundled Asset Transfer	
	<i>Ex Ante</i> Licensing	<i>Ex Post</i> Licensing
Independent Users	No	No
Quasi-Independent Users	Yes	Maybe
Dependent Users	Yes	Not Applicable

“Independent users” refers to users who have assets that are not less effective than those of patentees with respect to the implementation of the patented technology.²⁷⁴ What they want from the patentees is merely a promise not to file a patent lawsuit against them. As the findings show, in 52.44% of

271. See Feldman & Lemley, *Patent Licensing Demands*, *supra* note 37, at 161-62; Feldman & Lemley, *Sound and Fury*, *supra* note 37, at 1837.

272. Feldman & Lemley, *Sound and Fury*, *supra* note 37, at 1799.

273. Feldman & Lemley, *Patent Licensing Demands*, *supra* note 37, at 139.

274. See TEECE, *supra* note 27, at 55 (stating that individual inventors might license their technology to “incumbent firms who already have the necessary complementary assets in place”); *supra* note 211 and accompanying text.

the ex ante licensing transactions in this study, the licensees did not obtain other assets from the patentees. The licensees in these transactions are likely to be independent users because they had the chance to obtain other assets from the patentees in an ex ante context but did not do so. This suggests that they did not need the patentees' assets.

If independent users are unable to enter ex ante licensing agreements with the patentees, they might infringe the patent and then pay patent damages back to the patentees' ex post the implementation, according to the terms of the settlement agreement or the court's decision.²⁷⁵ As in an ex ante context, they would not acquire other assets from the patentee at this stage because they have comparable or more effective assets. That is to say, independent users would not acquire the patentees' assets to implement the patented technology in either an ex ante context or an ex post context. The timing of the licensing transaction does not affect the outcome of the allocation of patentees' assets to them.

"Quasi-independent users" refers to users who are able to deploy the patented technology with their own assets, even though these assets are less effective than those of the patentees. Rather than using their own assets, quasi-independent users would prefer to deploy the technology using the patentees' assets. If they are unable to contract the patentee in an ex ante context, then they, like independent users, can infringe the patent by implementing the technology with the assets that they possess. Quasi-independent users can pay royalties to the patentees when they solve their patent dispute. But this leads to inefficiencies because the users would not be able to implement the more effective assets of the patentees at earlier stages of innovation.

In ex post licensing transactions, quasi-independent users might acquire patentees' assets, especially when they have a plan to develop the patented products further.²⁷⁶ The findings show that 5.88% of the ex post licensing transactions involved bundled asset transfers. But if they have already completed the stage of innovation to which the patentee's assets would apply,

275. Cf. Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089, 1092 (1972) (stating that under liability rules, "someone may destroy the initial entitlement if he is willing to pay an objectively determined value for it"); Robert P. Merges, *Of Property Rules, Coase, and Intellectual Property*, 94 COLUM. L. REV. 2655, 2664 (1994) (stating that when transaction costs are high, liability rules might be more favorable and that under liability rules "a court sets the price in a proceeding that typically takes place after the right has been infringed").

276. See Feldman & Lemley, *Sound and Fury*, *supra* note 37, at 1837 (finding that ten percent of the firms always acquire new knowledge in ex post licensing transactions from patentees that are operating companies); see, e.g., Gevo, Inc., *supra* note 220, at 1.

they would no longer need the patentees' assets²⁷⁷ In this situation, what they need is merely permission to keep doing what they have already done. The findings show that 94.22% of the ex post licensing transactions did not involve bundled asset transfers. The licensees of these transactions can be independent users or quasi-independent users who no longer need the patentees' assets.

“Dependent users” refers to users who depend on the patentees' assets to implement the technology. For example, in one licensing transaction, the patentee's facility is the “only existing production facility” that manufactures the patented products.²⁷⁸ In this case, the user must utilize the patentee's facility if it is going to use the patented technology. Because they cannot implement the technology without the patentee's support, dependent users must enter ex ante licensing transactions for the complementary assets.²⁷⁹ Inefficiency occurs if they fail to do so. Here, the user would have to abandon the technology.²⁸⁰ The findings show that 47.56% of the ex ante transactions involved bundled asset transfers. The licensees of these transactions can be dependent users or quasi-independent users. Both of them would demand the patentees' assets in an ex ante context.

This analysis shows that licensees' inability to enter ex ante licensing transactions with patentees leads to efficiency loss for dependent users and quasi-independent users.²⁸¹ The fact that ex post bundled asset transfers exist indicates high transaction costs impeding technology users' ability to enter ex ante patent licensing transactions, leading to efficiency loss.²⁸² The fact of any given ex post transaction suggests that the patentee's assets are more effective than the licensee's. After all, a licensee would not acquire complementary assets from the patentee unless those assets were the more effective ones. It also suggests that both parties were able to agree on the price and the terms.

277. Feldman & Lemley, *Patent Licensing Demands*, *supra* note 37, at 156, 160 (noting that ex post licensing transactions rarely lead to new products or services).

278. Meridian Waste Sols., Inc., Annual Report (Form 10-K) 38 (Apr. 16, 2018), https://www.sec.gov/Archives/edgar/data/949721/000121390018004538/f10k2017_meridianwaste.htm.

279. *See* TEECE, *supra* note 27, at 25 (noting that certain complementary assets might be the “choke point” in the value chain of innovation).

280. *See, e.g.*, Walsh et al., *supra* note 109, at 321 (noting that the failure to gain access to certain important databases leads to delay and abandonment of innovation projects).

281. Quantifying the magnitude of such efficiency loss accurately is beyond the scope of this study—it requires extra data, such as the amount of financial loss due to the licensees' delay in obtaining the patentee's complementary assets.

282. The efficiency loss in reality is likely to be worse than what the findings suggest, because the dataset of this Article only covers the transactions that parties entered successfully—it does not include cases in which dependent users abandoned a technology due to their inability to enter ex ante transactions with the patentee.

If a potential licensee whose assets are less effective than the patentee's can identify the patentee and its complementary assets in an ex ante context, it should approach the patentee in a timely fashion in order to contract for the assets and the license of the technology. Doing so leads to an efficient outcome because the potential licensee can promptly use the patentee's assets to deploy the technology. Instances when a licensee as such does not act quickly suggest that the transaction cost of detecting licensing opportunities was too high, which delayed the efficiency-enhancing ex ante bundled asset transfer.

This Article recommends that policymakers improve patent disclosures, as many potential technology users rely on the information that patents disclose in order to detect the opportunities for patent licensing, as well as to develop a sense of the patentee's relevant assets and capabilities.²⁸³ Improved patent disclosures would lower the cost of detecting the opportunities of contracting with relevant patentees, reducing the possibility of efficiency loss for dependent and quasi-dependent users. Policymakers can create a secondary platform through which patentees can disclose the information about the complementary assets that they are willing to transfer along with a patent license. They can allow patentees to create links in the relevant patent documents to the information that patentees disclose to the platform. The platform and the links would make the connection between patented technology and its complementary assets explicit. This would allow potential users to identify the patentee's complementary assets at a lower cost, giving them the opportunity to reach out promptly to the patentee regarding a contract for a bundled asset transfer. As potential users would need to locate the relevant patent documents to use the links and the platform, it is critical to

283. See Lee, *supra* note 12, at 1543 (claiming that patents as “publicly recorded instruments” can help the technology owners and users to “find each other relatively easily in the marketplace”); Merges, *supra* note 60, at 1501 (stating that “the *primary* purpose of patents is to spearhead the transfer of the really valuable stuff—the associated unpatented information”); Holger Ernst, *Patent Information for Strategic Technology Management*, 25 WORLD PAT. INFO. 233, 239-40 (2003); Makri et al., *supra* note 222, at 606 (discussing how to use patent information to identify which targeted technology firms to acquire); Ming-Yeu Wang, *Exploring Potential R&D Collaborators with Complementary Technologies: the Case of Biosensors*, 79 TECH. FORECASTING & SOC. CHANGE 862 (2012) (discussing the use of patent information in order to explore potential R&D partners with complementary capabilities); see also Bomi Song, Hyeonju Seol & Yongtae Park, *A Patent Portfolio-Based Approach for Assessing Potential R&D Partners: An Application of the Shapley Value*, 103 TECH. FORECASTING & SOC. CHANGE 156 (2016); Jeonghwan Jeon, Changyong Lee & Yongtae Park, *How to Use Patent Information to Search Potential Technology Partners in Open Innovation*, 16 J. INTELL. PROP. RTS. 385 (2011).

reduce the search costs of relevant patent documents by making them easier to locate²⁸⁴ and read.²⁸⁵

V. CONCLUSION

Though bundling arrangements frequently occur in patent licensing transactions, the nature of these arrangements is not well understood. This is partly due to a lack of access to these arrangements because firms often hold patent licensing agreements and associated agreements in confidence as trade secrets.²⁸⁶ This Article takes a preliminary step toward revealing their nature by analyzing 400 material patent licensing transactions that public companies filed with the SEC and finding that 42.25% of them involved bundled asset transfers. The assets in the bundles included intellectual property, property, and labor.

The findings suggest that there are two complementary relationships underlying the innovation marketplace. In terms of *assets*, intellectual property, property, and labor can work complementarily with patented technology in the licensees' process of innovation, helping the licensees to deploy the technology. Regarding *legal institutions*, contracts complement the patent system as they bundle complementary assets with patent licenses and transfer them as a package to licensees. This helps the patent system achieve its ultimate goal of promoting innovation, as the assets in the bundles can facilitate the development and implementation of the technology that the patent system discloses.

The positive effects on innovation that bundling arrangements facilitate cannot be realized if government intervention or high transaction costs hinder

284. For proposals for improving the searchability of patent information, see Fromer, *supra* note 46, at 543 (proposing the inclusion of patent documents into the principal databases or libraries of relevant technological fields); Ouellette, *supra* note 46, at 583-87 (proposing to make patents appear alongside the technical literature in the commonly used search engines; to use peer production platforms such as WikiPatents to share information about patents; and to increase the number of patent citations in scientific articles).

285. For proposals for improving the readability of patent documents, see *Disclosure Function*, *supra* note 47, at 2027 (suggesting that patent applicants should provide “a summary section within their written description that reads more like a journal article than a patent”); Ouellette, *supra* note 46, at 601 (proposing that the PTO should make patents subject to peer review of scientists); Seymore, *supra* note 69, at 666 (proposing to transform patents into reader-friendly “teaching documents”); Fromer, *supra* note 46, at 543 (suggesting technical and legal information in the patent document should be “teased apart for each layer to speak most fruitfully to its audience”).

286. See Chien, *supra* note 12, at 1677 (noting that the lack of public data is part of the reason why scholars paid relatively little attention to the transactional events that involve patents).

their formation. This Article suggests that lawmakers incorporate into the law of patent misuse and antitrust case law an analysis that weighs bundling arrangements' efficiency-enhancing effects against their potential anticompetitive effects. This would encourage bundling arrangements that promote innovation because it would allow patentees to use this kind of arrangement with less concern about the potential legal liabilities. In addition, this Article suggests that policymakers lower the transaction costs of bundled asset transfers by making patent documents easier to read and locate, and by linking them to a platform in which patentees can present information about the complementary assets that they are willing to transfer along with the patent license.

This Article adds empirical evidence to the growing body of literature concerning the role that contracts play in promoting innovation. It provides a detailed account of the contractual bundles that innovators frequently use in material patent licensing transactions and suggests that contracts can promote innovation by overcoming the limitations of the patent system. Because the observations of this study are confined to the material patent licensing transactions of public companies, its conclusions are tentative. A more comprehensive study will follow this one if the data of less substantial patent licensing transactions or smaller firms' patent licensing transactions becomes accessible.

APPENDIX. THE DATASET

Information about the actual patent licensing practices of companies is difficult to obtain because they often hold patent license agreements and associated agreements in confidence as trade secrets.²⁸⁷ The reasons for doing so are compelling as the agreements can reveal the licensee's costs, strategic partnerships, future business plans, etc. Much of this information could be helpful to competitors. If there is no legal requirement that firms reveal this information, they are very likely not to do so. But the Securities Act of 1933 and the Securities Exchange Act of 1934 authorize the U.S. Securities and Exchange Commission (SEC) to require public companies to disclose certain information in order to protect investors and to insure fair dealing. The SEC has exercised that statutory authority to promulgate rules requiring the disclosure of certain information that is "material" to public companies.

287. See Mark A. Lemley, Kent Richardson & Erik Oliver, *The Patent Enforcement Iceberg*, 97 TEX. L. REV. 801, 801 (2019) (noting that "licensing negotiations and license deals that don't result in litigation are almost invariably kept secret").

Companies must disclose to the public all patent license agreements that fall into the category of “material contracts.”²⁸⁸

Specifically, under Section 7 of the Securities Act of 1933 and Section 12 of the Securities Exchange Act of 1934, when a company makes a public offering, it must file a registration statement and the relevant material contracts with the SEC.²⁸⁹ Under Sections 13 and 15(d) of the Securities Exchange Act of 1934, a public company must file material contracts, along with annual reports and both quarterly and current reports, with the SEC.²⁹⁰ According to 17 CFR § 229.601(a)(4), public companies must file their material contracts as exhibits to their reports and registration statements if the material contracts are executed or become effective during the reporting period that the annual reports, quarterly reports, or current reports reflect, or if the text of the registration statement incorporates them by reference.²⁹¹ According to 17 CFR § 229.601(b)(10), “material contracts” are the contracts that are not made in the ordinary course of business and that are material to the registrant.²⁹² The same rule applies to patent licenses. Even those made in the ordinary course of business qualify as “material contract[s]” if the registrant’s business substantially depends on them.²⁹³ This means that if a registrant files a patent license as an exhibit with its reports, it is, by definition, a material contract that is important to the registrants’ business.

The agreements that I examined for this Article were all “material contracts” that SEC registrants filed as exhibits to their reports. These agreements were stored in the SEC’s Electronic Data Gathering, Analysis, and Retrieval system (EDGAR). But EDGAR does not organize documents by category, which made it difficult to collect EDGAR’s patent licenses systematically. Fortunately, Westlaw has drawn exhibits from EDGAR since January 1, 2000 and saved them by category, including a category for patent license agreements. Specifically, Westlaw created a library called “Patent License Agreements” where it stores the patent licenses registrants disclosed as material contracts. The “Patent License Agreements” library picks out and stores an agreement if (1) its title contains the term “license,” “royalty,” or “sub-license”; (2) its title contains the word “patent”; and (3) its title does not contain the terms “collateral,” “amendment,” or “amended.”²⁹⁴ Westlaw

288. 17 C.F.R. § 229.601(a)(4) (2018).

289. 15 U.S.C. §§ 77g, 78l (2012).

290. 15 U.S.C. §§ 78m, 78o(d) (2012).

291. 17 C.F.R. § 229.601(a)(4) (2018).

292. 17 C.F.R. § 229.601(b)(10) (2018).

293. *Id.*

294. Live Chat Transcript with Westlaw Staff (Oct. 22, 2018) (on file with author).

regards agreements that meet these three criteria as “patent license agreements” that it stores in the library.

Admittedly, this data selection method is bound to neglect patent license agreements with titles that do not meet these three criteria. For example, this library will miss patent license agreements with the titles of “intellectual property agreement” or “license agreement.” But this selection method is relatively efficient and accurately picks out patent license agreements from among millions of documents without intensive analysis of their contents. Because of the lack of a better database of patent license agreements, I chose this library as the data source.²⁹⁵

From the “Patent License Agreements” library, I collected agreements that companies filed between January 1, 2000, and May 14, 2018, collectively 659 documents. Some of these were not suitable for patent license analysis, however, because they contained duplications or irrelevant documents, such as press releases, patent security agreements, and patent sublicense agreements. I examined the documents one by one to identify and delete the irrelevant ones. This left me with 400 patent license agreements and 61 amendments to patent license agreements.

The patent license agreements record what patentees transferred to licensees. I scrutinized each contract, looking for every complementary asset that patentees conveyed to licensees with the patent licenses. When I identified any, I examined the transaction background to see how the parties expected to use the patented technologies and complementary assets together. The transaction background appeared in the reports to which patent license agreements were attached, as well as the registration statement of the filing parties. The reports of the SEC registrants often explained how they planned to use patented technologies and complementary assets in their process of innovation. The reports also disclosed the signing of any other agreements with the patent licensing agreement. When I found that the patentee and licensee signed other agreements, I looked into them to see whether the patentee also transferred other assets to the licensee.

This Article also distinguishes patent licensing transactions that parties entered in the context of patent litigation and those that did not involve litigation. I made this distinction using the “Dockets Search” feature of the

295. Westlaw states that its “EDGAR Precedent Agreements” database “provides access to over a million executed business agreements with language, clauses, and provisions drafted by leading law firms and in-house counsel.” The “Patent License Agreements” library is one of the sub-databases. See *Patent License Agreements*, WESTLAW EDGE, <https://1.next.westlaw.com> (follow “EDGAR Precedent Agreements” hyperlink under “Business Law Center”) (last visited Oct. 25, 2018).

Bloomberg Law database. Specifically, I entered the names of the parties of each patent licensing agreement into the Dockets Search to see whether it brought up a relevant court case. When I found patent litigation, I read the complaint to see whether the patents in dispute were the patents licensed in the agreement. To avoid mistakes, I also read the report to which each patent licensing agreement was attached. The report revealed the agreement's licensing background. If the parties entered the agreement as a way to settle a patent litigation, the company that filed the report would disclose the litigation in it.

This dataset has several limitations. First, all of the patent licenses in this research came from companies that registered with the SEC or from their subsidiaries. The dataset does not cover any patent licensing transactions between private companies with no relationship to SEC registrants. Second, the SEC does not require the disclosure to the public of contracts that are "immaterial in amount or significance."²⁹⁶ Therefore, the data might not represent the contracts that are insubstantial to the companies' business. Third, Westlaw's selection of patent license agreements might have filtered out a number of relevant agreements. Fourth, the dataset only includes 400 patent licensing transactions, meaning that the sample size of this dataset is relatively small. Due to these limitations, the conclusions that this Article makes based on this dataset might not apply to the overall population of patent licensing transactions.

296. 17 C.F.R. § 229.601(b)(10) (2018).