AN EX ANTE THEORY OF PATENT VALUATION:
TRANSFORMING PATENT QUALITY INTO
PATENT VALUE

Maayan Perel*

ABSTRACT

This Article presents a novel, ex ante method of patent valuation for licensing purposes. It suggests that the value of patents should correlate with their technological contribution for our patent system to adequately reward innovation. The proposed method deviates from existing methods in at least four aspects. First, it adopts a social-normative perspective instead of a positive-economic one. Thus, it asks what should be the license value, from the standpoint of the patent system, and not what would be that value in a world with no regulatory intervention. Second, it is performed ex ante, upon the grant of patent protection, far before any licensing negotiations are initiated. Third, it recommends setting flexible limitations over the ultimate license value, rather than setting a single fixed price. Fourth, it suggests subjecting the process of patent valuation to external regulation, instead of leaving it to the exclusive control of free market powers.

Accordingly, this Article advances a two step, novel method of patent valuation: first, determining the quality of a given patent according to the proposed quality indicators, and then, assigning flexible price limitations that correlate with the patent’s quality. Such a social-normative method of patent valuation, this Article contends, would promote at least four significant objectives. First, by translating patent quality into a numerical patent value, it could encourage high quality innovation and improve patent quality. Second, by setting ex ante limitations over the licensing price the patentee may ultimately demand, it would downgrade
patent trolling. Third, by determining the price of a patent upon issuance, it could neutralize the manipulative effect of external factors, such as the identity of negotiating parties and their respective bargaining powers, as well as the circumstances surrounding the licensing negotiations, which bears no relation to patent quality, over the patent’s value. The proposed ex ante method could hence limit the ability of patentees having strong bargaining power to obtain un-proportional licensing fees that fail to reflect the true value of their inventions. Consequently, it could hamper their ability to hold-up follow-on innovation and impede future research. Fourth, in the long term, the proposed method would also reduce litigation costs and decrease litigation rates for the benefit of the public as a whole.
TABLE OF CONTENTS

I. INTRODUCTION

II. EXISTING PATENT VALUATION METHODS
   A. The Existing Patent Valuation Methods
      1. Rules of Thumb
      2. The Cost Method
      3. The Market Method
      4. The Competitive Advantage Valuation (CAV) Method
      5. The Discounted Cash Flow Method
      6. The Option Pricing Method
   B. The Common Characteristics of Existing Valuation Methods
      1. A Positive-Economic Perspective of Patent Valuation
      2. An Ex Post Perspective of Patent Valuation
      3. Defining a Fixed Licensing Price
      4. No Regulatory Intervention

III. THE OBJECTIVES OF THE PROPOSED METHOD
   A. Improving Patent Quality
   B. Downgrading Patent Trolling
   C. Combatting Abusive Acts Of Price Manipulations
   D. Reducing Litigation and Related Costs

IV. AN EX ANTE, SOCIAL-NORMATIVE PERSPECTIVE OF PATENT VALUATION: VALUING PATENTS ACCORDING TO THEIR QUALITY TRAITS
   A. What Is Patent Quality?
   B. The Bases For Proposing A Social-Normative Perspective
   C. The Proposed Quality Indicators
      1. Indicators of Subject Matter Eligibility
      2. Indicators of Utility
      3. Indicators of Novelty and Non-Obviousness
      4. Indicators of Clarity and Definiteness
V. DEFINING FLEXIBLE PRICE LIMITATIONS
   A. Rules Of Thumbs
   B. The Rules Governing The Determination of Reasonable Royalty
   C. Databases Concerning Patent Licensing, Patent Licensing Statistics and Surveys

VI. REGULATING THE PROCESS OF PATENT VALUATION
   A. Establishing a Regulating Body
      1. The Patent and Trademark Office Is The Most Suitable Regulating Body To Implement the Proposed Theory
      2. Forming A Special Division For The Purpose of Price Valuation
      3. The Quality Assessment Process
      4. Financing the Establishment of The Special Division
   B. Justifying The Regulation of Patent Pricing
      1. Public Goods, Innovation and Exclusive Rights
      2. Compulsory Licensing As a Limitation Over The Patentee’s Freedom of Contract
      3. The Justified Objectives of Compulsory Licensing According to the Agreement on Trade-Related Aspects of Intellectual Property Rights
      4. Examining The Proposed Price Limitations’ Compliance With Article 30

VII. CONCLUSION
I. INTRODUCTION

Our patent system affords patentees with an exclusive right of limited duration over a new, non-obvious invention.\(^1\) This limited period of exclusivity bestows upon patentees an exclusive control over the invention’s price and, in turn, gives them a mechanism by which they can recoup their research and development costs.\(^2\) Generally, our patent system does not interfere with the patentee’s right to freely negotiate the licensing price of his patent.\(^3\) Despite exceptional instances of compulsory licensing,\(^4\) patent licensing is governed by the rules of free competition: the licensor and the licensee independently negotiate the price of the patent, hoping to maximize their respective profits.\(^5\) Indeed, “there are gains to trade from licens-
ing, and the patentee can design contracts that split these gains between itself and potential licensees.\(^6\)

Under this regime of free competition, different methods of valuing patents for licensing purposes were developed.\(^7\) Assuming a positive-economic perspective, these existing methods essentially purport to predict “the value of the potential extra profits obtainable from fully exploiting the invention . . . compared with those obtainable without patent protection.”\(^8\)

At least four characteristics are shared by existing patent valuation methods that value patents for licensing purposes.\(^9\) First, they

---

\(^6\) Id.


\(^9\) See Anna Boman & Jonas Larsson, Patent Valuation in Theory and Practice, Ekonomiska Institutionen 1 (2003) archived at www.perma.cc/02DkyGBj9sj (discussing the crucial factors affecting the choice of valuation approach). As described in section II, there is another group of patent valuation methods that do not relate to the concept of licensing- these are methods that are used in prize systems. The characteristics described henceforth are not necessarily shared by these prize methods.
adopt a pure economic perspective, in that they apply different mathematical calculations to determine the patent’s future financial gains. \(^{10}\) The quality traits of the patent, or its social benefit are rarely, if ever, considered under these calculations. \(^{11}\) Second, existing valuation methods become effective only after a patent turns into a desired commercial product. \(^{12}\) In this sense, they implement an ex post perspective - valuing patents that are ripe for licensing purposes. \(^{13}\) At that point, it becomes clear who the exact parties negotiating the license are, their respective financial capacities, as well as, what are the specific circumstances surrounding the licensing agreement. \(^{14}\) All of these inevitably affect the ultimate licensing value. \(^{15}\) Third, existing valuation methods attempt to determine a fixed licensing price. \(^{16}\) And fourth, they are governed by competitive market powers. \(^{17}\) No regulating body is involved in electing the appropriate method of valuation and managing its implementation. \(^{18}\) The parties negotiating the license elect their preferable valuation method, and are thus fully accountable for its resulting value. \(^{19}\)

\(^{10}\) See id. at 7, 19 (comparing several patent valuation approaches to determine future financial gains).

\(^{11}\) See id. (suggesting social benefits are not factors in patent valuation).

\(^{12}\) See id. at 18, 33 (identifying need to consider commercial viability in patent valuation).

\(^{13}\) See id. at 5 (discussing difficulties in commercializing intellectual property rights).

\(^{14}\) See id. at 21-23 (discussing advantages of determining licensing parties before patent valuation).

\(^{15}\) See Boman & Larsson, supra note 9, at 17-20 (discussing various factors considered in patent valuation).

\(^{16}\) See Boman & Larsson, supra note 9, at 20-32 (summarizing fixed price patent valuation methods).

\(^{17}\) See Boman & Larsson, supra note 9, at 21-23 (recognizing various market factors in patent valuation).


\(^{19}\) See Robert Goldscheider, The Negotiation of Royalties and Other Sources of Income From Licensing, 36 IDEA 1, 4-9 (1995) (discussing the process of achieving a mutually-satisfactory licensing agreement). Again, the judiciary will enforce such an agreement so long as it was made according to the parties’ free will. See RESTATEMENT (SECOND) OF CONTRACTS § 8.5 (2013) (analogizing licensing agreement as a contract enforceable under respective state law).
This state of affairs, under which existing valuation methods focus exclusively on the prospected financial gains from a given patent, while disregarding the patent’s quality without imposing any meaningful limitations on the ultimate licensing value, fuels several intertwined problems. First, it encourages low patent quality. This is so because our patent system effectively affords low quality patents with the same reward it affords high quality patents. Indeed, all patentees enjoy the same exclusive rights over their inventions, including the right to freely set their value based on their elected valuation method. Hence, assuming it is generally easier to develop low quality inventions than high quality ones, patentees may be better off applying for low quality patents. By disregarding the quality traits of the underlying patent, the current, ex post regime of patent valuation effectively supports low patent quality.

Second, the current regime of patent valuation provides very few opportunities for weaker inventors and severely undercuts their ability to operate in the licensing market. Even when these inventors succeed in obtaining access to licensing opportunities, they still face significant barriers in negotiating favorable licensing terms with potential licensees. As a result, some small inventors who lack the means to commercialize their inventions resort to “patent trolling.”

20 See Goldscheider, supra note 19, at 4 (explaining the problems that arise when valuation methods focus on the potential profits rather than the patent’s quality).
21 See R. Polk Wagner, Understanding Patent-Quality Mechanisms, 157 U. PA. L. REV. 2135, 2146 (2009) (listing incentives for drafting low quality patents). This Article associates patent quality to a patent’s compliance with the statutory requirements of patentability. See Graf, infra note 58 (concluding that a patent that has met statutory requirements is presumed valid).
22 See Wagner, supra note 21, at 2146 (arguing that the low quality of patents can be attributed to incentive systems that reward low quality patents).
23 See Wagner, supra note 21, at 2138-39 (discussing the independence between patent quality and patent valuation).
24 See Wagner, supra note 21, at 2139 (addressing advantages of applying for low quality patents).
25 See Goldscheider, supra note 19, at 4 (suggesting why patent valuation favors low patent quality).
27 See id. at 637-39 (analyzing difficulties faced by inventors when negotiating licensing terms).
28 The term patent troll has been attributed to Peter Detkin, when he was assistant counsel at Intel; Detkin defined a patent troll as “somebody who tries to make a lot
- a phenomena associated with the generation of income not through commercialization but through aggressive licensing and litigation of patents.\textsuperscript{29} Through diverging investment from research and development to potentially unwarranted licensing fees or litigation, such patentees, often referred to as “patent trolls,” practically hinder innovation.\textsuperscript{30}

Third, the current regime of patent valuation, which imposes no meaningful limitations on the ultimate license value, allows strong patentees to manipulate the licensing price in such a way that ultimately decreases the social benefit of the public.\textsuperscript{31} Often times, patentees with strong bargaining power manipulatively use injunction threats as means of obtaining more licensing fees than the true value of their inventions.\textsuperscript{32} Consequently, they hamper the ability of downstream innovators to fully commercialize the benefit of their knowledge and hold-up follow-on innovation.\textsuperscript{33} When the downstream firm faces injunction threats from multiple patent owners (a concept often referred to as “royalty stacking”\textsuperscript{34}), these harmful consequences are perceptibly magnified.\textsuperscript{35} In a different context, patentees may manipulate the licensing price to secure their market share by setting a value that is lower than the patent’s real contribution.\textsuperscript{36}

\textsuperscript{29} See id. (describing a patent troll as someone who makes a lot of money off a patent not in practice nor with intent to practice).

\textsuperscript{30} See Maayan Perel, \textit{Reviving the Gatekeeping Function: Optimizing the Exclusion Potential of Subject Matter Eligibility}, 23 ALB. L.J. SCI. & TECH. 237, 245-46 (2013) (noting some patents are economically valuable simply by control and therefore particularly vulnerable to abuse by patent trolls).


\textsuperscript{32} See id. (explaining that threat of injunction leads to increased royalties in excess of true market value)

\textsuperscript{33} See id. at 1992-93 (exploring how problems with injunction threats and royalty stacking affect royalties negotiated between patent holders and downstream producers).

\textsuperscript{34} See id. at 1993 (defining the term “royalty stacking”)

\textsuperscript{35} See id. at 2011 (explaining how the magnitude of the problem is multiplied by the number of patents that read on the product).

\textsuperscript{36} See id. at 2012 (illustrating how patentees manipulate market value of patent and product).
By engaging in such a manipulative tactic, incumbent firms may reduce the incentive of potential entrants to develop their own, possibly better, technology.\textsuperscript{37} The detrimental impact of this tactic over progress and innovation is patently obvious.\textsuperscript{38}

To change this state of affairs, this Article presents a novel method of patent valuation for licensing purposes.\textsuperscript{39} Essentially, it suggests that the value of patents should correlate with their technological contribution so that the patent system could efficiently reward innovation.\textsuperscript{40} This Article thus proposes to “price tag” patents ex ante, upon issuance, in accordance with their inventive value and ability to benefit the public.\textsuperscript{41} Essentially, it advances a two step method of valuation: First, determining the quality of a given patent according to the proposed quality indicators, and then, assigning flexible price limitations that correlate with the patent’s quality.\textsuperscript{42} Such a social-normative method of patent valuation, this Article contends, would improve patent quality.\textsuperscript{43} It would also downgrade patent trolling and prevent abusive acts of price manipulations.\textsuperscript{44} In the long term, the proposed method of patent valuation would also reduce litigation costs and decrease litigation rates.\textsuperscript{45}

Accordingly, the remainder of this Article proceeds in five sections.\textsuperscript{46} Section II expands on the literature concerning patent valuation.

\textsuperscript{37} See Lemley & Shapiro, supra note 31, at 2012 (highlighting how patentee valuation of products negatively influences firms’ interests to innovate and produce new products).
\textsuperscript{38} See Lemley & Shapiro, supra note 31, at 1993 (recognizing that royalty stacking impedes innovation).
\textsuperscript{39} See infra Part IV.C (discussing a novel method of patent valuation).
\textsuperscript{40} See infra Part IV.B (suggesting result of incentivizing innovation due to improved patent valuation).
\textsuperscript{41} See infra Part III.C (proposing benefits to patent owners of pricing patents ex ante).
\textsuperscript{42} See infra Part IV-V (describing two-step method of patent valuation).
\textsuperscript{43} See infra Part IV (highlighting the benefits of the proposed patent valuation method).
\textsuperscript{44} See infra Part III.B (indicating reduced patent trolling with proposed patent valuation method).
\textsuperscript{45} See infra Part III.D (describing decreased litigation costs from improved patent valuation).
\textsuperscript{46} See infra Part II-0 (recognizing need to separate patent valuation method into sections).
tion. Particularly, it describes the main existing valuation methods, including the rules of thumb often used to predict patent value, the cost method, the market method, the competitive advantage valuation method (known as the CAV method), the discounted cash flow method and the option pricing methods. It also shows how these economic methods by and large fail to consider the patent’s quality traits when determining patent value. Afterwards, Section II explains the common characteristics of existing valuation methods that value patents for licensing purposes. Particularly, it proves that they adopt a positive-economic perspective; that they implement an ex post perspective; that they set a fixed licensing price, and that they are governed by competitive market powers. No regulating body is involved in managing their implementation.

Section III explains the key goals of the proposed method of patent valuation. Four intertwined objectives are hence presented. The first relates to improving overall patent quality. In this regard, it is argued that bolstering the correlation between patent quality and patent value would incentivize high quality innovation, while suppressing low quality innovation. The second, intertwined objective of the proposed theory concerns downgrading patent trolling. Patent trolling is fueled by the issuance of poor quality patents. This

47 See infra Part II (elaborating on the literature relating to patent valuation).
49 See infra Part II.B (observing failure of current patent valuation methods to consider patent quality).
50 See infra Part II (explaining common characteristics of current patent valuation methods).
51 See infra Part II (detailing factors of current patent valuation methods).
52 See infra Part II (identifying lack of regulatory oversight for patent valuation).
53 See infra Part III (describing key goals of proposed patent valuation method).
54 See infra Part III (identifying four objectives of the proposed patent valuation method).
55 See infra Part III.A (explaining goal to improve patent quality in proposed patent valuation method).
56 See Wagner, supra note 21, at 2146 (listing incentives for drafting low quality patents).
57 See Sandburg, supra note 28 (discussing the harms of patent trolling).
58 See Susan Walmsley Graf, Improving Patent Quality Through Identification of Relevant Prior Art: Approaches to Increase Information Flow to the Patent Office,
article asserts that the consequential improvement in patent quality should diminish the effect of patent trolling. The third objective of the proposed method of patent valuation focuses on combating abusive acts of price manipulations. By setting limitations over the ultimate licensing price, this Article essentially contends, the proposed theory would prevent patent owners from obtaining un-proportional licensing revenues that fail to accurately reflect the real contribution of their inventions. Finally, the fourth objective of the proposed theory relates to reducing litigation and related costs. Finding that an improvement in patent quality amounts to more patents that meet the statutory requirements of patentability and acknowledging that the validity of such patents is inevitably more certain, this Article argues that a substantial cut down in both litigation costs and litigation rates could be reasonably expected.

Section IV of this Article describes its novel, social-normative perspective of translating patent quality into patent value. In this regard, it presents this proposal’s definition of patent quality and provides three bases for its underlying theory: a constitutional basis, an economic basis and an empirical basis. Subsequently, it affords an open list of quality indicators to determine patent quality. Particularly, it presents four groups of quality indicators according to the different statutory requirements of patentability: The first group includes quality indicators reflecting the patent’s subject matter eligibility; the second group indicates the patent’s utility; the third

11 Lewis & Clark L. Rev. 495, 498 (2007) (arguing that the issuance of poor quality patents should be minimized).
59 See infra Part III.B (indicating reduced patent trolling with proposed patent valuation method).
60 See infra Part III.C (describing abusive acts of price manipulation).
61 See infra Part IV (justifying regulation of patent licensing price).
62 See infra Part III.D (proffering improved patent quality results in decreased litigation cost).
63 See infra Part III.D (justifying higher patent quality results in lowers litigation cost).
64 See infra Part IV (arguing patent licensing increases the social value of the innovation).
65 See infra Part IV.B (outlining three bases for novel patent quality evaluation).
66 See infra Part IV.C (describing indicators in calculating patent quality).
68 See id. (demonstrating patent utility).
group reflects the patent’s novelty and non-obviousness, and the fourth - the patent’s clarity and definiteness.

Section V explains the proposed theory’s novel recommendation to create flexible limitations over the prospected licensing price. In particular, it suggests that each issued patent would be tagged with a specific color indicating an upper limitation and a lower limitation over the final licensing price the negotiating parties could ultimately set. As a general matter, the higher the quality of the patent, the less restrictive would be the limitations attached to it. Section V subsequently explains how the proposed limitations should be practically determined. Accordingly, it suggests consulting at least three resources before setting price limitations: (1) the “rules of thumb” method for valuing patents, (2) the rules governing the determination of damages in cases involving patent infringement, as much as they apply quality indicators, and (3) databases containing information regarding licensing revenues obtained by different firms, statistics of patent licensing and surveys that examine how much patent owners in different fields of innovation charge for licensing their patented inventions. This Article asserts that all these factors may assist in setting price limitations that are not only appropriate but also reasonable and realistic.

Section VI expands on this proposal’s suggestion to regulate the process of patent valuation within the context of licensing. Particularly, it proposes to nominate a regulating body to ensure objectivity, stability, predictability and proficiency in applying the proposed

---

71 See infra Part V (defining the flexible limitations of prospected licensing prices).
72 See infra Part V (suggesting color-coded price system for issued patents).
73 See infra Part V (discussing inverse relationship between patent quality and pricing limitations).
74 See infra Part V (describing how pricing limitations would be determined).
75 See infra Part V.A-C (discussing three necessary factors in setting patent price limitations).
76 See infra Part V.A-C (highlighting positive influence of factors on price limitations).
77 See infra Part VI (recognizing concerns in implementing novel patent valuation method).
method. This section further explains who this regulator should be, its members’ qualifications, how the valuation process should actually work and how it could be financed. Acknowledging that regulating the process of patent pricing may interfere with the fundamental principle of freedom of contract, this Article subsequently argues that regulating the price of inventions - a form of privately produced public goods - is appropriate as means of ensuring their continued provision. In fact, this Article contends, the proposed price limitations should be considered as a legitimate imposition of compulsory licensing used to encourage socially beneficial innovation. Proving that these limitations comply with the international requirements governing the use of such licensing, this Article concludes that they constitute a defensible governmental intervention; notwithstanding the regulatory boundaries they impose on patentees’ freedom of contract.

II. EXISTING PATENT VALUATION METHODS

The following section describes the current literature concerning patent valuation for licensing purposes. It demonstrates, that while many commentators have written about valuing patents for licensing purposes, most of them describe the same handful of overly simplistic mathematical methods. As the following section reveals, existing methods of patent valuation in the context of licensing are ex post methods that value patents from a positive economic perspective.
Their key concern is to predict what *would* be the underlying patent’s future financial earnings. Apparently, none of them are concerned about how high *should* these earnings be from the standpoint of the patent system. Accordingly, none of them suggests assuming a social, ex-ante perspective of valuing patents in accordance with their quality traits.

Note, that the purpose of the following discussion is to examine the common characteristics of existing patent valuation methods, which account for the inferiority of the current regime of patent val-

85 See Boman & Larsson, *supra* note 9, at 20-23 (providing examples of valuation methods which emphasize future financial gains).
86 See Boman & Larsson, *supra* note 9, at 23 (failing to consider the overarching patent system when estimating future profits).
87 See Boman & Larsson, *supra* note 9, at 20-24 (discussing various patent valuation methods that do not take into consideration patent quality).
Accordingly, while examining the financial accuracy of existing methods and comparing their respective effectiveness is interesting and appealing on its own, it remains outside the scope of this Article. The following discussion is hence limited to describing the existing patent valuation methods – the rules of thumb, the cost method, the market method, the competitive advantage valuation method, the discounted cash flow method and the option-pricing methods of patent valuation - and discussing their common characteristics.

A. The Existing Patent Valuation Methods

"Patents are like lotteries in which there are a few prizes and a great many blanks."\(^{90}\)

Generally, “[T]he valuation of an asset is an estimation of its price. The price of an asset is the amount paid for it in a market exchange.”\(^{91}\) While the price of an asset reflects certain, fixed monetary value, its value is necessarily an uncertain prediction.\(^{92}\) This is especially true in regard to the value of intellectual property (IP) assets.\(^{93}\) Indeed, predicting the value of IP assets is especially indeterminate for four main reasons.\(^{94}\) First, established markets for the exchange of intellectual property assets do not yet exist.\(^{95}\) “Second, intellectual property assets are rarely comparable. Third, the terms and conditions of intellectual property exchanges vary widely, [and] [f]inally, the details of [IP] exchanges, especially prices, are rarely available to the

---

88 See infra Part II.B (describing the characteristics of the current patent valuation system); see also infra Part III (highlighting the pitfalls of the current methods of patent valuation).
89 See infra Part II.A-B (outlining current methods of patent valuation and the characteristics of the current patent valuation regime).
90 Pitkethly, supra note 8, at 2 (quoting The Economist from July 26, 1851).
91 Hagelin, supra note 48, at 80.
92 See Hagelin, supra note 48, at 80 (explaining the correlation between the estimated patent value and actual prices).
93 See Hagelin, supra note 48, at 80 (discussing why intellectual property asset valuation is more uncertain than real or personal property).
94 See Hagelin, supra note 48, at 80 (addressing the four reasons why intellectual property asset valuation is more uncertain than real or personal property valuation).
95 See Hagelin, supra note 48, at 80 (acknowledging that IP markets have not been-established).
public.”\textsuperscript{96} Add to this the “multiplicity of factors that affect a patent’s value over time,” and you will acknowledge that establishing an accurate model of patent valuation is rather elusive.\textsuperscript{97}

Before turning to discuss existing methods that value patent for licensing purposes, it is important to explain what exactly is being valued pursuant to these methods. A patent can be defined as “an exclusive right of limited duration over a new, non-obvious invention capable of industrial application where the right - to sue others for infringement, is granted in return for publication of the invention.”\textsuperscript{98} Accordingly, “the direct financial value of a patent or patent application per se, must be the value of the potential extra profits obtainable from fully exploiting the invention defined by the patent’s claims in the patent’s presence compared with those obtainable without patent protection.”\textsuperscript{99}

\textbf{1. Rules of Thumb}

“Rules of thumb” are often used to price patents for purposes of licensing, especially for royalty rate payments.\textsuperscript{100} Particularly, when the parties are uncertain about whether the invention can be profitably exploited, it makes sense for them to “agree to enter into a profit-sharing license rather than fix a price for the patent and engage in a sales transaction.”\textsuperscript{101} Generally, patent holders receive 5% of sales revenues or 25% of operating profit margins.\textsuperscript{102} Another rule that is used frequently calls for a 25%/75% profit splitting.\textsuperscript{103}

\textsuperscript{96}Hagelin, supra note 48, at 80-81 (explaining why intellectual property assets are difficult to compare).
\textsuperscript{98}Pitkethly, supra note 8, at 2.
\textsuperscript{99}Pitkethly, supra note 8, at 2.
\textsuperscript{101}See Denton & Heald, supra note 97, at 1191 (noting techniques parties can use when there is uncertainty about an invention’s profitability).
\textsuperscript{103}See Stiroh & Rapp, supra note 7, at 7 (describing general formulas for profit splitting).
These rules of thumb propose a “one-fits-all” approach that is incontestably simple and easy-to-apply. On the other hand, they ignore the specific characteristics of the patent being licensed. In this regard, they fail to ask under which of the rules of thumb the objectives of our patent system would be best promoted. Advancing a positive-economic perspective, this method of valuation applies technical rules of profit sharing irrespective of the underlying patent’s quality or potential to promote follow-on innovation. As a result, a broad patent, having relatively low research and development costs, with a low degree of inventiveness, that pertains to a popular field of cumulative innovation may potentially acquire a similar value as that of a pioneering patent, having high research and development costs and pertaining to a newly discovered field of technology, even though the later should clearly merit a higher value from a social-normative perspective.

2. The Cost Method

The cost method approach for valuing patents simply calculates the cost of developing and patenting the underlying invention and then adds an arbitrary profit margin to that cost. Essentially, this method considers only historic costs of acquisition, while ignoring future benefits that may accrue from the patent and influence its value. While it does consider one important indicator of patent quality—the cost of developing the underlying invention—it does so from a positive-economic perspective. That is, it views this indicator as a pure financial indicator that signals the patent’s prospected com-

104 See Lerner & Layne-Farrar, supra note 100, at 7 (describing one-size-fits-all approach to patent valuation).
105 See Lerner & Layne-Farrar, supra note 100, at 7 (noting the drawbacks of using the rule of thumb in valuating patents).
106 See Lerner & Layne-Farrar, supra note 100, at 7-8 (analyzing the drawbacks to these industry rules of thumb).
107 See Denton & Heald, supra note 97, at 1190 (discussing the drawback of valuation based on profit sharing regardless of patent quality).
108 See infra Part IV.C (describing the proposed indicators of patent quality).
109 See Lerner & Layne-Farrar, supra note 100, at 8 (discussing the method of valuing patents based on the cost method).
110 See Pitkethly, supra note 8, at 6 (explaining a pitfall of the cost method of patent valuation).
111 See infra Part IV.C (summarizing the ways in which patent valuation can be manipulated ultimately affecting overall patent quality).
commercial value, without affording it with any social-normative relevance.\textsuperscript{112}

3. \textit{The Market Method}

This comparative pricing approach holds that “the best metric for determining the worth of a patent is the range of prices garnered in the sale of similar technologies.”\textsuperscript{113} Theoretically, this method may be more considerate of the potential economic benefit of the specific patent being licensed.\textsuperscript{114} Nevertheless, much like its predecessors, the market method assumes a positive-economic point of view.\textsuperscript{115} Accordingly, it disregards the quality of the underlying patent and fails to accurately reflect its potential to promote innovation and increase public benefit.\textsuperscript{116}

4. \textit{Competitive Advantage Valuation or the CAV Method of Valuation}

The major premise of the CAV method is that the value of an IP asset should derive entirely from the value of the product, process or service that utilizes it.\textsuperscript{117} The CAV method assumes that the value of an IP asset can be best measured by the competitive advantage that it contributes to a product, process or service.\textsuperscript{118} This competitive advantage is defined as the asset’s advantages or disadvantages in comparison to an average substitute IP asset.\textsuperscript{119} Accordingly, the main variables in the CAV valuation model are the net present value of the

\textsuperscript{112} See Denton & Heald, \textit{supra} note 97, at 1183 (recognizing the cost method’s limitations when valuing a patent).

\textsuperscript{113} Lerner & Layne-Farrar, \textit{supra} note 100, at 8.

\textsuperscript{114} See COMMERCIAL TRANSACTIONS, \textit{supra} note 7, at 55-58 (analyzing the benefits of the use of the market method when evaluating patent value).

\textsuperscript{115} See COMMERCIAL TRANSACTIONS, \textit{supra} note 7, at 58 (explaining assumption that best efforts are used to expand application of intellectual property).

\textsuperscript{116} See COMMERCIAL TRANSACTIONS, \textit{supra} note 7, at 58 (illustrating how uniqueness of certain patents makes using market approach more difficult).

\textsuperscript{117} See Hagelin, \textit{supra} note 48, at 81 (noting the major principle of the competitive advantage valuation).

\textsuperscript{118} See Hagelin, \textit{supra} note 48, at 81 (identifying the competitive advantage as what contributes to the value of an intellectual property asset).

\textsuperscript{119} See Hagelin, \textit{supra} note 48, at 81 (explaining the competitive advantage contribution as difference between certain asset and an average replacement).
product, process or service incorporating the IP asset and the competitive advantage contribution of the IP asset to the net present value.\textsuperscript{120}

The principals of the CAV method of valuation are appealing as they are easy to understand, inexpensive, repeatable and scalable.\textsuperscript{121} Indeed, the model is based on a logical association of variables, while utilizing simple input values.\textsuperscript{122} Nevertheless, like other existing patent valuation methods, it valuates patents from a pure economic point of view, while overlooking their social value.\textsuperscript{123}

5. The Discounted Cash Flow Method

The discounted cash flow method relies on the same kinds of calculations that financiers employ in valuating other kinds of investment opportunities.\textsuperscript{124} In particular, this method assumes that the price of a patent can be expressed as the present value of the future stream of economic benefits derived from ownership.\textsuperscript{125} “The stream of economic benefits includes projected sales of products based on the patent over its expected life or any increased share of sales as compared to competitors, net of any capital requirements of production.”\textsuperscript{126}

Regardless of the discounted cash flow method’s financial accuracy, it clearly remains a pure economic method of valuation, for while the stream of economic benefits derived from ownership may constitute an adequate criterion for purposes of financial valuation, it is entirely oblivious of the licensed patent’s social value.\textsuperscript{127}

\textsuperscript{120} See Hagelin, supra note 48, at 81 (describing the key variables in the CAV valuation model).
\textsuperscript{121} See Hagelin, supra note 48, at 113 (summarizing how CAV can be used in multiple valuation contexts).
\textsuperscript{122} See Hagelin, supra note 48, at 113 (concluding how CAV input values are drawn from common experience).
\textsuperscript{123} See Hagelin, supra note 48, at 112 (proposing CAV method as similar to all valuation methods in degrees of subjectivity and uncertainty).
\textsuperscript{124} See Lerner & Layne-Farrar, supra note 100, at 10 (describing the discounted flow method).
\textsuperscript{125} See Lerner & Layne-Farrar, supra note 100, at 10 (describing how patent price is expressed in discount cash flow method).
\textsuperscript{126} Lerner & Layne-Farrar, supra note 100, at 10.
\textsuperscript{127} See Lerner & Layne-Farrar, supra note 100, at 10 (describing the challenge of separating purely economic value from other factors affecting sales and profitability).
Consider, for instance, the following example: one may develop a novel and non-obvious optic chip in the field of information technology (IT) and be granted a patent over it. It might be that the chip’s development costs were negligible and that the chip reflects a minor (but still non-obvious) advancement over the prior art. Additionally, it may be that the patented chip can be only utilized as a component in a different end product, yet never as an end product of itself. On the other hand, the patented chip may have the potential of greatly improving the efficiency, productivity and performance of a specific end product in the IT industry; since this last factor is the only one relevant to the calculation of the patented chip’s monetary value, according to the discounted cash flow method, the patented chip would be probably valued at a very high price. Potentially, its owner could demand enormous returns under the licensing agreement. Such overly charged fees that fail to accurately reflect the patented chip’s quality may cause the downstream firm to inevitably abandon its project. Indeed, the firm may not find it worth incurring the costs necessary to develop, manufacture, and sell the end product. When this happens, our patent system’s objectives of encouraging downstream research and promoting innovation are obviously curtailed.

6. The Option Pricing Methods

Another type of valuation methods described in the literature is based on option valuation formulas. The theory behind these methods is based on the principle that a patent can be viewed as an option to produce, sell, or license the patented technology. The value of the option is determined by considering factors such as the potential benefits to the company, the costs associated with developing and manufacturing the product, the risks associated with the technology, and the potential for market growth. This approach allows for a more nuanced valuation of the patent, taking into account the uncertainty and risk associated with the technology and its potential market.

---

128 See 35 U.S.C. § 103 (2006) (discussing how a patent may not be obtained if the difference between prior art and the claimed invention would have been obvious, before the effective filing date, to a person with ordinary skills in the claimed art).
129 See id. (discussing the conditions for patentability).
130 See Boman & Larsson, supra note 9, at 24 (explaining the two key factors needed for the discounted cash flow method).
131 See Lemley & Shapiro, supra note 31 at 1995-96 (discussing patent holder’s right under the licensing agreement).
132 See Lemley & Shapiro, supra note 31 at 1992-93 (referring to the downstream producer pulling the product from the market).
133 See Lemley & Shapiro, supra note 31, at 2012 (referring to the cost necessary to develop the end product).
134 See Lemley & Shapiro, supra note 31, at 2012 (illustrating the cost outweigh the benefits innovation is discouraged).
methods was primarily developed for use in pricing financial options. Nevertheless, it was found applicable to patents due to the many similarities between these two types of assets. Indeed, both patents and financial options represent a future right to exploit an asset and exclude others from it. The owner of a stock option has a right to obtain “an exclusive (although usually limited) equity interest in the underlying firm.” Similarly, the owner of a patent has “the right to exclude others from using the underlying invention, and further investment is required to exploit its commercial potential.”

Second, financial options and patents are rights of limited duration: “options by their exercise dates and patents by their expiration dates.” Third, both financial options and patents are directly linked to an underlying asset, a firm or an innovation respectively, and both can be used to leverage or hedge against variance in prices. Finally and most importantly, similar valuation difficulties exist with respect to both assets that merely afford a potential of future earnings that cannot be priced accurately without making a complex series of economic predictions.

In 1973, Fischer Black and Myron Scholes published their option valuation formula, which permitted prompt and exact option pricing solutions for the first time. Diving into the complicated economics underlying this breaking-through formula known as the “Black-Scholes formula” is indeed fascinating, but yet beyond the scope of...
this Article. Suffice it to mention that options on an underlying asset can be valued, according to Black-Scholes, if information exists regarding: the current price of the underlying asset, the exercise price of the option, the time to expiry, the standard deviation of the underlying asset returns, the risk free interest rate and the distribution function for the asset price.

From an economic perspective, these patent valuation methods are presumably more accurate than the previously described methods. Indeed, option-pricing methods, “account for total risk, including the impact of uncertainty on the value of the patent,” while providing “managers with more flexibility in evaluating the strategic possibilities entailed in licensing.”

From a social perspective, the option-pricing methods completely ignore the quality traits of the underlying invention, because while they try to predict what would be the price of a given patent, according to specific financial indicators, they discount this normative question: what should that price be? Hence, pursuant to this Article’s proposed theory of ex ante patent valuation, option-pricing methods are inadequate to estimate appropriately a patent’s prospected social value.

B. The Common Characteristics of Existing Valuation Methods

1. A Positive-Economic Perspective Of Patent Valuation

The most striking of the four common characteristics shared by existing methods of patent valuation is their positive-economic point

145 See id. (creating option pricing solutions).
146 See Pitkethly, supra note 8, at 12 (highlighting the advantages of the Black & Scholes approach).
147 See supra Part II.A.1-5 (setting forth various valuation methods).
148 Lerner & Layne-Farrar, supra note 100, at 12.
149 See Lerner & Layne-Farrar, supra note 100, at 12 (highlighting a shortcoming of option-pricing method is lack of appropriate inputs).
150 See infra Part IV (describing the proposed indicators of patent quality to determine social value of patent).
of view. As the previous discussion revealed, the key concern of existing valuation methods is to estimate the future financial gains from licensing a patent under the regime of free competition. Essentially, they purport to predict what would be the price of a given patent, according to specific financial indicators, while disregarding the normative question of what should that price be. The goal of existing methods is hence relatively restricted: they look for different financial indicators that may signal the patent’s value, without considering whether the determined value is socially desired from the standpoint of our patent system.

In fact, even when existing methods consider indicators that are presumably qualitative, they do not afford them with any social-normative relevance. Take for example the cost method discussed previously, which considers the cost of developing the underlying invention. While this indicator may evoke something about the quality of the underlying patent - perhaps its subject matter eligibility - the cost method does not provide it with any normative relevance that may affect the patent’s desired value from a social point of view. Essentially, the cost method of valuation uses this indicator to predict the patent’s value, while disregarding whether the specific costs spent on developing the underlying patent indeed merit the determined value from the patent system’s perspective.

---

151 See infra Part II.B.1-4 (describing characteristics shared by methods of patent valuation).
152 See supra Part II.A.6 (addressing concerns of valuing future earnings from patents).
153 See Lerner & Layne-Farrar, supra note 100, at 7-18 (evaluating patent valuation methods without considering what price should be).
154 See Lerner & Layne-Farrar, supra note 100, at 7-18 (failing to consider whether patent’s value is preferable to society).
155 See supra Part II.B.1-4 (commenting on qualitative methods of valuation).
156 See supra Part II.A.2 (analyzing cost method).
157 See infra Part IV.C.1 (discussing two quality indicators). This proposal suggests two quality indicators that may reflect the patent’s compliance with the statutory requirement of subject matter eligibility. One of these would be the extent to which the patent’s development was based on the Patent Act’s pecuniary incentives. Among the evidence this Article suggests considering to evaluate how this indicator relates to the research and development costs associated with the underlying patent. See infra Part IV.C.1.
158 See supra Part II.A.2 (explaining cost method valuation process).
2. An Ex Post Perspective Of Patent Valuation

The second characteristic common to patent valuation methods that exist within the context of patent licensing relates to their ex post application. Apparently, these methods become effective only after a patent turns into a desired commercial product. In this sense, they value patents that are ripe for licensing purposes. At that point, it becomes clear who the exact parties negotiating the license are, their respective financial capacities, as well as, what are the specific circumstances surrounding the licensing agreement. All of these inevitably affect the ultimate licensing value determined pursuant to existing valuation methods. As explained henceforth, this effect may often result in un-proportional fees that hinder innovation.

a. The Parties Negotiating the Licensing Agreement

The identity of the parties negotiating the license inevitably affects the final pricing when patents are evaluated ex post, upon the initiation of specific licensing negotiations. Most noticeable in this context is the affect of the parties’ corresponding bargaining power.

---

159 Note, that the different models for a system of prizes, excluding perhaps the model of Michael Abramowicz, also articulate a form of ex ante valuation. Nevertheless, these models remain outside the scope of this Article because they exist outside the realm of licensing. Indeed, when a system of prizes is applied, it replaces the current system of exclusive patent rights. As there is no exclusivity in a system of prizes, there is no need to engage in licensing and there is no room for abusive licensing practices. See supra note 84.
160 See supra Part II (setting forth ex post patent valuation methods).
161 See supra Part II (addressing how valuation methods are exclusively ex post).
162 See supra Part II (recognizing that patents are valued after there is a demand for licenses).
163 See Boman & Larsson, supra note 9, at 42-45 (discussing crucial factors affecting current valuation methods).
164 See Boman & Larsson, supra note 9, at 42-54 (noting various factors that affect licensing value).
165 See infra Part II.B.2.a-c (identifying unfair pricing methods as a result of the demand for licensing).
ers.\textsuperscript{167} Indeed, a large firm is likely to possess complementary resources to successfully commercialize its innovation,\textsuperscript{168} or it can attain such resources easily due to its access to financial markets.\textsuperscript{169} Consequently, large firms often possess strong bargaining powers that allow them to obtain more favorable licensing terms.\textsuperscript{170} On the other hand, a small firm is less likely to be capable of developing a necessary technology and is thus more dependent on licensing.\textsuperscript{171} Accordingly, small firms generally possess weak bargaining powers.\textsuperscript{172} Even if they succeed in obtaining access to licensing opportunities, they still face significant barriers in negotiating favorable licensing terms with potential licensees.\textsuperscript{173} It is no surprise then, that a negative association between licensing propensity and licensor’s market share is often reported.\textsuperscript{174}

\textsuperscript{167} See id. (calling to attention the difference between downstream manufactures and companies removed from the final goods market).


\textsuperscript{169} See Alfonso Gambardella, Paola Giuri & Alessandra Luzzi, \textit{The Market for Patents in Europe}, 36 RES. POL’Y. 1163–1183 (2007) (finding the complimentary assets of large firms discourages them from licensing their technologies).

\textsuperscript{170} See Teece supra note 168, at 294 (explaining advantages of large firms in negotiating license agreements).

\textsuperscript{171} See Teece supra note 168, at 295 (highlighting disadvantages of small firms in negotiating license agreements).

\textsuperscript{172} See Teece supra note 168, at 301 (discussing disadvantages of small firms in the lack of “relevant specialized and co-specialized assets within their boundaries”).

\textsuperscript{173} See Detkin, supra note 26, at 639 (citing as a primary barrier the challenge of establishing credibility with busy corporate license negotiators who are effectively incentivized not to indulge solitary inventors).

\textsuperscript{174} See Andrea Fosfuri, \textit{The Licensing Dilemma: Understanding the Determinants of the Rate of Technology Licensing} 1, 2 (Working Paper accepted for publication in the STRATEGIC MGMT. J., April 2006), archived at www.perma.cc/0vAsQzy8RFZ (finds a negative association between the rate of licensing and licensor’s market share in the chemical industry); Alfonso Gambardella & Marco S. Giarratana, \textit{Innovations for Products, Innovations for Licensing: Patents and Downstream Assets in the Software Security Industry} (Working Paper, October 2006), archived at www.perma.cc/0arheyYbGxL (report that patents from smaller companies have a higher propensity to be licensed); Kazuyuki Motohashi, \textit{Licensing or Not Licensing? An Empirical Analysis of the Strategic Use of Patent by Japanese Firms}, Research Policy, 37 RES. POL’Y 1548, 1555 (2008) (providing reasons smaller firms are more likely to license out technology).
b. The Purposes of the Licensing Negotiations

The purposes for entering into the licensing negotiations greatly affect the license value determined under the current ex post regime of patent valuation. In fact, there are different strategic purposes for licensing, which often times manipulate the license value in such a way that hinders innovation and decreases public benefit.

One such strategic purpose is to gain un-proportionally high revenues in exchange to despairing lengthy and costly litigation. Several possible scenarios in this context may substantially increase the final license value: First, the patent holder may own a patent without producing any product. Since he cannot be countersued for patent infringement, the alleged infringer (the potential licensee) is left in a poor negotiation position. Most likely, he would accept unfair licensing terms with unreasonably high fees. Second, the patent holder may acquire a large number of patents in the same field as the alleged infringer, creating a “patent thicket.” Such a licensor can easily obtain un-proportionally high licensing fees, as the potential licensee’s alternative option of litigating the validity or infringement

---

175 See supra Part II.A (discussing current ex post regime of patent valuation).
176 See Lerner & Layne-Farrar, supra note 100, at 17 (maintaining problems with patent evaluation that hinder technology transfer).
178 See id. (explaining the possibilities available to own patents through holding companies without producing the product). The existence of the patent right is unaffected for patentees who decide not to commercialize their inventions. See Cont’l Paper Bag Co. v. E. Paper Bag Co., 210 U.S. 405, 424-25 (1908) (describing the exclusive enjoyment of the patentee’s right to exclude others from its use).
179 See Landers, supra note 177, at 205 (highlighting the reduced bargaining power of the alleged infringer).
180 See Landers, supra note 177, at 206 (noting companies may be forced to choose between settling with liquid patent owners, costly litigation, or unfair licensing and high fees).
of a large number of claims is impractical.\textsuperscript{182} Third, a patent holder may conceal its patent ownership and then assert the patent against an inadvertent infringer who is already engaged in manufacturing and selling a product based on an infringing design.\textsuperscript{183} To continue exploiting his allegedly infringing product, such a defendant is usually forced to pay royalties far in excess of the patent holder’s true contribution.\textsuperscript{184}

Another strategic purpose for engaging into a licensing agreement is “to reduce the incentive of a potential [market] entrant to develop its own, possibly better, technology.”\textsuperscript{185} “If the licensing [agreement] leaves the potential entrant with its expected return[s] from further research, the later [would] have no incentive to [independently] engage in research and development activity.”\textsuperscript{186} Hence, “an incumbent firm, threatened by the risk of successful research” by potential competitors, can possibly secure its market share by demanding lower licensing fees.\textsuperscript{187} By tolerating such manipulations of license value, the current ex post regime of patent valuation curtails the development of alternative, possibly more beneficial technologies for the detriment of society as a whole.\textsuperscript{188}

\textsuperscript{182} See Landers, supra note 177, at 206 (noting the consequence of litigating patent infringement).

\textsuperscript{183} See Marcus Reitzig et al., On Sharks, Trolls, and Other Patent Animals— ‘Being Infringed’ as a Normatively Induced Innovation Exploitation Strategy 1, 2 (2006), archived at www.perma.cc/PDH9-JBGS (discussing how the deficiencies of corporate monitoring allows patent sharks to profit from accidental infringement).


\textsuperscript{186} Id. at 931.

\textsuperscript{187} See id. (explaining an incumbent firm may secure market share by selling right to use lower-cost technology)

\textsuperscript{188} See Stephen Salant, Preemptive Patenting and the Persistence of Monopoly: Comment, 4 Am. Econ. Rev. 247, 250 (1984) (commenting on how ex post licensing encourages new market entrants to perform research in anticipation of future returns from license); see also Gallini, supra note 185 (articulating counterpoint that ex ante licensing deters further research by new market entrant).
c. The Circumstances Surrounding The Licensing Negotiations

Finally, ex post patent valuation methods are inevitably influenced by the different circumstances surrounding the licensing negotiations. One such influencing condition concerns the state of the economy. Indeed, whether the economy shows signs of expansion, recession, or recovery unavoidably affects the parties’ expectations regarding the patent’s earnings potential. Other influencing conditions include, “existing or proposed laws, or tax incentives, which could affect the licensing parties’ contemplated business.” It is patently obvious that these factors bear no relation to patent quality. Nevertheless, under the current regime of ex post patent valuation, they may have a substantial effect over the license value, which could in turn diminish the incentive of potential inventors to engage in innovative activity.

3. Defining A Fixed Licensing Price

The third common characteristic shared by the valuation methods described previously relates to the nature of the value they predict. In particular, these methods purport to determine a fixed licensing price, regardless of whether this price would be paid as a lump sum or as periodical royalty payments. Nevertheless, so long as patents are valuated from a pure economic perspective, this factor does not appear to cause any substantial problems, despite perhaps the rigidity it may possibly impose over value predictions that are based on exist-

---

189 See Goldscheider, supra note 19, at 2 (noting several factors that quantify profit potential of specific license).
190 See Goldscheider, supra note 19, at 3 (highlighting economic indicators that help parties assess financial outlook of licenses).
191 See Goldscheider, supra note 19, at 3 (stating how economic indicators help negotiating parties generate successful economic forecast to avoid disappointing transactional relationships).
192 Goldscheider, supra note 19, at 3.
193 See infra Part IV.A (advancing author’s argument that meeting statutory requirements is best indicator for determining patent quality).
194 See Goldscheider, supra note 19, at 2 (noting economic factors quantify profit potential of specific licenses).
195 See Lerner & Layne-Farrar, supra note 100, at 2-6 (examining when industry assumptions drive firms to license and how patents are ultimately licensed).
196 See Lerner & Layne-Farrar, supra note 100, at 2-7 (noting myriad ways of payment for value of patents).
ing methods. Yet, were patents valued ex ante, in accordance with their quality traits, as this Article essentially proposes, some flexibility in setting the ultimate license value would have been required.

Indeed, as elaborated in section V, the proposed method of patent valuation recommends setting ex ante limitations over the ultimate licensing price. Nevertheless, it leaves room for independent negotiations over the ultimate licensing price; so long as the final value would not exceed the determined ex ante limitations. Accordingly, upon initiation of actual licensing negotiations, factors that do not relate to the quality of the underlying patent may be taken under consideration, as much as they can assist in determining the financial value of the patent, yet only in a limited, regulated manner.

For instance, while the identity of parties negotiating the licensing agreement generally remains outside the group of relevant considerations affecting the determination of value pursuant to the proposed ex ante method of valuation, it may be afforded with limited financial relevance at a later point, when actual licensing negotiations are initiated. In this regard, a licensor may accept a low licensing price if a licensee is in a different industry and not likely to become a competitor as a result of licensing. On the other hand, the licensor may insist on a higher license value (which does not exceed the determined ex ante price limitations), if the licensee is a potential competitor. Similarly, a licensor that enjoys a well-recognized reputation as an innovator and a continuing source of useful ideas and improvements, or a licensee that is financially powerful and an effi-

197 See Lerner & Layne-Farrar, supra note 100, at 17 (concluding that a licensing model that can accommodate preexisting methods can be utilized despite its inflexibility).
198 See infra Part V (elaborating methods of ex ante limitations).
199 See infra Part 0 (proposing United States Patent and Trademark Office as governmental body for implementation of ex ante licensing limitations when issuing a patent).
200 See Lerner & Layne-Farrar, supra note 100, at 5 (indicating that license value is never perfect).
202 See id. at 290 (explaining the correlation between efficient licensing contracts with potential competitors and an increased propensity to license).
203 See Toikka, supra note 7 (explaining the ability of a licensor to charge a high royalty to potential competitors).
cient manufacturer, could demand higher fees (in accordance with the proposed limitations) because they are capable of increasing the profit potential.  

4. No Regulatory Intervention

The fourth and last characteristic common to existing methods that value patents for licensing purposes relates to the fact that they are governed by competitive market powers. No regulating body is involved in electing the appropriate method of valuation and managing its implementation. The parties negotiating the licensing agreement choose their preferable valuation method (often under the supervision of a licensing attorney), and are thus fully accountable for the resulting value of the licensing fees.

Recall that our patent system affords a patentee with an exclusive right of limited duration over his new, non-obvious invention. This limited period of exclusivity bestows upon patentees an exclusive control over the invention’s price and, in turn, gives them a mechanism by which they can recoup their research and development costs. Generally, our patent system does not interfere with the pa-

204 See Goldscheider, supra note 19, at 3 (listing the quality of contribution by the proprietor as a parameter of opportunities to demand higher fees).
205 Again, the different proposals for prize systems that should replace or otherwise supplement the patent system depend on the formation of an agency that will determine the size of the prize and distribute it. Nevertheless, these models exist outside the realm of patent licensing and therefore they exceed the limits of this Article. See supra note 84.
206 See Toikka, supra note 7 (describing the impact of competitive markets on licensee’s profits and overall patent values).
207 See Wang, supra note 18, 163-83 (arguing that there is a need for agency oversight to determine appropriate patent valuations).
208 See Boman & Larsson, supra note 9, at 20-32 (discussing the crucial factors affecting the choice of valuation approach); see also RESTATEMENT (SECOND) OF CONTRACTS § 8.5 (2013) (prescribing state contract law as the enforcement mechanism for licensing agreements).
210 See Cotropia, supra note 2, at 168-71 (outlining the benefits of patent protection); see also Lemley, supra note 2, at 129-30 (arguing that intellectual property protection allows the owner to make further investments in the improvement, maintenance, or commercialization of the product).
tentees right to freely negotiate the licensing price of their patents.\textsuperscript{211} Despite exceptional instances of compulsory licensing,\textsuperscript{212} patent licensing is governed by the rules of free competition: the licensor and the licensee independently negotiate the price of the patent, hoping to maximize their respective profits.\textsuperscript{213} The argument is straightforward: “There are gains to trade from licensing, and the patentee can design contracts that split these gains between itself and potential licensees.”\textsuperscript{214}

Under this regime of free competition where existing methods of patent valuation do not limit or otherwise regulate the ultimate price the negotiating parties may agree upon, licensing revenues negotiated outside the courthouse are expected to continue to skyrocket.\textsuperscript{215} Indeed, during the 1990s, annual patent licensing revenue in the United States increased from approximately $15 billion to over $100 billion.\textsuperscript{216} Worldwide patent licensing revenues totaled approximately $500 billion in 2007.\textsuperscript{217} Since such a substantial portion of our nation’s capital is invested in patent licensing, our patent system must ensure that this constant increase in patent licensing revenues actually benefits the public.\textsuperscript{218}

\textsuperscript{211} See Cotropia, supra note 2, at 169 (explaining ability of inventor to recoup cost of development through negotiating license agreement).


\textsuperscript{214} Shapiro, supra note 5, at 25.

\textsuperscript{215} See Toikka, supra note 7 (discussing licensing royalties in competitive markets).

\textsuperscript{216} See Bruce C. Haas & Christopher Beckman, Patent Policing, EUR. PHARMACEUTICAL CONTRACTOR, (Spring 2010) archived at www.perma.cc/0A5k3n5RB15 (describing substantial increase in patent licensing revenue).

\textsuperscript{217} See id. (citing Deloitte statistic regarding global patent licensing revenues).

To sum up, existing valuation methods that value patents for licensing purposes share at least four common characteristics. First and foremost, they adopt a positive-economic perspective. Their key concern is to estimate what would be the future financial gains from licensing the patent under the regime of free competition. Second, these methods become effective only after a patent turns into a desired commercial product. In this sense, they implement an ex post perspective: valuing patents that are ripe for licensing purposes. Third, the valuation methods described in the previous section are concerned with determining a fixed licensing price, and fourth, they are governed by competitive market powers. No regulating body is involved in electing an appropriate method of valuation and managing its implementation.

As the remainder of this Article demonstrates, the proposed method of patent valuation deviates from the formerly discussed methods in the combination of four aspects: (1) the proposed method adopts a social-normative perspective; (2) it is performed ex ante, upon issuance of a patent, far before any licensing negotiations are taking place; (3) it wishes to limit the licensing price rather than to set a single fixed price; and (4) it suggests regulating

---

219 See supra Part II.B.1-4 (outlining the characteristics shared by methods of patent valuation).
220 See supra Part II.B.1 (noting similarities shared by patent valuation methods).
221 See Lerner & Layne-Farrar, supra note 100, at 7-18 (evaluating patent valuation while considering various pricing methods).
222 See Boman & Larsson, supra note 9, at 18 (commenting that more accurate patent valuation methods are needed due to their frequent commercial failure).
223 See Boman & Larsson, supra note 9, at 20-32 (discussing advantages and disadvantages of different valuation models).
224 See Lerner & Layne-Farrar, supra note 100, at 12 (noting that all five practical valuation methods arrive at fixed price).
225 See Goldscheider, supra note 19, at 2 (considering effects of market size, dynamism, and competitiveness when valuing patents).
226 See Goldscheider, supra note 19, at 4 (detailing the concept of inherent value).
227 See infra Part III-VI (explaining this article’s proposed method of patent valuation).
228 See infra Part IV.B (providing the basis for proposing a social-normative perspective).
229 See infra Part IV.C (proposing quality indicators to value patents ex ante).
230 See infra Part V (defining flexible price limitations).
the process of patent evaluation instead of leaving it to the exclusive control of free market powers.\footnote{See infra Part VI (suggesting establishing a regulatory body and justifying such regulations).}

\section*{III. THE OBJECTIVES OF THE PROPOSED METHOD}

Before explaining the novel aspects of the proposed method of patent valuation, it is instructive to first expand on its objectives.\footnote{See infra Part III.A-D (expounding on proposed method’s ability to improve patent quality, combat abuse, and reduce litigation).} Accordingly, the following section is dedicated to explaining the key goals of the proposed method of patent valuation.\footnote{See infra Part III.A-D (delineating key goals of proposed method).} Essentially, it clarifies why it is advisable to create an ex ante method of patent valuation for licensing purposes, which limits the ultimate licensing price the parties may set, according to the quality of the underlying patent.\footnote{See infra Part III.A-D (explaining benefits from limiting licensing price based on quality).} Four intertwined objectives are, thus, presented.\footnote{See infra Part III.A-D (associating increase in patent quality with decrease in patent trolling, price manipulations, and litigation).}

The first objective relates to improving overall patent quality.\footnote{See infra Part III.A (advocating that proposed method will increase patent quality).} In this regard, it is argued that bolstering the correlation between patent quality and patent value would incentivize high quality innovation, while suppressing low quality innovation.\footnote{See Graf, supra note 58, at 499 (presenting three approaches through which patent quality will increase if valued appropriately).}

The second intertwined objective of the proposed theory concerns downgrading “patent trolling,”\footnote{See Sandburg, supra note 28 (providing the definition of patent troll).} a phenomena associated with the generation of income not through commercialization but through aggressive licensing and litigation of patent portfolios.\footnote{See Sandburg, supra note 28 (criticizing aggressive lawyers that hurt companies with infringement claims).} Since patent
trolling is fueled by the issuance of poor quality patents the anticipated improvement in patent quality could diminish its effect.\footnote{See Graf, supra note 58, at 498 (arguing that patent trolling is driven by issuance of poor quality patents).}

The third objective of the proposed theory of patent valuation relates to combating abusive acts of price manipulations.\footnote{See infra Part III.C (describing three types of abusive price manipulation tactics).} By creating limitations over the ultimate licensing price, the proposed method would stop patent owners from obtaining more licensing revenue than the value of their patents.\footnote{See infra Part III.C (explaining how price limitations will correlate to appropriate licensing revenues).} “[T]he larger goals of encouraging advancement in developing knowledge, creating follow-up inventions and commercializing the benefits of this knowledge for use by the public” would be respectively promoted.\footnote{Landers, supra note 177, at 207 (detailing the impact of holdups on subsequent invention).}

Finally, the fourth objective of the proposed theory relates to reducing litigation and related costs.\footnote{See infra Part III.D (suggesting higher threshold for patent quality will result in reduction of transaction costs).} Essentially, an improvement in patent quality should amount to more patents that meet the statutory requirements of patentability.\footnote{See infra Part III.D (explaining how improved standards of patent quality lead to more clarity in granting of patents).} The validity of such high quality patents is inevitably more certain and the scope of their claims is respectively clearer.\footnote{See infra Part III.D (recognizing reduced confusion with regards to patent claims flowing from higher patent quality).} With increased certainty and heightened clarity, a substantial cut down in both litigation costs and litigation rates could be reasonably expected.\footnote{See infra Part III.D (concluding direct correlation between higher patent quality and reduced litigation costs).}

\textbf{A. Improving Patent Quality}

It is undisputed that patent quality is low.\footnote{See Wagner, supra note 21, at 2140 (discussing the decline in patent quality).} Also, it is reasonably well understood that high quality patents are better than low quality...
Indeed, low quality patents are presumed to be undesirable for several reasons. First, substantial uncertainty surrounds their validity, scope and enforcement, imposing heavy costs on those who make decisions based on patents (i.e., patentees, prospective licensees, investors, etc.). Second, a system of low quality patents “is characterized by a large number of errors in the patent-granting process.” These errors include, in addition to inappropriate grants, inappropriate denials of patentable inventions, which can be a disincentive for future researchers and can impact the incentive to fully commercialize important innovations. Finally, the most apparent consequence of low patent quality relates to its impact on litigation. Not only that the uncertainty which surrounds low-quality patents leads to increasing litigation over patents, it also yields more complex and expensive disputes, which increases the cost of the whole system. Accordingly, it is no surprise that the demand to improve patent quality centers many of the political and academic establishments’ major reform agendas. Most efforts and proposals in this context view patent quality as mainly an administrative concern. Thus, they focus on increasing the number of patent examiners, improving patent offices’ search tools, forming internal offices that are tasked with assessing and disseminating information about patent quality, increasing public access and incorporating a form of post-grant review into the U.S. patent system.

249 See Wagner, supra note 21, at 2140 (explaining the uncertainty caused by low quality patents).
250 See Wagner, supra note 21, at 2140 (outlining the problems raised by low quality patents).
251 See Wagner, supra note 21, at 2140 (summarizing the costs of low quality patents).
252 Wagner, supra note 21, at 2141.
253 See Wagner, supra note 21, at 2141 (considering the ramifications of improperly denying patent grants).
254 See Wagner, supra note 21, at 2142 (observing the correlation between litigation and low quality patents).
255 See Wagner, supra note 21, at 2141-43 (discussing the effects of low quality patents).
256 See Wagner, supra note 21, at 2136 (citing sources discussing patent reform).
257 See Wagner, supra note 21, at 2158 (discussing patent reform approaches).
258 See Wagner, supra note 21, at 2158-61 (outlining the administrative changes that patent reform focuses on).
Other proposals focus on reforming the prosecution process. For instance, one calls to establish a system whereby patentees who choose to seek a more thorough form of validity analysis, would enjoy the benefit of a stronger “presumption of validity” for their patents. Another type of proposal suggests turning the current patent system into a system of registration that relies on private ordering and litigation to sort out invalid patents.

These proposals alone, however, are insufficient to make a significant improvement in patent quality. While they might reduce the percentage of low quality patents being issued - a proposition that is itself doubtful - they would hardly decrease the total number of low quality patents issued. At most, these proposals would keep the pace with increased filings of low quality patent applications. Indeed, since the number of overall patent applications, including low quality applications, is continuously growing, a decrease in the

259 See Wagner, supra note 21, at 2162 (describing the proposed prosecution focused patent reform). I myself have previously suggested optimizing section 101’s exclusion potential as means of improving patent quality. Essentially, I proposed to exclude inventions whose development was not depended on the incentives afforded by our patent system and inventions that lack any intended commercial use as ineligible subject matters. That proposal can be identified as one viewing patent quality as a problem in the current prosecution process. See Filmar-Perel, supra note 30 (discussing her own proposal to exclude certain inventions).

260 See Mark Lemley, Doug Lichtman & Bhaven Sampat, What to Do About Bad Patents?, 40 REG. 10, (Working Paper Winter Series 2005-2006), at 12-13 (arguing that The Patent Office should only focus its examination resources on important patents); see also Michael Abramowicz & John F. Duffy, Ending the Patenting Monopoly, 157 U. PA. L. REV. 1541, 1566-75 (2009) (addressing the possibilities of relying on foreign nations’ patent determinations or permitting private firms to take on the burden of examining patents).

261 See F. Scott Kieff, The Case for Registering Patents and the Law and Economics of Present Patent-Obtaining Rules, 45 B.C. L. REV. 55, 70-74 (2003) (proposing use of the soft-look registration system in conjunction with the commercial-litigation system in order to reduce the current patent system’s significant social costs).

262 See Wagner, supra note 21, at 2163 (arguing that there is no actual evidence that improving the performance and efficiency of the patent office or broadening public access to the prosecution process would necessarily improve patent quality).

263 See Wagner, supra note 21, at 2163 (discussing improved patent office efficiency and performance would not correlate with decreasing quantity of low quality patents filed).

percentage of low quality patents would probably have no expressive
affect over patent quality.

Nevertheless, if such a decrease would be accompanied with a re-
duction in the overall number of low quality patent applications, we
can expect a considerable improvement in patent quality. Accordingly,
in addition to reducing the percentage of low quality patents is-
sued, we should aim at decreasing the overall number of low quality
patent applications. This proposal purports to do exactly that. In
particular, by linking patent value to patent quality, it hopes to
strengthen the incentive to file high quality patent applications and
weaken the incentive to file low quality applications. Consequent-
ly, it hopes to decrease the total number of low quality patents, while
improving overall patent quality.

The proposition that improving patent quality depends on ad-
dressing the incentives that encourage low quality innovation had
been previously advanced by Professor R. Polk Wagner. Indeed, he
observed that, “low patent quality is a problem with roots deeply e-
bedded in the incentive structure of the current patent system.” To
support his observation, Professor Wagner presented several ince-
tives that affirmatively encourage low quality innovation. In par-
ticular, he discussed the following three types of incentives:

(1) incentives that encourage patentees to draft patent
applications that effectively obscure the true scope of
the invention and its relationship to the prior art; (2)
incentives that lead the administrative agencies (the
USPTO and other patent offices) to conduct relatively
ineffective examinations of many patents; and. . . (3)
incentives that compel modern innovative firms to

the total number of U.S. patent applications was 315,015; in 2005, this number in-
creased to 417,508; in 2010, it went up to 520,277 and in 2011 to 535,188).

265 See Wagner, supra note 21, at 2170-71 (proposing penalties for low quality pa-
tents to decrease overall number of low quality patents filed and improve patent of-
cice efficiency).

266 See infra Part IV (proposing patent valuation method to incentivize higher qual-
ity patent applications and deter low quality applications).

267 Wagner, supra note 21, at 2158 (describing the low quality patent problem).

268 See Wagner, supra note 21, at 2146-58 (summarizing incentives to file low
quality patent applications).
adopt a high-volume, low-quality patenting strategy.\textsuperscript{269}

This proposal wishes to add to this appreciated list of incentives that affirmatively encourage low quality innovation, the incentives that encourage patentees to engage in innovative activity and seek patent protection in the first place; these are the monetary incentives that underlie our patent system.\textsuperscript{270} Essentially, this Article contends that potential patentees are currently better off applying for low quality patents.\textsuperscript{271} Why? Because while it is presumably easier to develop a low quality invention, the reward guaranteed for such an invention is similar to that guaranteed for a high quality invention.\textsuperscript{272}

Recall that our patent system awards all patentees with the same monetary reward: a twenty year government sanctioned monopoly over their claimed inventions.\textsuperscript{273} All patentees enjoy the same exclusive rights over their inventions, including the right to freely set their value.\textsuperscript{274} Accordingly, from a potential inventor’s financial perspective, owning a low quality patent is more rewarding than owning a high quality invention.\textsuperscript{275} Nevertheless, if a high monetary value would be guaranteed only to those high quality inventions, the development of low quality inventions would be discouraged.\textsuperscript{276}

\textsuperscript{269} Wagner, \textit{supra} note 21, at 2146 (quoting the three types of patent incentives).
\textsuperscript{270} See Filmar-Perel, \textit{supra} note 30 at 284-88 (explaining other incentives that encourage innovation outside of the patent system). Note that this discussion does not refer to other incentives that are external to our patent system, which may nonetheless encourage innovation, i.e. the inventor’s personal benefit from the invention, the availability of other legal protections (such as trade secret law), social incentive of reputation and low research and development costs. \textit{See id.}
\textsuperscript{271} See Wagner, \textit{supra} note 21, at 2139 (describing the incentives for filing a low quality patent application).
\textsuperscript{272} See Goldscheider, \textit{supra} note 19, at 4 (explaining how the patent system encourages low quality patents).
\textsuperscript{274} See \textit{id.} at 193 (reiterating the extensive rights afforded to inventors by the patent monopoly).
\textsuperscript{275} See \textit{id.} at 192-193 (inferring that the benefits of patent monopoly translate into financial gains for investors).
\textsuperscript{276} See Wagner, \textit{supra} note 21, at 2138-39 (describing the effects of high patent and low patent quality)
ing patent quality into patent value is hence proposed as means of improving patent quality. 277

B. Downgrading Patent Trolling

“Patent trolling” is associated with the generation of income not through commercialization but through aggressive licensing and litigation of patents. 278 While encroaching upon the constitutional mandate to “promote the progress of science and useful arts,” patent trolls diverge investment from research and development to potentially unwarranted licensing fees or litigation. 279 Patent trolling is often facilitated by the grant of low quality patents that frequently cover overly broad claims. 280 “By asserting overbroad, obvious, or non-novel patents . . . patent trolls often force alleged infringers to choose between paying licensing fees for a patent that they believe is invalid or facing costly and protracted litigation.” 281

Unfortunately, however, the current regime of patent law tolerates patent trolling. 282 Indeed, the Patent Act does not require that inventors “manufacture, sell, or market their writings or ideas” in exchange for the grant of patent protection. 283 In fact, it affords patentees with exclusive rights over their inventions, without demanding that they exploit their inventions to the benefit of the public in return. 284 Fur-

277 See Wagner, supra note 21, at 2163 (stating how improving analysis of patent quality is a good thing).
278 See Sandburg, supra note 28 (describing patent trolls and the methods they use to profit).
279 See U.S. CONST. art. I, § 8, cl. 8 (discussing that authors and inventors have exclusive rights to their respective works); see also Mary Rose Roberts, Are R&D Resources Being Diverted to Fight Patent Trolls?, MC PRESS ONLINE (Apr. 2, 2006), archived at www.perma.cc/0HTCpzJGyr5 (detailing the impact of patent trolls on patent development).
280 See Graf, supra note 58, at 498 (explaining how poor quality patents containing overly broad claims are used offensively to obtain licenses or bring infringement lawsuits).
281 Graf, supra note 58, at 498.
282 See Katherine E. White, Preserving the Patent Process to Incentivize Innovation in Global Economy, SYRACUSE SCI. TECH. L. REP. 27, 27 (2006), archived at www.perma.cc/GJ99-X7FT (explaining how major amendments would have to be in order to make patent laws more favorable to patent owners and disadvantage patent trolls).
283 Id.
284 See id. (noting how manufacture and sale of products is not required under Patent Clause).
thermore, it does not impose any limitations over the ultimate licensing price the patent owner may demand, and the moment a patent is issued, its owner is afforded with an unlimited right to exploit it for his own narrow financial benefit.\textsuperscript{285}

By adopting an ex ante, social-normative perspective of patent valuation for licensing purposes, this Article suggests that patent trolling could be downgraded.\textsuperscript{286} Indeed, patentees would be limited in their ability to charge exaggerated licensing fees that negatively affect progress and innovation.\textsuperscript{287} Moreover, since the value of patents would directly reflect their quality, the proposed method would curtail the ability of patent trolls to exploit low quality patents and slow innovation.\textsuperscript{288}

C. Combating Abusive Acts of Price Manipulations

Turning to the third objective of the proposed theory, the following section describes three prodigies of price manipulations – (1) injunction threats, (2) royalty stacking, and (3) underpriced licensing that aims at reducing the incentive of potential entrants to develop their own, possibly better, technology – which the proposed method of patent valuation purports to tackle.\textsuperscript{289} In essence, the first two concepts - injunction threats and royalty stacking - allow patent owners to obtain more licensing revenue than the value of their patents.\textsuperscript{290} Involving a strong element of hold-up, they hamper the ability of downstream innovators to fully commercialize the benefit of their knowledge.\textsuperscript{291} The third concept encourages firms to enter into the

\textsuperscript{285} See id. (explaining exclusive rights of patent owner including ability to demand any price for their own benefit).
\textsuperscript{286} See id. (suggesting that there is need of a major amendment to make patent law more favorable to owners so as to reduce the power of patent trolls).
\textsuperscript{287} See Graf, supra note 58, at 498 (highlighting current negative effects of patent trolling).
\textsuperscript{288} See Graf, supra note 58, at 498-99 (explaining how patent trolls curb innovation currently).
\textsuperscript{289} See Lemley & Shapiro, supra note 31, at 1991 (introducing three issues causing patent holdups).
\textsuperscript{290} See Lemley & Shapiro, supra note 31, at 1993 (explaining how injunction threats and royalty stacks permit patent owners to gouge licensees thereby producing greater revenue).
\textsuperscript{291} See Lemley & Shapiro, supra note 31, at 1992-93 (noting how injunction threats deter patent owners and innovators from investing further in inventions).
product market as a way of deterring them from R&D activity.\textsuperscript{292} Here, patent owners obtain less licensing revenue than the value of their patents.\textsuperscript{293} In the long term, all of these three hinder follow-on innovation and impede future development in knowledge.\textsuperscript{294}

“The threat of injunctive relief,” as a price manipulation tactic, “allows a patent owner to capture a substantially greater share of a component invention in a settlement than it otherwise could have....”\textsuperscript{295} This is so, “because if the patent is found valid and infringed, the injunction will generally be effective immediately,” forcing the defendant to stop commercializing his product instantly.\textsuperscript{296} To avoid this damaging outcome, the defendant will most likely agree to settle the dispute and pay whatever the patent owner demands for the licensing of his patent.\textsuperscript{297}

In this context, threats of injunctive relief come from owners of upstream, patented technologies.\textsuperscript{298} Indeed, it is when the injunction is based on a patent covering one small component of a complex, profitable, and popular product,\textsuperscript{299} that these threats have a substan-

\textsuperscript{292} See Lemley & Shapiro, supra note 31, at 2009-10 (explaining why patent system actually discourages innovation by victimizing firms that make significant R&D investments themselves).
\textsuperscript{293} See Lemley & Shapiro, supra note 31, at 2009 (describing how these companies are paying holdup money to avoid threat of infringement and similarly overpay royalties in comparison to patent holder’s actual innovative contribution).
\textsuperscript{294} See Lemley & Shapiro, supra note 31, at 2044 (describing patents are important to innovation yet are an impediment in industries that are overly clogged).
\textsuperscript{295} Mark A. Lemley, Ten Things to do About Patent Holdup of Standards (And One Not To), 48 B.C.L. Rev. 149, 153 (2007).
\textsuperscript{296} Id.
\textsuperscript{297} See id. at 153-54 (discussing the negotiation value associated with threats of injunctive relief).
\textsuperscript{298} See Lemley & Shapiro, supra note 31, at 1995 (describing litigation costs for downstream firms during patent disputes).
\textsuperscript{299} See Lemley & Shapiro, supra note 31, at 1996 (discussing the threat that a patent holder will obtain an injunction that will force the downstream producer to pull its product from the market); see also Lemley, supra note 295, at 151 (stating that significant percentage of patents are in the information technology (“IT”) sector, which includes the Internet, semiconductors, telecommunications, computer hardware, and computer software). “There are so many IT patents because of the nature of these technologies and the ways in which they interact; it is almost always the case that a product in the IT field combines a number of different components and therefore a number of different patents. Therein lies the basic problem.” See Lemley, supra note 295, at 151.
tial impact over licensing negotiations. Often times, such patents are essential for a standard and there is no possibility of implementing the standard without infringing upon the patent. For a defendant who has already invested heavily in developing and commercializing his product, which presumably includes an allegedly infringing feature, this impact amounts to “hold up.” To continue exploiting his allegedly infringing product, such a defendant is forced to pay royalties far in excess of the patent’s true economic contribution. “Such royalty over-charges act as a tax on new products incorporating the patented technology, thereby impeding rather than promoting innovation.”

To tackle the hold-up problem, we should ensure that what patent owners get for the technology they contribute reasonably resembles what they actually contributed. Professor Lemley had previously proposed ten solutions to the problem of hold-up that allegedly achieve this goal. Some of his recommended solutions focused on the things private organizations, especially standard setting organizations (“SSOs”), can do to avoid hold-ups, and others- on things the law can do. Among Lemley’s suggestions to private organiza-

---

300 See Lemley & Shapiro, supra note 31, at 1993 (addressing threat of an injunction can enable a patent holder to negotiate royalties far in excess of the patent holder’s true contribution).
301 See Lemley & Shapiro, supra note 31, at 1992-93 (discussing the consequences of patent infringing).
302 See Lemley & Shapiro, supra note 31, at 1993 (indicating injunction threats often involve a strong element of “holdup”).
303 See Lemley & Shapiro, supra note 31, at 1993 (addressing threat of an injunction can enable a patent holder to negotiate royalties far in excess of the patent holder’s true contribution).
304 Lemley & Shapiro, supra note 31, at 1993.
305 See Lemley, supra note 295, at 155 (suggesting the way to tackle the patent problem should be by ensuring what patent owners get paid reasonably resembles what they actually contributed).
306 See Lemley, supra note 295, at 155-67 (indicating possible solutions to address the holdup problem).
307 See Lemley, supra note 295, at 155-67 (indicating the recommendations include things SSO’s can do as well as things the law can do); see also Mark A. Lemley, Intellectual Property Rights and Standard-Setting Organizations, 90 CAL. L. REV. 1889, 1892-93 (2002) (defining standard-setting organizations (“SSOs”) as industry groups that set common standards in a variety of significant areas). Also explains that “telephones talk to each other, the Internet works, and hairdryers plug into electrical sockets because private groups have set ‘interface’ standards, allowing compatibility between products made by different manufacturers.” Id. at 1893.
tions, one is especially pertinent to this discussion: patent owners, according to Lemley’s suggestion, should be required to specify the content of their reasonable and nondiscriminatory (RAND) license ex ante.\textsuperscript{308} Recognizing that a potential standard may build on several different patents, each of which entails a separate licensing fee, Lemley reasonably suggested that every patentee who is a member of the SSO would be required to set his royalty rate ex ante.\textsuperscript{309} By so requiring, the SSO could realize the true cost of a standard before adopting it.\textsuperscript{310}

Advancing Lemley’s above solution, this article contends that creating ex ante limitations over the ultimate price the parties negotiating a licensing agreement may set should assist in tackling the hold-up problem.\textsuperscript{311} Indeed, by limiting patent owners’ ability to extract exaggerated royalties beforehand, the manipulative tactic of injunctive threats discussed above would be effectively tackled.\textsuperscript{312} Since the value of any given patent would be determined upon issuance, downstream innovators (as well as SSOs) could realize their expected costs even before they make any investment (and SSOs could realize the anticipated cost of a standard before they adopt it).\textsuperscript{313} Most importantly, since the value of each patent would reflect its quality, as

\textsuperscript{308} See Lemley, supra note 295, at 158 (suggesting patentees should be required to specify the content on their RAND licenses ex ante); see also Baron & Delcamp, supra note 184, at 3 (stating “Competition law and the Intellectual Property rules of Standardization Organizations provide for a specific regime of Reasonable and Non-Discriminatory Licensing Conditions, but industry participants disagree on whether this regime is efficient in yielding reasonable prices for licensing essential patents.”).

\textsuperscript{309} See Lemley, supra note 295, at 155 (suggesting patentees who are SSO members should be required to set their royalty rate ex ante).

\textsuperscript{310} See Lemley, supra note 295, at 158 (indicating SSO’s need to discover what the true cost of a standard is before they adopt that standard).

\textsuperscript{311} See supra Part III.C (discussing how to tackle the hold-up problem).

\textsuperscript{312} See supra Part III.C (expanding on the advantages of limiting patent owners abilities).

\textsuperscript{313} See Lemley, supra note 295, at 158-59 (suggesting that setting up an internal discussion procedure among group members will result in figuring out the cost of alternative standards while there are still competitive alternatives).
determined by the proposed quality indicators, patent owners would be entitled to what they actually contributed and not more.  

The second context in which manipulations of patent value often occur is known as royalty stacking.  

The term “royalty stacking” reflects the fact that, “from the perspective of the firm making the product in question, all of the different claims for royalties must be added or “stacked” together to determine the total royalty burden borne by the product if the firm is to sell that product free of patent litigation. 

Royalty stacking essentially amplifies the problem associated with injunction threats and hold-ups discussed earlier. As a matter of simple logic, the problem of hold-up is magnified “when the downstream firm faces infringement claims from multiple patent owners.”  

Lemley and Shapiro had previously developed an economic model, which efficiently explains the impacts of royalty stacking. Essentially, their model showed that when patent owners charge royalties that exceed their “benchmark,” which is defined as “the royalty rate that would be reasonable and expected in the ideal patent system without any element of hold-up,” downstream “firm[s] may not find it worth incurring the costs necessary to develop, manufacture, and sell the product.”  

Indeed, the problem is that patent owners, instead of charging a royalty rate that accurately reflects their contributions to the product

314 See Lemley, supra note 295, at 168 (stating patent law should aim to have the value a patentee receives bear a reasonable relationship to the contribution his or her invention makes).
315 See Lemley & Shapiro, supra note 31, at 1992 (indicating that royalty stacking affects the royalties negotiated between patent holders and downstream firms).
316 Lemley & Shapiro, supra note 31, at 1993.
317 See Lemley & Shapiro, supra note 31, at 1993 (indicating the problems of injunction threats and royalty stacking are intertwined).
318 Lemley & Shapiro, supra note 31, at 2011.
319 See Lemley & Shapiro, supra note 31, at 2012 (detailing the economic model of royalty stacking).
320 Lemley & Shapiro, supra note 31, at 1999.
321 Lemley & Shapiro, supra note 31, at 2012.
(and indicates their marginal costs of production), demand exaggerated royalties that leave the firm at a break-even point with no adequate returns on its investment in R&D, manufacturing and marketing.\textsuperscript{322} Consequently, in the long term, the downstream firm may not find it worth incurring the costs necessary to develop and commercialize the product.\textsuperscript{323}

This Article argues that if the proposed method of patent valuation would be adopted and license values would be limited ex ante, in accordance with the quality traits of the underlying patent, we could tackle the problem of royalty stacking.\textsuperscript{324} This is so because the value of a given patent would reasonably reflect its marginal cost of production as well as its anticipated contribution.\textsuperscript{325} Indeed, as the next section demonstrates, one relevant quality indicator would be the costs of developing the underlying invention.\textsuperscript{326} Another factor would be the invention’s intended commercial use;\textsuperscript{327} dependent inventions that are anticipated to end up as components in other products would acquire a lower value than that acquired by independent inventions.\textsuperscript{328}

Accordingly, the proposed theory ensures that the value of patents actually reflects their contribution to science and innovation.\textsuperscript{329} Patent owners would be thus restrained from demanding overcharged royalties that hold-up other inventors from fully commercializing their inventions and in the long term, reduce their incentive to engage

\textsuperscript{322} See Lemley & Shapiro, supra note 31, at 2012 (describing the consequence of arbitrarily determining royalty rates).
\textsuperscript{323} See Lemley & Shapiro, supra note 31, at 2012 (explaining the effect of high royalty rates on the downstream market).
\textsuperscript{324} See infra Part IV.B-C (advocating for a method of patent valuation that considers patent quality rather than arbitrary royalties).
\textsuperscript{325} See infra Part IV.C (describing how the proposed valuation method would combat royalty stacking by emphasizing quality indicators).
\textsuperscript{326} See infra Part IV.C.1.a (discussing correlation of cost of development to higher patent valuation).
\textsuperscript{327} See infra Part IV.C.1.b (identifying relationship between invention commercial utility and patent value).
\textsuperscript{328} See infra Part IV.C.2.a (comparing patent value of standalone patented product to a patented product component).
\textsuperscript{329} See infra Part IV.B-C (explaining how his proposed theory of valuation reflects contributions).
in innovative activity. Consequently, inventors who depend on licensing components and essential patents would be left with more resources to invest in R&D, manufacturing and commercialization for the benefit of the public.

The third type of price manipulation this proposal hopes to tackle concerns an incumbent firm that instead of engaging in preemptive research itself, licenses “its production technology to reduce the incentive of a potential entrant to develop its own, possibly better, technology.” Arguably, if the licensing agreement “leaves the potential entrant with its expected return[s] from further research, it would have no incentive to engage in further R&D activity.” By demanding low licensing fees, an incumbent firm, “threatened by the risk of successful research by market challengers”, could secure its market share. The example of Standard Oil of New Jersey, which was presented in professor’s Nancy Gallini’s fascinating research on market sharing as a strategic incentive for licensing, well demonstrates how this tactic works in practice:

In the 1940’s, Standard Oil of New Jersey discovered a process for synthetic rubber. It traded patent rights on this process for a synthetic oil production process discovered by Farben, a German rubber company. In both the synthetic oil and synthetic rubber markets, rival companies were encouraged to take out licenses and led to believe that their requests for licenses would be granted. F. L. Vaughan writes, “The apparent purpose [of licensing] was to discourage independent research to find out [Farben’s and Standard’s] progress towards synthetic rubber.” Standard and Farben remained dominant in synthetic rubber and syn-

330 See Lemley & Shapiro, supra note 31, at 2013 (explaining the effect of high royalty rates).
331 See Lemley & Shapiro, supra note 31, at 2009-10 (explaining the benefits of having more resources for R&D).
332 See Gallini, supra note 185, at 931 (describing incentive of incumbent firm to license production technology to inhibit competitor incentive to develop superior technology).
333 Gallini, supra note 185, at 931 (highlighting license agreement prevention of competitor research and development).
334 Gallini, supra note 185, at 931 (asserting incumbent firms incentive to secure market share through licensing).
thetic oil until 1942 when a government indictment charged them with agreements “. . . to use their combined present and future patents to prevent others from manufacturing and selling better and cheaper oil and chemical products.”

A low licensing value that is set under such circumstances is obviously detrimental from a social-normative perspective. By persuading entrants to terminate their research activity and by deeming any preemptive research efforts of incumbents superfluous, this tactic potentially thwarts the development of alternative, possibly improved technologies. Accordingly, it violates the principles underlying our patent system: instead of promoting the progress of science and encouraging innovation, it hinders essential research efforts.

Nevertheless, if the proposed theory of patent valuation would be adopted, this manipulative tactic could be tackled. Indeed, if patents would be price tagged ex ante, according to their quality traits, patent owners could be restricted in their power to set inappropriate, underpriced licensing values. In particular, since high quality patented technologies would be designated with a high price valuation, their owners would be unable to set low licensing values as means of preventing competitors from developing their own, possibly better technologies. By guaranteeing further research, the proposed theory should effectively vindicate the significant objectives of our patent system.

---

335 Gallini, supra note 185, at 931-32 (citations omitted).
336 See Gallini, supra note 185, at 931 (highlighting license agreement prevention of competitor research and development).
337 See U.S. CONST. art. I § 8, cl.8 (Declaring that the promotion of science and the useful arts is the underlying policy for granting patents).
338 See Lemley, supra note 295, at 168 (arguing that patent valuation should bear reasonable relationship to the qualities of the patent).
339 See Lemley, supra note 2, at 132 (observing that ex post theory relies on encouraging use of existing works).
340 See Gallini, supra note 185, at 931 (describing how low-cost technologies can deter research).
341 See Lemley, supra note 295, at 168 (noting that patents provide incentives to promote innovation).
D. Reducing Litigation and Related Costs

Finally, the fourth objective of the proposed theory relates to reducing litigation. 342 As a matter of simple logic, an improvement in patent quality should follow with a subsequent decrease in litigation. 343 Under the adopted definition of patent quality, improving patent quality amounts to granting more patents that meet the statutory requirements of patentability. 344 The validity of such high-quality patents is inevitably more certain and the scope of their claims is respectively clearer. 345 Accordingly, with a prospective increase in certainty and heightened clarity, we should reasonably expect a substantial cut down in litigation. 346 In conclusion, with clearer patents, litigation is expected to be less complicated, and thus, less costly and lengthy. 347

IV. AN EX ANTE, SOCIAL-NORMATIVE PERSPECTIVE OF PATENT VALUATION: VALUING PATENTS ACCORDING TO THEIR QUALITY TRAITS

The first and most striking point of novelty of the proposed theory of patent valuation concerns its social-normative perspective. 348

342 See, e.g., Sandburg, supra note 28 (discussing patent trolling and subsequent litigation).
343 See Shapiro, supra note 181, at 126 (discussing post-grant review process to improve patent quality and reduce subsequent litigation).
344 See supra Part IV.A (explaining method for patent valuation that focuses on patent quality rather than ambiguous royalty payments).
345 See supra Part IV.A (explaining how patent values more clearly demonstrate objective worth).
346 See Wagner, supra note 21, at 2142 (describing the connection between low quality patents and the increase in litigation).
347 See Shapiro, supra note 181, at 133 (highlighting the benefits of a legal strategy that can establish a type of litigation free zone).
348 See Stephen M. Maurer & Suzanne Scotchmer, Profit Neutrality in Licensing: The Boundary Between Antitrust Law and Patent Law, 8 AM. L. & ECON. REV. 476, 476-481 (2006) (discussing the correlation between the social value of the invention and patent holder’s profits). Stephen M. Maurer and Suzanne Scotchmer had previously presented the concept of “derived reward,” yet they did not turn it into a model of patent valuation. Essentially, they used the label of derived reward to refer to the principle that “the profit reward of the patent must be derived from the
Indeed, none of the existing methods of patent valuation suggests translating the quality of a patent into monetary value. Rather, they all adopt a positive-economic perspective of valuation, which is based on financial predictions. The proposed idea of quantifying a patent’s quality is, thus, revitalizing. Yet, in this regard, two preliminary queries should be initially addressed: (1) what does this proposal exactly mean in “patent quality”? And (2), is there any empirical or other basis that supports creating a linkage between the quality of a given patent and its value? After addressing these queries, the next concern should relate to the practical application of this revitalizing idea of quantifying the quality of a patent. In particular, specific quality indicators should be defined and validated. Accordingly, the following discussion respectively addresses the two preliminary queries mentioned above. Subsequently, it introduces the proposed quality indicators and explains their merit.

A. What Is Patent Quality?

Although the term “patent quality” is heard everywhere, especially in conjunction with the near-universal demand “to improve patent quality,” a common and precise definition of “patent quality” is still missing. In fact, there are at least three different ways to approach patent quality. One is to evaluate “how well a patent meets the statutory requirements: patentable subject matter, utility, novelty, non-obviousness, and adequate written description and enablement.” According to this approach, “the grant of a patent that is not statutorily warranted gives the patent holder market power to raise prices or threaten litigation without providing any true benefit to the public.”

See Wagner, supra note 21, at 2137 (examining the undisputed need to improve patent quality).

See Wagner, supra note 21, at 2136 (asserting that patent lawyers universally seek to improve patent quality).

See Graf, supra note 58, at 499 (defining patent quality).

Graf, supra note 58, at 499.

Graf, supra note 58, at 499.
The second way to approach patent quality is to assess the validity and scope of the patent claims from the standpoint of certainty. A high quality patent, according to this approach, would be one whose “specific features . . . should be clearly defined, and the claims should be likely to be upheld in subsequent legal proceedings.” Granting patents of uncertain validity may impede innovation by causing patentees to under-invest in the field or by discouraging competitors from investing in further research for fear of infringement.

A third way to approach patent quality is from an economic perspective. A high quality patent, hence, could be “one that covers an invention that would not have been [developed] without the incentive of patent protection.” A different variation of this approach would be to evaluate the quality of a patent according to its commercial success. Note, however, that many patents that are not commercially successful could still be of “good quality from the standpoint of the statutory criteria and certainty.” Therefore, it is perhaps more accurate to view this approach to patent quality as “a subjective indicator of whether something is a desirable invention, rather than a reflection of the quality of the patent itself.”

This Article advances the first approach to patent quality. Accordingly, it associates patent quality with a patent’s compliance with

---

354 See Graf, supra note 58, at 499 (indicating a second way to measure patent quality); see also Bronwyn H. Hall & Dietmar Harhoff, Post-Grant Reviews in the U.S. Patent System-Design Choices and Expected Impact, 19 BERKELEY TECH. L.J. 989, 991 (2004) (asserting a high quality patent should have little uncertainty over its validity).
355 See Hall & Harhoff, supra note 354, at 991 (describing a high quality patent from the standpoint of certainty).
356 See Graf, supra note 58, at 499-500 (indicating consequences of granting uncertain patents).
357 See Graf, supra note 58, at 500 (describing the economic perspective as a means to value patent quality).
358 Graf, supra note 58, at 500.  
359 See Graf, supra note 58, at 500 (assessing patent quality in terms of commercial success).
360 Graf, supra note 58, at 500.  
361 Graf, supra note 58, at 500.  
362 See Graf, supra note 58, at 499 (evaluating patent quality based on statutory compliance).
the statutory requirements of patentability.\textsuperscript{363} Given this approach to patent quality, understanding the proposed social-normative perspective to patent valuation is a matter of simple logic: affording patent protection is justified if, and only if, the patent granted indeed “promote[s] the progress of science and useful arts.”\textsuperscript{364} When a patent meets the statutory requirements of patentability it is presumed to satisfy this constitutional mandate.\textsuperscript{365} Therefore, we should put our efforts into incentivizing the development of patents that comply with the statutory standards and penalize the development of patents that fail them.\textsuperscript{366} How? We must translate patent quality into patent value.

To achieve this goal, this Article suggests a two-step method of patent valuation. First, determining the quality of a given patent, according to the list of quality indicators proposed henceforth.\textsuperscript{367} Then, attaching a corresponding range of applicable values based on the proposed price limitations.\textsuperscript{368} Essentially, the proposed quality indicators derive from the statutory requirements of patentability.\textsuperscript{369} Ac-

\begin{itemize}
\item \textsuperscript{363} See Graf, supra note 58, at 499 (attributing patent quality to statutory conformity).
\item \textsuperscript{364} U.S. CONST. art. I, § 8, cl. 8.
\item \textsuperscript{365} See Boumediene v. Bush, 553 U.S. 723, 739 (2008) (articulating the presumption of constitutionality, granted to statutes and presuming Congress considers the constitutionality of laws and amendments).
\item \textsuperscript{366} See Wagner, supra note 21, at 2138 (discussing patent quality in relation to statutory standards).
\item \textsuperscript{367} See supra Part IV.C (describing patent quality indicators).
\item \textsuperscript{368} See supra Part IV.C. (describing the steps applied to patent quality indicators).
\item \textsuperscript{369} Note that after applying these steps and upon initiation of actual licensing negotiations, factors that do not relate to the quality of the underlying patent may be taken under consideration, as much as they can assist in determining the financial value of the patent and so long they comply with the attached price limitations. These may include the size of the relevant market, the dynamism of the market, the special characteristics of the underlying technology, and the general state of the economy. See supra Part IV.C.
\item \textsuperscript{360} See Graf, supra note 58, at 500-01.
\end{itemize}

Other methods of quantifying the quality of issued patents are: (1) USPTO internal quality assessment audits and (2) the rate of patent invalidity determinations in patent litigation. Both of these methods articulate \textit{ex post} measurements of patent quality as they depend on the initiation of a validity dispute. Accordingly, they are inapplicable in the context of this Article, where patent quality is determined \textit{ex ante}, upon issuance.

\textit{Id.}
Accordingly, there should be better chances that a patent designated as having more of these indicators actually meets the statutory requirements of patentability.\textsuperscript{370} Therefore, such a patent is more likely to promote the progress of science and useful arts.\textsuperscript{371} It should thus merit a high value.

\textbf{B. The Bases For Proposing A Social-Normative Perspective}

Turning to the second query, it is interesting to examine three different bases for the proposed theory’s social-normative perspective: the constitutional basis, the economic basis, and the empirical basis. Pursuant to the constitutional basis, patents exist “[t]o promote the Progress of Science and useful Arts.”\textsuperscript{372} Although they unavoidably block subsequent dependent innovation during the limited time of exclusiveness granted to their owners, in the long term, they incentivize innovation and increase public welfare.\textsuperscript{373} Thus, valuating patents from a social-normative perspective, according to their ability to benefit the public as whole, is constitutionally warranted.\textsuperscript{374}

Pursuant to the economic basis, patents are justified as means of incentivizing innovation.\textsuperscript{375} Indeed, a patent incentivizes innovation by granting its owner the sole right to exclude others from making, selling, using, or licensing the underlying invention.\textsuperscript{376} Any other individual who “makes, sells, uses, or licenses the invention or an equivalent thereof - even if that person invented it independently - infringes the patent and can be enjoined from practicing the patent and be made to pay damages.”\textsuperscript{377} In this sense, patents supply monetary incentives to innovators: innovate, and enjoy a government-sanctioned monopoly over the right to make money from your inven-

\begin{itemize}
\item \textsuperscript{370} See Wagner, \textit{supra} note 21, at 2138 (setting forth premise that high quality patents generally meet statutory requirements).
\item \textsuperscript{371} See U.S. CONST. art. I, § 8, cl. 8 (providing one of the benefits of patents)
\item \textsuperscript{372} See id. (introducing the specific constitutional language of the Patent and Copyright Clause to explain the constitutional purpose of patents).
\item \textsuperscript{374} See id. (setting forth the constitutional purpose of the Patent and Copyright Clause).
\item \textsuperscript{375} See White, \textit{supra} note 282, at 2-3 (noting that the purpose of the patent system is to spur innovation).
\item \textsuperscript{376} See White, \textit{supra} note 282, at 3 (discussing the foundation of the patent system).
\item \textsuperscript{377} Olson, \textit{supra} note 273, at 193.
\end{itemize}
To reinforce this monetary incentive, especially in regard to high quality innovation, this Article suggests drawing a parallel line between patent value and patent quality; rewarding inventions in accordance with their quality, thereby encouraging the development of socially beneficial inventions.\textsuperscript{379}

Finally, an empirical basis, showing a correlation between different measures of patent quality and measures of patent value, also supports adopting a social-normative perspective of patent valuation.\textsuperscript{380}

In this regard, a study conducted by Jean O. Lanjouw and Mark Schankerman used a compound of different indicators of “technological importance” (which they referred to as “quality”) to predict patent value.\textsuperscript{381} Specifically, they analyzed the following indicators of technological importance: (1) the number of patent claims as an indicator of the breadth of the technology claimed; (2) the number of forward citations (the number of citations received by posterior patents) as an indicator of the relevance of the patent for future research; (3) family size (the number of international patents filed for the same priority patent) as an indicator of the patent’s international importance and the holder’s willingness to incur high application costs; and (4) backward cites (the number of citations made to previous patents) as an indicator of the extent to which the patent makes use of the existing prior art.\textsuperscript{382}

Lanjouw and Schankerman examined the relation between these indicators of technological importance and the private value of patents in different fields of technology, as expressed by litigation and

\textsuperscript{378} See Olson, supra note 273, at 193 (discussing the monopoly granted to patent owners).
\textsuperscript{379} See Baron & Delcamp, supra note 184, at 9 (recognizing the strong link between patent quality and patent value).
\textsuperscript{380} See Jean O. Lanjouw, & Mark Schankerman, The Quality of Ideas: Measuring Innovation with Multiple Indicators 2 (Nat’l Bureau of Econ. Research, Working Paper No. 7345, 1999), archived at www.perma.cc/SZ7V-7CZZ (discussing the technological importance of patented innovation). Although this study uses a different definition of “patent quality,” they can be used to indicate that a correlation between value and quality does exist, even if not as direct as the one proposed in this Article. See id. (noting difference in definition).
\textsuperscript{381} See id. at 15-18. (identifying the four factors of the empirical study).
\textsuperscript{382} See Baron & Delcamp, supra note 184, at 9 (pointing to the study used to predict patent litigation and renewal to measure patent value).
renewal rates. Interestingly, they found a strong positive link between these two. Although they did not examine the precise measures of quality as those suggested by this proposal, their study remains relevant for showing that a meaningful correlation between some measures of patent value and patent quality practically exits, even if not in the same value in the different technological sectors.

C. The Proposed Quality Indicators

The following discussion suggests an open list of quality indicators that should be used to determine patent quality; defined in this proposal as, the patent’s compliance with the statutory requirements of patentability. Particularly, it presents four groups of quality indicators according to the different statutory requirements of patentability: The first includes quality indicators indicating the patent’s subject matter eligibility; the second indicates the patent’s utility; while the third reflects the patent’s novelty and non-obviousness; and the fourth focuses on the patent’s clarity and definiteness.

Recall, that a two-step method of patent valuation is advanced in this Article: first, determining the quality of a given patent; and then, attaching the corresponding price limitations. These steps must be completed upon issuance of a patent, as the proposed method of pa-

---

384 See Lanjouw & Schankerman, supra note 380, at 20-22 (relating the likelihood of patent litigation to forward citations, family size and claims).
386 See supra Part IV.A (defining the term patent quality).
388 See id. (specifying “useful” as a utility indicator).
391 See supra notes 367-368 and accompanying text (describing the two-step method of patent valuation).
tent valuation assumes an ex ante perspective. Therefore, to be considered as a quality indicator within the context of this proposal, any suggested indicator first must be found measurable at that preliminary point of time. Accordingly, some indicators of patent quality that had been previously suggested in the economic literature become inapplicable. For instance, the number of forward citations (the number of citations received by posterior patents) could not be used under the proposed theory. While these citations may provide a good indication regarding the relevance of the patent for future research, they cannot be measured upon issuance of a patent, and are thus inapplicable.

Finally, the author acknowledges the argument that assessing qualitative indicators of patent quality may be uncertain, in contrast to our patent system’s agenda, which aspires to certainty. Opponents of the theory proposed in this Article may further argue that this uncertainty may ultimately reduce the inventors’ incentive to inno-

---

392 See Graf, supra note 58, at 500-01 (identifying alternative methods of patent valuation). Accordingly, these methods are inapplicable in the context of this Article, where patent quality is determined ex ante, upon issuance.
393 See Graf, supra note 58, at 498 (inferring that the issuance of poor quality patents can be reduced at the preliminary level).
394 See Baron & Delcamp, supra note 184, at 5 (defining patent quality as “the size of the inventive step protected by the patent or as the relevance of the underlying technology for future use by follow-up innovators” because this is the standard nomenclature within economic literature). Although this proposal adopts a different definition, viewing patent quality as a given patent’s compliance with the statutory requirements of patentability, both definitions are generally interested in the social value of the patent, i.e. “the value added by the protected technology independently of who appropriates this value.” Compare Baron & Delcamp, supra note 184, at 5 with Hall & Harhoff, supra note 354, at 992 (looking to a patent’s statutory adherence and clarity to determine its quality). Accordingly, this proposal incorporates some of the previously recommended quality indicators into its own proposed list of quality indicators. See supra Part IV.C.
395 See Baron & Delcamp, supra note 184, at 9 (summarizing prior findings of empirical studies that examined relevance of patents’ forward cites in different industries).
396 See Lanjouw & Schankerman, supra note 380, at 14 (discussing the value of forward cites to empirical research of patent valuation).
397 See Erik S. Maurer, An Economic Justification for a Broad Interpretation of Patentable Subject Matter, 95 NW. U. L. REV. 1057, 1095 (2001) (discussing a recent and articulate defense of the importance of certainty in patent law).
Michael Abramowicz faced a similar criticism when he proposed a model for a system of prizes that will replace the patent system, where an agency will determine the size of the prize independently. His arguments in response to that criticism suit here perfectly:

Some of the uncertainty in the patent system itself is embedded in requirements that inevitably will require some judgment. Though concepts like nonobviousness receive detailed treatment in case law, no matter how much explanation of the concepts is provided, application ultimately requires some human judgment. As in law generally, the existence of litigation suggests that litigants sometimes have different predictions about the law, whether about patent validity or about patent scope. There can be more or less uncertainty and more or less litigation, but the high reversal rate in patent cases suggests that there are at least some difficult cases. More importantly, even in the absence of any doubt as to the validity and scope of a patent, inventors face considerable uncertainty about the commercial success of the innovation. A product may face unexpected competition, regulatory hurdles, or consumer indifference. These uncertainties may damper innovation somewhat, but probably not too much.

1. Indicators of Subject Matter Eligibility

The statutory requirement of subject matter eligibility is set forth in section 101 of the Patent Act of 1952: “Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.” Our Patent Act does not explicitly enumerate that which

399 Id.
is not patentable. According to courts, this statutory requirement to exclude "laws of nature, physical phenomena, and abstract ideas." This interpretation was based on the notion that subject matter covered by these exceptions must remain in the public domain in order to enable downstream research and application and promote innovation.

It is this Article’s proposition that the requirement of subject matter eligibility, as the “first door” an invention must pass through in order to obtain patent protection, should also reflect the extent to which the patent promotes innovation. Patents having a higher potential of promoting innovation should be assigned with a higher price range. Accordingly, the indicators included in this first group reflect the extent to which a patent promotes innovation. Although they are essentially qualitative and thus harder to evaluate, they are pertinent to the determination of patent quality.

a. To what extent was the patent’s development based on the Patent Act’s pecuniary incentives?

Patents that would not have been developed but for the patent law’s monetary incentive reflect an appropriate balance between the ex post costs of short-term monopoly and the benefits of higher ex

---

401 See Peter Yun-hyoung Lee, Inverting the Logic of Scientific Discovery, 19 HARV. J. L. & TECH. 80, 93 (2005) (stating “because the patent laws only define patentable subject matter affirmatively, they do not explicitly enumerate that which is not patentable.”).
403 See Lee, supra note 401, at 100 (stating “courts may reject these patents for policy reasons, particularly the prudential interest in keeping such subject matter in the public domain in order to enable downstream research and application”).
404 See Rebecca Eisenberg, Wisdom of the Ages or Dead-Hand Control? Patentable Subject Matter for Diagnostic Methods After In re Bilski, 3 CASE W. RES. J. L. TECH. & INTERNET 1, 43-44 (2012) (seeing the courts engage in a “gatekeeper role…at the point of entry to the patent system”).
405 See supra Part IV.C (discussing the basis for evaluating patent valuation).
406 See supra Part IV.C (declaring the benefits of innovation brought about by new patents).
407 See Perel, supra note 30, at 291-92 (discussing the detriment caused by allowing patents to be awarded to inventions “lacking any prospective commercial use”).
With such patents, the decreased competition and increased costs associated with patent monopoly are mitigated by the benefit society gains from increased innovation of new, useful, and nonobvious things.\(^{409}\) When valuing a patent under this indicator, the following evidence should be considered:

1. High research and development costs should indicate that the inventor was indeed incentivized by the patent law, believing she can recoup greater returns from her future invention than from other investments of her time and talent.\(^{410}\) “When the process of inventing involves relatively low monetary expenses, the inventor is likely to invent, regardless of the pecuniary incentives embedded in the right to exclude rivals from entering the market for her invention.”\(^{411}\) A patent covering such an invention should be designated as a low quality one and assigned with a low value range.

2. “Proof that the inventor did not engage in innovation, intending to consume the invention herself…When the inventor invents in order to gain an internal benefit from the invention, she has an isolated incentive to innovate, unrelated to the external incentive afforded by the grant of a patent.”\(^{412}\) A patent that covers such an invention is socially undesired and should therefore be valued at a lower range.

3. “Proof that other legal protections, such as trade secret law, are not available to protect the invention…”\(^{413}\) A patent that could have been protected through other legal means should be designated as a low quality one; it is likely that such a patent would have been developed regardless of the pecuniary incentive afforded by the grant of a patent.\(^{414}\) Such a patent should be hence price tagged on the lower side.

\(^{408}\) See Perel, supra note 30, at 283-84 (reflecting on the incentivizing role patents play in spurring technological progress).
\(^{409}\) See Perel, supra note 30, at 283-84 (concludes that although patent monopolies increase costs, the benefits received trump any disadvantages).
\(^{410}\) See Perel, supra note 30, at 296 (suggesting proof of high research and development costs should determine that the applicant has successfully satisfied his burden of proof).
\(^{411}\) Perel, supra note 30, at 296.
\(^{412}\) Perel, supra note 30, at 297.
\(^{413}\) Perel, supra note 30, at 297.
\(^{414}\) See Perel, supra note 30, at 296 (describing why inventors are likely to invent regardless of pecuniary incentive).
b. What is the patent’s prospected commercial use?

The social benefit of a given patent depends also on its commercial utility. Indeed, “[a]n inventor will not be rewarded and society will not be benefited until the invention passes into commercial channels.” Patents having no intended commercial use could be harmful. Patent trolls often seek such patents for the sole purpose of initiating infringement lawsuits and extorting un-proportional licensing fees. Accordingly, they should be designated as low quality patents and afforded with a low value rank.

To valuate patents under this indicator, it is suggested to implement professor Risch’s double-folded requirement for establishing commercial utility. First, it must be shown that there is a market for the patent. Second, it must be shown that the patent can be manufactured at a cost sufficient to fulfill market demand. The evidence presented by the patentee should thus establish “sufficient profit expectations by a reasonable producer to justify recovery of fixed costs and market demand of more than a handful of people.”

---

415 See Risch, supra note 373, at 1199-1200 (introducing the social benefits of commercial utility).
417 See Risch, supra note 373, at 1206 (noting patentee is harmed if the patent has no commercial value).
418 See Olson, supra note 273, at 189 (describing how some owners of patents extract payments from firms).
419 See Risch, supra note 373, at 1240-41 (establishing a two-pronged standard for defining commercial utility).
420 See Risch, supra note 373, at 1241 (discussing first factor for defining commercial utility).
421 See Risch, supra note 373, at 1241-42 (providing that in order to establish commercial utility, people must want to purchase the patent and the patent must be manufactured cost efficiently in order to satisfy the demand for it).
422 See Risch, supra note 373, at 1243 (establishing that although the commercial utility test requires minimal utility, it nevertheless requires a standard of “profit expectations” by a “reasonable producer”).
2. Indicators of Utility

The requirement that a patent be useful is incorporated under section 101 of the Patent Act.\textsuperscript{423} Essentially, an invention must be both operable and practical to be patentable.\textsuperscript{424} Operable usefulness requires that a patented invention achieve some intended result.\textsuperscript{425} Practical usefulness requires that a patented invention have some currently available specific and substantial use to be patentable.\textsuperscript{426} Section 112 is also relevant to the requirement of practical utility because it requires inventors to disclose how to use an invention.\textsuperscript{427} Pursuant to the proposed theory of valuation, patents having high utility should be designated as high quality patents and should be thus entitled to a higher value rank.\textsuperscript{428} The following indicator should assist the decision maker in valuing utility:

\textbf{a. The nature of the patent - It is an independent product or a small component in a downstream product?}

It is this Article’s proposition that a patent for an independent product has a higher utility, \textit{in and of itself}, than a patent for a small component in a downstream product. This is because the latter, if isolated from the end product, is practically useless.\textsuperscript{429} Accordingly,


\textsuperscript{424} See id. (reiterating that in order to be patentable, an invention must be a “useful improvement” under the Patent Act).

\textsuperscript{425} See Michael Risch, \textit{A Surprisingly Useful Requirement}, 19 GEO. MASON L. REV. 57, 65 (2011) (describing one of three categories of usefulness that invention can exhibit); see also Risch, \textit{supra} note 373, at 1200 (establishing that operable usefulness requires that a patented invention must achieve an intended result).

\textsuperscript{426} See Risch, \textit{supra} note 425, at 66 (clarifying that in order for the practical utility eligibility requirement to be satisfied, inventions must have “specific” and “substantial” use).

\textsuperscript{427} See 35 U.S.C. § 112 (2006) (discussing the requirements inventors must follow to receive a patent).


\textsuperscript{429} See Risch, \textit{supra} note 373, at 1208 (recognizing the argument that the invention is only a small piece of the whole and that redesigns would be expensive).
it should be designated as a low quality patent, consequently affording its owner with a small percentage of the product’s future profits. Such a designation should effectively limit its owner’s ability to charge excessive licensing fees and hold-up subsequent innovation. On the other hand, a patent on an end product has a high utility, in and of itself, and should therefore allow its owner to extract high percentages of the product’s future profits. Otherwise, there would be no correlation between what the patentee has actually contributed and what he is entitled for under the licensing agreement.

3. Indicators of Novelty and Non-Obviousness

Section 101 states that a patentable invention must be “new.” Section 102 defines the situations in which alleged novelty can be refuted. Generally, the requirement of novelty seeks to establish that the claimed invention did not exist and was unavailable to the public prior to the inventor’s application. Section 103 sets the statutory

---

430 The phrase “low quality patent” is intuitively negative, however, recall that in the context of this Article it merely yields to the degree of compliance of a given patent with the statutory requirements of patentability. It is true, that a patent on a tiny component can be extremely useful to another end product and it seems unjust to classify such a patent as a “low quality patent.” Nevertheless, the proposed quality assessment should be applied for the sole purpose of pricing the patent. The argument here is that our patent system should not allow the licensing price of a component to exceed the price of the end product. Otherwise, patent hold-up may result, for the detriment of society as a whole. See supra Part IV.A (discussing patent quality)

431 See Risch, supra note 373, at 1208 (speculating that the smaller contribution made to the patent’s overall utility should be equated to the profits earned).

432 See Graf and Lemley, supra text accompanying notes 287 and 339 (discussing the counters to price manipulation).

433 See Risch, supra note 373, at 108 (suggesting that an end product has an inherently higher value).

434 See Graf, supra note 58, at 498 (indicating that patent owners’ contributions provide leverage to licensing agreements).


437 See id. (affirming that for the invention to be considered a novelty it must not have been in existence prior to the inventor’s application for a patent).
requirement of non-obviousness. Essentially, this statutory requirement asks whether the invention would have been readily apparent to a skilled worker in the specific field. Analysis for obviousness must therefore examine all relevant prior art to determine whether the claimed invention represents a significant advancement beyond what was already known. The following group of indicators should assist the decision maker in determining a patent’s degree of novelty and non-obviousness:

a. Backward cites or the number of citations made to previous patents.

This quantitative indicator reflects the extent to which the patent makes use of existing prior art. It can hence assist the decision maker in determining the degree of inventiveness of a given patent. Arguably, patents citing a long list of references would not be groundbreaking. On the other hand, patents citing a very short list of references are more likely to be “pioneering.” As such, they are presumably of higher quality, and should be thus entitled to a higher value rank.

438 See 35 U.S.C. § 103 (2006) (establishing the difference between the new invention must not have been obvious prior to claiming the invention).
439 See id. (establishing the non-obvious subject matter condition for patentability).
441 See Baron & Delcamp, supra note 184, at 6 (establishing one indicator in determining patent quality).
442 See Baron & Delcamp, supra note 184, at 6 (indicating justification for backward cites indicator).
443 See Baron & Delcamp, supra note 184, at 6 (indicating backward cites can help determine the originality of a patent).
444 See Baron & Delcamp, supra note 184, at 12 (indicating patents referencing a high number of essential patents are less innovative).
445 See Baron & Delcamp, supra note 184, at 12 (indicating patents with a shorter list of references are more innovative).
446 See Baron & Delcamp, supra note 184, at 14-15 (concluding backward citations are useful for screening out low quality patents).
b. Generality index: 447

This is another quantitative indicator that is often used in the economic literature studying patent quality. 448 Basically, it measures the dispersion of prior art over technology classes to indicate that the patent covers a fundamental rather than incremental innovation. 449 The degree of inventiveness is arguably higher when the patent covers a fundamental invention. 450 Presumably, such a patent represents a significant advancement beyond what was already known, and should be hence entitled to a higher value rank. 451

c. Family size: 452

This quantitative indicator measures the number of international patents filed for the same priority patent to indicate that the patent is important on an international scale, and that its holder is willing to incur high application costs. 453 Allegedly, patents with a higher degree of inventiveness have a bigger family size. 454 Such patents should be designated as high quality patents and should thus merit a higher value rank. 455

447 See Baron & Delcamp, supra note 184, at 6 (establishing another indicator in determining patent quality).
448 See Baron & Delcamp, supra note 184, at 5 (asserting generality is another indicator used in determining patent quality).
449 See Baron & Delcamp, supra note 184, at 6 (indicating justification for generality indicator).
450 See Baron & Delcamp, supra note 184, at 15 (noting that being a fundamental invention results in higher quality).
451 See Baron & Delcamp, supra note 184, at 15 (noting that fundamental patents are of better quality than patents disclosed later in the process).
452 See Baron & Delcamp, supra note 184, at 6 (establishing another indicator used in determining patent quality).
453 See Baron & Delcamp, supra note 184, at 6 (indicating justification for family size indicator).
454 See Baron & Delcamp, supra note 184, at 12 (arguing essential patents have a bigger family size).
455 See Baron & Delcamp, supra note 184, at 12 (arguing a bigger family size corresponds to a higher quality patent).
d. The nature of the industry in which the invention occurs:456

This qualitative indicator may provide a reasonable indication of the patent’s degree of inventiveness, assuming inventions occurring in cumulative industries, i.e. electronics and computers, are most likely incremental, and thus less innovative than, say, pharmaceutical inventions.457 Accordingly, patents covering incremental inventions should be entitled to a lower value rank.

4. Indicators of Clarity and Definiteness

Section 112 of the Patent Act requires that patentees publish to the world a description of their invention sufficient to enable one of ordinary skill in the art to make and use it, as well as their best mode of implementing the invention.458 Providing a clear and definite disclosure is necessary to permit competitors to make use of the patented invention once the patent expires.459 It also enables others to improve on the patented technology during the term of the patent itself.460 The clearer and more concise the written description, the better it serves these socially beneficial objectives.461 The following indicator should assist in evaluating a given patent’s compliance with the statutory requirements of section 112:

457 See id. at 1339-40 (indicating the nature of the industry in which the invention occurs may be relevant).
459 See Pitney-Bowes Inc. v. Mestre, 701 F.2d 1365, 1372 n.12 (11th Cir. 1983) (indicating patent holders must provide full disclosure of their patents to avoid monopoly).
461 See Graf, supra note 58, at 499 (describing the patent holder’s power to raise prices or threaten litigation when a patent is not adequately defined to the public).
a. The breadth of the patent’s claims:

Arguably, the broader the patent’s claims, the less clear and precise they are about the subject matter they cover.\textsuperscript{462} Such patents are more likely to be abused by so called patent trolls.\textsuperscript{463} Indeed, “[b]y asserting overbroad, obvious, or non-novel patents . . . patent trolls often force alleged infringers to choose between paying licensing fees for a patent that they believe is invalid or facing costly and protracted litigation.”\textsuperscript{464} Hence, broad patents should be designated as having low quality and be thus assigned with a low price range.\textsuperscript{465}

Determining the quality of a given patent pursuant to this proposed list of indicators entails a common law, case-by-case analysis.\textsuperscript{466} While in some cases, the degree of inventiveness would be strikingly low; in other cases the prospected commercial utility would be the most influential.\textsuperscript{467} Whatever factor dominates, the key to performing a correct analysis under this proposed list is flexibility; all factors (including those incorporated into this list over time) should be weighted, yet the final decision should be based on the one factor dominating any given case.\textsuperscript{468}

V. DEFINING FLEXIBLE PRICE LIMITATIONS

In its second point of novelty, the proposed theory of patent valuation wishes to create flexible limitations over the prospected licensing price, unlike other methods of patent valuation that attempt to set

\textsuperscript{462} See Graf, supra note 58, at 500 (characterizing good quality patent claims as clearly defined and likely to be upheld in future court proceedings).
\textsuperscript{463} See Graf, supra note 58, at 498 (noting poorly defined patents are seen as more attractive to patent trolls in order to profit from outside infringement).
\textsuperscript{464} Graf, supra note 58, at 498.
\textsuperscript{465} See Graf, supra note 58, at 498 (discussing the correlation between broad patent’s and their value).
\textsuperscript{466} See Baron & Delcamp, supra note 184, at 6 (summarizing the main indicators of patent quality).
\textsuperscript{468} See id. (discussing how factors can be either blended or viewed separately to determine the outcome of the case).
a single fixed price.\textsuperscript{469} In particular, it suggests that each issued patent would be tagged with a specific color indicating an upper limitation and a lower limitation over the final licensing price the negotiating parties could ultimately set.\textsuperscript{470}

These price limitations would be extracted in terms of specific percentages of the actual revenue the product covering the patented inventions would eventually produce.\textsuperscript{471} It is recommended that a special division within the United States Patent and Trademark Office would be nominated to perform the task of setting actual limitations over the ultimate licensing price.\textsuperscript{472} As proposed henceforth, the members of this division would possess specific economic qualifications, in addition to the qualifications possessed by regular patent examiners, which should qualify them to accomplish this task successfully.\textsuperscript{473}

As a general matter, the higher the quality of the patent, the higher would be the percentage of revenue attached to it.\textsuperscript{474} For instance, a possible set of limitations could determine that a very low quality patent could be licensed for no more than 0.5\% of the actual revenue; that a patent having better quality could be licensed for no more than 5\% of the actual revenue; that a patent having intermediate quality could be licensed for no more than 10\% of the actual revenue; that a patent having high quality could be licensed for no more than 25\%, and so on.\textsuperscript{475} While still permitting some leeway for specific negotiations according to the particular circumstances surrounding the underlying license negotiations, these limitations would directly reflect

\textsuperscript{469} See contra INTELLECTUAL PROPERTY, supra note 7, at 148-50 (describing various patent valuation methods that attempt single fixed price).
\textsuperscript{470} See contra INTELLECTUAL PROPERTY, supra note 7, at 148-50 (calculating fixed licensing prices without limitations).
\textsuperscript{471} But cf. INTELLECTUAL PROPERTY, supra note 7, at 150-52 (explaining income producing capabilities of intellectual property).
\textsuperscript{472} See infra Part VI.A (proposing special division within the USPTO).
\textsuperscript{473} See infra Part VI.A (describing qualifications for employees for proposed division).
\textsuperscript{474} See Graf, supra note 58, at 500 (assessing relationship between patent quality and commercialization of property).
\textsuperscript{475} But cf. Graf, supra note 58, at 500 (stating that high quality patent allows for greater profits).
the quality of the issued patent according to its different quality traits.\textsuperscript{476}

This Article is persuaded that dictating such a structured method of patent valuation with appropriate price limitations is advantageous for several reasons. First and foremost, it could hamper the ability of patent owners with strong bargaining powers to reap un-proportional revenues through exaggerated licensing fees.\textsuperscript{477} In particular, because the limitations over the licensing price would be set ex ante, patent owners would be restrained from exploiting ex post opportunism.\textsuperscript{478} They would be prevented from demanding overly priced licensing fees that hold-up the development of downstream products, especially in those instances where patents eventually mature into essential products.\textsuperscript{479}

Second, this structured method of patent valuation is capable of increasing certainty and predictability that promote innovative activity.\textsuperscript{480} Potential inventors in industries characterized as cumulative, who must license upstream inventions in order to develop sequential innovative products, would be able to better predict their research and developments costs if the value of patents is subject to ex ante limitations.\textsuperscript{481} In this regard, the proposed method would arguably minimize the risk of prospective inventors facing unexpectedly high expenses abandoning a potentially socially beneficial project.\textsuperscript{482}

\begin{itemize}
  \item See supra Part IV.A (exploring ways to assess patent quality).
  \item See supra Part III.C (exposing abusive price manipulation techniques).
  \item See Lemley & Shapiro, supra note 31, at 2005-06 (discussing how downstream firms are implicated by the hold-up); see also James Bessen, Holdup and Licensing of Cumulative Innovations with Private Information, 82 ECON. LETTERS 321, 321-26 (2004) (supporting the general proposition that as more rights are given to patent owners, less innovation will occur).
  \item See supra Part III.C (discussing how patent valuation can lead to an increase in innovative activity)
  \item See Jerry R. Green & Suzanne Scotchmer, On The Division of Profit in Sequential Innovation, 26 RAND J. ECON. 1, 20 (1995); see also Carl Shapiro, supra note 181, at 135 (describing the benefits of ex ante competition on patents).
  \item But see Bessen, supra note 479 (the economic model developed by James Bessen, shows that when development costs are private information, \textit{ex ante} licensing will not prevent hold-up in cumulative innovation).
\end{itemize}
Understanding the above benefits of the proposed theory’s price limitations is a rather easy task. Yet, appreciating how these price limitations should practically be determined in order to achieve these goals is much more difficult. It obviously requires a separate comprehensive research, accomplishment of which is beyond the scope of this Article. Nevertheless, this Article does hope to establish the foundation for the development of such a stimulating research. Accordingly, it suggests henceforth several resources that should be considered as general guidelines in any future research wishing to determine price limitations that are not only appropriate but also reasonable and realistic.

A. Rules Of Thumb

One possible resource the regular might wish to consider before forming the proposed price limitations is the “Rules of Thumb” method for valuing patents.\(^{483}\) As explained earlier, rules of thumb are often used to price patents for purposes of licensing.\(^{484}\) In essence, they facilitate the formation of a licensing deal where the parties are uncertain about whether the invention can be profitably exploited.\(^{485}\) A standard rule calls for 5% of sales revenues or 25% of operating profit margin to be paid to the patent holder.\(^{486}\) Another rule that is used frequently calls for a 25%/75% profit splitting.\(^{487}\) While the Court of Appeals for the Federal Circuit has recently rejected the “rule of thumb” approach in determining ex post patent damages, these rules may nonetheless provide the regulator with a general framework for setting ex ante price limitations that are both reasonable and realistic.\(^{488}\)

\(^{483}\) See supra Part II.A.1 (defining the “Rules of Thumb” as a way to price patents for the purpose of licensing).
\(^{484}\) See supra Part II.A.1 (explaining the uses of the “Rules of Thumb” method).
\(^{485}\) See Denton & Heald, supra note 97, at 1215 (analyzing how to predict the changes in revenue after a patented invention).
\(^{486}\) See Geradin & Layne-Farrar, supra note 102, at 778 (noting a common rule used for valuing licensed patents).
\(^{487}\) See Stiroh & Rapp, supra note 7, at 7 (defining “profit splitting” rule).
\(^{488}\) See Uniloc USA, Inc. v. Microsoft Corp., 632 F.3d 1292, 1315 (Fed. Cir. 2011) (finding that “the 25 percent rule of thumb is a fundamentally flawed tool for determining a baseline royalty rate in a hypothetical negotiation . . . because it fails to tie a reasonable royalty base to the facts of the case at issue”).
B. The Rules Governing the Determination of Reasonable Royalty

Another relevant resource the regulating body may want to consult before defining specific price limitations are the rules governing the determination of damages in cases involving patent infringement. Section 284 of Title 35 sets the criteria for the fixing of damages. Due to its broad application, two types of judicially created damages awards were formulated: The first is the “lost profits” measure, which estimates the patentee’s profits based on his actual damages, and the second is the “reasonable royalty” measure. This later measure wishes to estimate what the patentee and the licensee would have freely agreed upon had there been no infringement suit. Accordingly, its implementation in previous case law should provide the regulator with some relevant insight to determine the license’s value in practice.

Generally, a reasonable royalty is calculated under one of the following two methods. The first is the “analytical approach,” under which the infringer’s profit predictions relating to the infringing product or process are apportioned between the patentee and the infringer. The second method is the “willing licensor-willing licensee” method.

489 See 35 U.S.C. § 284 (2012) (codifying damages for patent infringement). The United States Code, which governs patent law and procedure, permits damages as one type of remedy for patent infringement. Id. Title 35 also permits injunctions as a patent infringement remedy. Id. at § 283.
492 See SKENYON, ET AL., supra note 491, at § 1:13 (estimating reasonable royalty as measure of damages).
493 See SKENYON, ET AL., supra note 491, at § 1:13 (asserting license values is versatile and best inferred from previous case law).
494 See SKENYON, ET AL., supra note 491, at § 1:14 (describing methodology for determining a reasonable royalty).
495 See The Analytical Approach, ACUITAS, archived at www.perma.cc/0NBsd3MdjLa (discussing analytical approach to measuring reasonable royalties). The “analytical approach” involves “calculating damages based on the infringer’s own internal profit projections for the infringing item at the time the infringement began, and then apportioning the projected profits between the pa-
see” approach, which imagines a hypothetical negotiation between
the patentee as a willing licensor and a willing licensee.496 Georgia-
Pacific Corp. v. United States Plywood Corp497 enumerated fifteen
factors that courts may consider when attempting to construct this
hypothetical negotiation.498

Any future research wishing to define practical limitations over
the value of patent licenses would benefit from studying the case law
that implements the measure of reasonable royalty and should con-
sider the effect of those Georgia-Pacific factors that relate to the
quality traits of the patented invention over the determined royalties.499
Note, that factors that relate to the external circumstances sur-
rounding the hypothetical licensing negotiations as well as factors
that can only be measured ex post, upon the filing of an infringing
suit, are irrelevant under the proposed theory.500 Therefore, only af-
fter their impact upon the determination of royalties under the measure
of reasonable royalty is neutralized, could these royalties be consi-
ered as guidelines for forming the proposed price limitations.501

tent owner and the infringer.” Id.; The Patent Prospector: Panning the Patent
Stream, PATENTHAWK (Sept. 11, 2009), archived at www.perma.cc/0iRPoqKExsD
(expanding on the analytical approach to reasonable royalties).
496 See ACUITAS, supra note 495, (detailing the royalty the parties would have
agreed had they negotiated prior to infringement).
497 See Georgia-Pacific Corp. v. United States Plywood Corp., 318 F. Supp. 1116
(S.D.N.Y. 1970), mod. and aff’d, 446 F.2d 295 (2d Cir. 1971), cert. denied, 404
U.S. 870 (1971) (No. 99-195) (highlighting the issue of patent infringement and
concluding that a plaintiff could be awarded damages based on a royalties estimate
for the amount of patented product made and sold by defendant).
498 See id. at 1120 (introducing factors pertinent to the issue of royalty for a patent
license).
70745, 90-91 (D. Del. 2013) (stating that the Georgia-Pacific factors are “widely
accepted to calculate a reasonable royalty rate.”); Datatreasury Corp. v. Wells Farg-
o & Co., 2011 U.S. Dist. LEXIS 118443, 26 (E.D. Tex. 2011) dismissed in part by
432 Fed. Appx. 974 (Fed. Cir. 2011) (discussing the district court’s reliance on
Georgia-Pacific analysis for guidance on reasonable royalty damages assessments);
out that most courts look to Georgia-Pacific’s fifteen factors to calculate reasona-
bly royalty).
500 See supra Part II.B.2 (describing ex post patent valuation).
501 See supra Part II.B.2 (describing ex post patent valuation).
Accordingly, the utility and advantages of the patent over old modes or devices should be found relevant as it is directed to the quality of the patented invention. Similarily, the nature of the patented invention should definitely be taken under consideration. Also, “[t]he portion of the profit or of the selling price that may be customary in the particular business or in comparable businesses to allow for the use of the invention or analogous inventions” should be found relevant when setting the proposed price limitations.

On the other hand, the nature and scope of the license, the licensor’s established policy and marketing program and the commercial relationship between the licensor and the licensee (i.e., whether they are competitors in the same territory in the same line of business, or whether they are inventor and promoter) should be disregarded as they are external to the quality traits of the patented invention. Similarly, the royalties received by the patent owner for the licensing of the patent-in-suit, the rates paid by the licensee for the use of other comparable patents, the effect of selling the patented specialty in promoting sales of other products of the licensee, the extent to which the infringer has made use of the invention and any evidence probative of the value of that use should generally remain outside the group of relevant considerations as these factors can only be evaluated ex post, upon initiation of an infringement suit.

Presumably, the amount of patent damages determined during litigation, especially those determined pursuant to the measure of rea-

502 See Georgia-Pacific, 318 F. Supp. at 1120 (presenting factor 9 which states, “9. The utility and advantages of the patent property over the old modes or devices, if any, that had been used for working out similar results.”).

503 See Georgia-Pacific, 318 F. Supp. at 1120 (presenting factor 10 which states, “10. The nature of the patented invention; the character of the commercial embodiment of it as owned and produced by the licensor; and the benefits to those who have used the invention.”).

504 See Georgia-Pacific, 318 F. Supp. at 1120 (concluding that when setting price limitations, customary profit or selling prices in particular businesses may be considered)

505 See Georgia-Pacific, 318 F. Supp. at 1120 (listing as factors 3 through 5 certain market considerations).

506 See supra Part.IV.A (looking to less subjective valuation systems than ex post market dynamics to determine patent value).

507 See Georgia-Pacific, 318 F. Supp. at 1120 (listing among the 15 factors a number of ex post facts which can only be considered following suit).
reasonable royalty, are excessive. Indeed, a study conducted by Mark Lemley and Carl Shapiro, which analyzed cases reported by Westlaw from 1982 through mid-2005 in which courts awarded a reasonable royalty to the patentee, revealed that the mean reasonable royalty rate for that sample was just over 13% of the price of the infringing product. This number, according to Lemley and Shapiro’s conclusions, is much higher than market royalty rates and even rates negotiated as part of settlement agreements. For this reason, the undue values determined under reasonable royalty should not be adopted automatically as price limitations pursuant to the proposed theory. Instead, they should only be considered as general guidelines.


Databases containing information regarding licensing revenues obtained by different firms, statistics of patent licensing, and surveys that examine how much patent owners in different fields of innovation charge for licensing their patented inventions should also assist the regulator in determining representative price limitations accord-

---


509 See Lemley & Shapiro, supra note 31, at 2030-32 (providing an empirical analysis of royalty rates awarded in patent litigation cases).

510 See Lemley & Shapiro, supra note 31, at 2032-33 (outlining the statistical evidence found by Lemley and Shapiro in regards to reasonable royalty rates in trial verdicts).

511 See Lemley & Shapiro, supra note 31, at 2035 (stating that the litigation data suggest that the reasonable-royalty rules do in fact accommodate component products but only to a limited extent).

512 See Lemley & Shapiro, supra note 31, at 2035 (concluding that the undue values determined under reasonable royalty should only be used as general guidelines in determining price limitations).
ing to the proposed theory of patent valuation. Reflecting actual values, these resources should help define price limitations that are not only appropriate but also realistic.

With no central database containing information about revenues obtained through patent licensing, it is suggested that the regulator refer to the annual reports of innovative firms that are accessible to the public and obtain information regarding their royalty income. Presumably, the best starting point would be large, innovative firms (e.g., IBM, Dow Chemicals) which place parts of their patent and know-how portfolios for trade on their websites; it is expected that such firms would allow public access to data regarding patent licensing. For those firms that do not allow access to licensing revenues, perhaps a good search alternative could be different financial publications and other online resources that contain general estimations of licensing income.

Statistics analyzing different licensing agreements could be another useful resource the regulator might want to consult prior to setting price limitations pursuant to the proposed theory. Finally, the regulating body should also consider surveying the parties to differ-


\[514\) See id. at 5-7 (noting how patent investors use licensing revenues and regulation disclosures to assign values to patents).

\[515\) See id. at 7 (discussing their method for determining how companies report royalty income from patent licensing). The authors conducted an automated keyword search of “royalty,” “licensing income,” and similar terms in firms’ annual reports and 10K filings available on NEXIS during the period 1990-1998. Id. In this way, they identified 198 companies that report the amount of royalty income from the licensing of technology. Id.

\[516\) See id. at 3 (describing how large innovative companies are making their patent information available on online exchanges); see, e.g., 2011 IBM ANN. REP. 53, archived at www.perma.cc/0j9LMUGNsut; 2011 DOW ANN. REP. 97, archived at www.perma.cc/0qhZWsw2YyfX (showcasing public access to records of company IP transactions).

\[517\) See e.g., David R. Jarczyk, Replacing the 25 Percent Rule with Fact-based Evidence: A Guide to Finding and Analyzing Royalty Rates, KtMINE (2013) archived at www.perma.cc/0j37FA4sAeB (advocating for royalty rates to be determined by analyzing fact-based evidence); see also Licensing Royalty Revenue, INVENTION STATISTICS (Oct. 15, 2013) archived at www.perma.cc/0e8S8ZrzHP (displaying statistics analyzing different licensing agreements for various companies).
ent licensing agreements in different fields of innovation to realize what license values are being set under the current free market regime.  

VI. REGULATING THE PROCESS OF PATENT VALUATION

Another important point of novelty of the proposed theory of patent valuation concerns its implementation. Particularly, the proposed theory suggests nominating a regulating body that would price tag each issued patent according to its specific quality traits. Appointing such a regulator would ensure objectivity, stability, predictability and proficiency in applying the proposed method. It would also warrant against price manipulations carried out by those having strong bargaining power.

Against this novel idea of regulating the process of patent valuation stands the basic principle of the law of contract: freedom of contract. As explained by Professor Kessler,

the rules of the common law of contract have to remain Jus dispositivum--to use the phrase of the Romans; that is, their application has to depend on the intention of the parties or on their neglect to rule otherwise . . . Beyond that the law cannot go. It has to delegate legislation to the contracting parties. As far as they are concerned, the law of contract has to be of their own making.

Setting ex ante limitations over the patent’s price allegedly interferes with this fundamental principle of freedom of contract; indeed, in the realm of patent law, this principle is vital to ensure the continu-

---

518 See Jarczyk, supra note 517 (recognizing that the use of third-party license agreements that are sufficiently similar to the subject situation or tested transaction is a valid measure of patent value).
519 See infra Part VI.A.2 (proposing a special division of the USPTO is created).
521 See supra Part III.C (recognizing price manipulations in patent licensing).
522 See Kessler, supra note 213, at 629 (discussing the basic principal of freedom of contract).
523 Kessler, supra note 213, at 629.
ing development of inventions.\textsuperscript{524}\footnote{See Lemley, supra note 2, at 130 (presenting issues surrounding ex ante method of patent valuation).} Indeed, by affording the patentee with exclusive control over the price of her invention, patent law gives her a mechanism by which she can recoup her research and development costs.\textsuperscript{525}\footnote{See Cotropia, supra note 2, at 168-174 (stipulating patent laws’ limited exclusive protection incentivizes inventors).} Yet, if this exclusive control would be limited, her incentive to invent would be arguably impaired.\textsuperscript{526}\footnote{See Christopher A. Cotropia, Compulsory Licensing Under TRIPS and the Supreme Court of the United States’ Decision in eBay v. MercExchange, in PATENT LAW: A HANDBOOK OF CONTEMPORARY RESEARCH, 557, 559 (Toshiko Takenaka ed., 2008) (describing potential decline in inventions from limiting patentee’s exclusive control).} 

Accordingly, the remainder of this section addresses two issues: first, it discusses the technical aspects associated with the establishment of the proposed regulatory body.\textsuperscript{527}\footnote{See infra Part VI.A.1 (outlining steps to establish regulatory body).} Thus, it explains who this regulator should be, its members’ qualifications, the valuation process and how it can be financed.\textsuperscript{528}\footnote{See infra Part VI.A.2 (suggesting most qualified regulator).} Second, this section attempts to justify the proposed theory’s interference with the fundamental principle of freedom of contract.\textsuperscript{529}\footnote{See infra Part VI.B.2 (rationalizing interference with freedom of contract).} In essence, it argues that regulating the price of inventions - a form of privately produced public goods - is appropriate as means of ensuring their continued provision.\textsuperscript{530}\footnote{See infra Part VI.B.1 (arguing regulating patent pricing would promote continued invention).} In fact, this section contends, the proposed price limitations constitute a legitimate imposition of compulsory licensing used to encourage socially beneficial innovation; because these limitations comply with the international requirements governing the use of such licensing, they constitute a defensible governmental intervention notwithstanding the regulatory boundaries they impose over the patentee’s freedom of contract.
A. Establishing a Regulating Body

1. The Patent and Trademark Office Is The Most Suitable Regulating Body To Implement The Proposed Theory

It is this Article’s proposition that the most suitable body to implement the proposed theory of patent valuation is the United States Patent and Trademark Office (USPTO). Two main reasons account for this contention: First, as a technical matter, the proposed theory promotes an ex ante method of valuation, according to which patents are valued upon issuance. Since the whole process of patent examination is performed at the USPTO, it only makes sense to nominate the USPTO as the body in charge of price tagging issued patents. In this regard, the USPTO is well equipped with various databases necessary to execute patent quality valuations. In particular, it possesses three computer systems: Examiner’s Automated Search Tool (“EAST”), Web-Based Examiner Search Tool (“WEST”), and Foreign Patent Access System (“FPAS”), which allow access to prior U.S. patents, foreign patent abstracts, certain pending U.S. applications, and additional proprietary database libraries.

Second, as a substantive matter, the proposed theory suggests creating a direct linkage between patent value and patent quality. As discussed earlier, patent quality, according to the proposed theory, “is the capacity of a granted patent to meet (or exceed) the statutory standards of patentability—most importantly, to be novel, nonobvi-

531 See UNITED STATES PATENT AND TRADEMARK OFFICE: PATENTS (2013), archived at www.perma.cc/03qVSQTr28 (describing general information regarding USPTO).
532 See supra Part IV.B, at 60-64 (asserting grounds for adopting social normative ex ante method of valuation).
533 See UNITED STATES PATENT AND TRADEMARK OFFICE: PROCESS FOR OBTAINING A UTILITY PATENT (2013), available at www.perma.cc/0tkv7bzYSTX (outlining the current process to obtain a utility patent).
535 See id. at 134-5 (listing the databases available to the USPTO).
536 See Baron & Delcamp, supra note 184, at 9 (acknowledging empirical literature linking patent quality and value).
ous, and clearly and sufficiently described.”\textsuperscript{537} Undoubtedly, the USPTO, as the governmental body responsible for examining patent applications according to the statutory requirements for patentability, is optimally situated to execute accurate quality assessments.\textsuperscript{538} Indeed, not only that patent examiners possess paramount knowledge regarding the heart and core of the statutory requirements for patentability, they also have incomparable experience with respect to their application and valuation.\textsuperscript{539}

2. **Forming A Special Division For The Purpose of Price Valuation**

While the USPTO is proposed as the most suitable regulating body capable of adequately implementing the proposed theory of price valuation, it is this Article’s contention that a special division within the USPTO should be nonetheless nominated.\textsuperscript{540} Accordingly, it is proposed that a special division of qualified patent examiners would be established.\textsuperscript{541} These quality examiners should possess some additional qualifications, beyond the common qualifications all patent examiners possess.\textsuperscript{542}

In particular, because the proposed quality indicators must be quantified into numeric values, it is advisable that the members of the special division would hold advanced degrees in economics.\textsuperscript{543} Indeed, “the most sophisticated search tools, and the clearest applications and standards are unavailing if the USPTO does not hire, train, and retain talented, dedicated employees.”\textsuperscript{544} Accordingly, requiring

\textsuperscript{537} Wagner, \textit{supra} note 21, at 2138.
\textsuperscript{539} See \textit{United States Patent and Trademark Office: Patent Examiner Positions} (last modified Nov. 16, 2003), \textit{archived at} www.perma.cc/0zMQ1FiqNt6 (outlining requirements, responsibilities and training for patent examiners).
\textsuperscript{540} See USPTO, \textit{supra} note 531 (offering current USPTO divisions).
\textsuperscript{542} See USPTO, \textit{supra} note 539 (listing qualifications of USPTO examiners).
\textsuperscript{543} See USPTO, \textit{supra} note 539 (articulating current qualifications for patent examiners).
the members of the special division to hold advanced degrees in economics would ensure proficiency and competence in applying the proposed theory.\footnote{See USPTO, supra note 539 (setting forth current requirements for examiners).}

3. The Quality Assessment Process

The process of assessing the quality of an issued patent, based on the proposed list of quality indicators, will essentially resemble the process of determining patentability: the patent applicant will be required to submit, in addition to his application and required fees, all relevant evidence that may assist the quality examiner in determining his patent’s quality.\footnote{See USPTO, supra note 533 (comparing the similarities between the current system of determining patentability with the proposed process for assessing the quality of patents issued).} This may include, among others, proof of research and development expenses, evidence of expected commercial success and evidence that show the patent’s anticipated use as a component or an end product.\footnote{See USPTO, supra note 533 (using similar qualifications in place for the proposed system as is in place with the current patentability system).} A quality examiner will then determine the quality of the patent, assign it with corresponding price limitations and submit it to the patent owner with his certificate of issuance.\footnote{See USPTO, supra note 541 (discussing the determination of quality of patents).} The patent owner will then have 30 days to contest this valuation and submit his opposition with an additional fee.\footnote{See USPTO, supra note 541 (setting forth the time frame patent holders will have to contest valuation).} Within this period of time, the patent will remain valid, but his owner will have to suspend any licensing negotiations until he receives his patent’s final valuation.\footnote{See USPTO, supra note 541 (discussing the appeals process).} A board of appeals that consists of three quality examiners will review the opposition and re-determine the patent’s valuation.\footnote{See USPTO, supra note 539 (discussing the appeals process).} The board’s value determination will be final.\footnote{See USPTO, supra note 539 (discussing the appeals process).}
4. Financing the Establishment of The Special Division

Finally, establishing the recommended special division may arguably impose additional administrative costs on the patent system. Indeed, pursuant to the above proposal, additional examiners who possess advanced degrees in economics would be inevitably hired and those examiners would be reasonably compensated for their work. It is therefore proposed, that these additional administrative costs would be financed either by patent applicants, through elevated patent application fees, or by the general public, through increased tax rates.

Note, however, that in the long term, these heightened administrative costs may be ultimately mitigated due to the prospective decrease in low quality patent applications. Indeed, since the proposed theory purports to create a direct and positive linkage between patent value and patent quality, it would presumably increase the incentive for filing high quality patent applications, while decreasing the incentive to file low quality ones. Supposing it is generally harder to develop high quality inventions than low quality ones, in the overall, the number of patent application should eventually decrease. Such a prospective reduction in the number of overall patent applications should, in turn, reduce the volume of human capital necessary to manage the examination process. Conceivably, then, the initial increase in administrative costs should only be tempo-

553 See USPTO, supra note 544, at 16 (establishing the U.S. Patent and Trademark Office incur administrative costs).
554 See USPTO, supra note 544, at 16 (inferring that employment would increase for persons with advanced degrees).
555 See Setting and Adjusting Patent Fees in Accordance with Section 10 of the Leahy-Smith America Invents Act, UNITED STATES PATENT AND TRADEMARK OFFICE REGULATORY IMPACT ANALYSIS 95 (Jan. 18, 2013), archived at www.perma.cc/0R86SNDfniv (offering alternatives to the current patent fee system).
556 See id. at 5 (suggesting that an increase in patent application fees could reduce the number of patent applications).
557 See id. (analyzing the benefits of increased patent application fees).
558 See id. (affirming an increased patent application fee will decrease the number of patent applications).
559 See id. at 15 (concluding that the more patent applications there are, the more the Patent Office will need to expand in terms of salaries, benefits, and human capital).
In any event, though, some increase in administrative costs should be tolerable, especially if a substantial improvement in patent quality is expected to follow.\footnote{See id. at 5 (suggesting a three month patent operating reserve to support sustainable funding).}

**B. Justifying The Regulation of Patent Pricing**

1. **Public Goods, Innovation and Exclusive Rights**


   Public goods are typically defined in terms of two qualities: non-rivalry in consumption and non-excludability.\footnote{See ROBERT COOTER & THOMAS ULEN, LAW & ECONOMICS 108 (Denise Clinton et al. eds., 5th ed. 2008) (explaining the two distinctive characteristics of public goods); see also RICHARD CORNES & TODD SANDLER, THE THEORY OF EXTERNALITIES, PUBLIC GOODS, AND CLUB GOODS 6-7 (1986) (providing concrete examples of non-rivalry and indivisibility); EDWIN MANSFIELD, PRINCIPLES OF MACROECONOMICS 400-04 (6th ed. 1989) (discussing the political nature of public goods and noting that national defense is an example of one).}

   Non-rivalry in the consumption of a good means that “a unit of [that] good can be consumed by one individual without detracting, in the slightest, the consumption opportunities still available to others from that same unit.”\footnote{CORNES & SANDLER, supra note 563, at 6-7.}

   Non-excludability means that individuals who have not paid for the production of that good cannot be prevented (at a reasonable cost)\footnote{See Peter Drahos, *The Regulation of Public Goods*, 7(2) J. INT’L. ECON. L. 321, 324 (2004), archived at www.perma.cc/MC6X-SSTY (indicating “the costs of exclusion combined with its non-rivalrous nature” allows consumers who have not paid for the good to nonetheless receive its benefit).} from availing themselves of its benefits.\footnote{See Setting and Adjusting Patent Fees in Accordance with Section 10 of the Leahy-Smith America Invents Act, supra note 555 at 95 (acknowledging potential costs to society would otherwise include reduced innovation or inefficient research and development).}

   Examples of pub-
lic goods include national defense, school systems and pollution abatement. The non-excludability characteristic of public goods produces two related problems: “First, public goods are likely to be underproduced if left to the private market”, and “[s]econd, markets for public goods will not form.”

Indeed, while in the realm of purely private goods, efficiency is generally achieved by private market arrangements, where suppliers compete to satisfy consumer demands; at the same time, problems of appropriation deter the private production and supply of public goods. Since a potential consumer of a public good may get its benefit without paying for it, rational consumers of public goods will presumably hide their preferences of the good and free ride on its production. A role for the government, hence, arises to resolve this market failure.

As inventions are inherently information goods, like other public goods, “they too are susceptible to the twin problems of underproduction and lack of market exchange.” Indeed, without patent protection, “copiers would be able to appropriate much of the value embodied in inventions without incurring the considerable costs of research and development.” Inventors would not bother to invent in such a world, so fewer inventions would be produced. To remedy this appropriability problem, governments bestow “exclusive rights to investors to enjoy the fruits of their innovative activity over

566 See CORNES & SANDLER, supra note 563, at 6 (listing examples of non-excludable goods to demonstrate that they are available to everyone regardless of who paid for them).
567 See CORNES & SANDLER, supra note 563 (listing examples of public goods).
569 See Drahos, supra note 565, at 324-25 (noting how efficiency is best achieved for purely private goods and indicating problems of appropriation).
570 See Drahos, supra note 565, at 324 (indicating that a rational strategy for consumers is to hide their preference for the good).
572 Parchomovsky & Wagner, supra note 568, at 13.
573 Parchomovsky & Wagner, supra note 568, at 13-14.
574 See Parchomovsky & Wagner, supra note 568, at 14 (discussing potential effects of inadequate patent protection).
a limited period.”

This limited period of exclusivity grants the patentee control over the invention’s price and, in turn, gives her a mechanism by which she can recoup her research and development costs.

These exclusive rights, however, are not limitless. Indeed, there are circumstances where the government, through various patent laws, limits the patent holder’s right to freely manage his patent. In particular, the government may impose a compulsory license on the patent holder, consequently limiting his freedom of contract. The next subsection elaborates on compulsory licenses and explains their justifications. Essentially, it shows that regulating the process of patent pricing is a justified strategy, which does not only ensure access to socially beneficial technology, but also warrants the continuous development of scientific innovation.

2. Compulsory Licensing As a Limitation Over The Patentee’s Freedom of Contract

Compulsory licenses are essentially “involuntary contract[s] between a willing buyer and an unwilling seller imposed or enforced by the state.” As such, they take away the patentee’s exclusive control over the patented technology. Through the imposition of compulsory licenses, “the government allows itself or a third party to practice the patented invention without the patentee’s consent,” which runs in contradiction to basic patent theory. As professor Cotropia explains:

The possibility of compulsory licensing and the involuntary breaking of exclusivity can erode the incentive

---

575 Stiglitz, supra note 562, at 310.
576 See Cotropia, supra note 2, at 168-171 (reasoning that patent protection is necessary to promote innovation); see also Lemley, supra note 2, at 129-30 (justifying patent exclusivity rights).
578 See Julian-Arnold, supra note 212, at 354-55 (considering government’s involvement on patent owner’s rights).
579 See infra Part VI.B.2 (defining compulsory licensing).
580 See infra Part VI.B.3 (justifying governmental intrusion of patent rights).
581 Julian-Arnold, supra note 212, at 349.
582 See Cotropia, supra 526, at 559 (discussing the effect of compulsory licensing on exclusivity).
583 Cotropia, supra 526, at 559.
to invent. A would-be inventor can no longer depend on patent exclusivity as a means of recouping costs because of the uncertainty of such exclusivity. As the likelihood that the patent system will bust patents via compulsory licenses increases, the incentive to create patentable inventions decreases. Compulsory licensing also harms a patentee’s ability to recover invention costs by controlling distribution and pricing of the patented technology across different markets. Accordingly, there must be a significant countervailing interest to justify such licensing. There needs to be some overriding ‘political or social objective’ that requires a compulsory license for the objective to be met.584

3. The Justified Objectives of Compulsory Licensing According to the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)585

The general use of compulsory licensing is regulated under the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS),586 to which the United States is a Member State.587 Article 8 of TRIPS sets forth principles that define the situations under which exceptions to the right of exclusivity embedded in a patent are acceptable.588 Specifically, a Member State may limit the right of exclusivity to protect “public health and nutrition” and other “public interest in sectors of vital importance to [a state’s] socio-economic and

584 Cotropia, supra note 526, at 560 (citation omitted).
586 See id. at art. 1 (detailed the scope of the agreement).
587 See Understanding the WTO: the Organization Members and Observers, World Trade Organization (Mar. 2, 2013), archived at perma.cc/0QBZzKydXQ (listing member states and observer states of the WTO).
588 See TRIPS, supra note 585, at art. 8.1 (stating “[m]embers may, in formulating or amending their laws and regulations, adopt measures necessary to protect public health and nutrition, and to promote the public interest in sectors of vital importance to their socio-economic and technological development, provided that such measures are consistent with the provisions of this Agreement.”) (quoting acceptable exceptions).
A Member State may also minimize “abuse[s] of intellectual property rights” that “unreasonably restrain trade or adversely affect the international transfer of technology.”

Articles 30 and 31 provide a mechanism by which Member States may create limitations over the patentee’s right of exclusivity. Article 30 provides three substantive requirements that must be met before an exception to patent exclusivity could be allowed: First, the exception must be limited; second, the exception cannot “unreasonably conflict with a normal exploitation of the patent”; and third, it cannot “unreasonably prejudice the legitimate interests of the patent owner, taking into account the legitimate interests of third parties.”

Article 31 provides a list of procedural requirements that must be met before the government may issue a compulsory license that allows a government or third party to engage in unauthorized use of a patented technology. I do not expand on this long list of procedural requirements since the exception to the right of exclusivity proposed in this Article is not related to the unauthorized use of a patent, but to the limitation on its ultimate licensing price.

4. *Examining the Proposed Price Limitations’ Compliance With Article 30*

To recoup, the proposed method of price valuation suggests determining ex ante limitations over the ultimate licensing price of an

589 See TRIPS, *supra* note 585, at art. 8.1 (identifying public interests that may be prioritized above the rights of exclusivity).
590 See TRIPS, *supra* note 585, at art. 8.2 (stating “[a]ppropriate measures, provided that they are consistent with the provisions of this Agreement, may be needed to prevent the abuse of intellectual property rights by right holders or the resort to practices which unreasonably restrain trade or adversely affect the international transfer of technology.”) (quoting the agreement wherein free trade is prioritized over intellectual property rights).
591 See TRIPS, *supra* note 585, at art. 30-31 (requiring applicants disclose invention details clearly and sufficiently, including any corresponding foreign applications or grants).
593 See TRIPS, *supra* note 585, at art. 31 (stating [w]here the law of a Member allows for other use of the subject matter of a patent without the authorization of the right holder, including use by the government or third parties authorized by the government, the following provisions . . . .”) (quoting and listing the required provisions for use by another without authorization).
issued patent, while these limitations inevitably violate the patentee’s right of exclusivity and interfere with his right to control his invention and define its price independently.\textsuperscript{594} Therefore, to be permissible, these limitations must comply with the three substantive requirements provided by Article 30 of the TRIPS.\textsuperscript{595} The following discussion thus examines the compliance of the proposed price limitations with these international requirements.\textsuperscript{596}

The first requirement under Article 30 is that any exception must be a “limited exception.”\textsuperscript{597} This requirement “connotes a narrow exception—one which makes only a small diminution of the rights in question.”\textsuperscript{598} Noticeably, the proposed method creates such a limited exception by determining a range of acceptable licensing prices, rather than a single fixed price, leaving room for the patentee to negotiate the ultimate licensing price.\textsuperscript{599} Since the proposed method does not eliminate the patentee’s exclusive right to determine the price of his patent, it constitutes a limited diminution of his rights.

The second requirement under Article 30 is that the limited exception cannot “unreasonably conflict with a normal exploitation of the patent.”\textsuperscript{600} “Exploitation” refers to “the commercial activity by which patent owners employ their exclusive patent rights to extract economic value from their patent.”\textsuperscript{601} The proposed theory’s price limitations comply with this requirement because they do not affect the normal commercial exploitation of a patent.\textsuperscript{602} Instead, they come into play only in those cases where the patentee hopes to reap

\textsuperscript{594} See supra Part 75 (elaborating methods of ex ante limitations).
\textsuperscript{595} See TRIPS, supra note 585, at art. 30 (requiring applicants disclose invention details clearly and sufficiently).
\textsuperscript{596} See TRIPS, supra note 585, at art. 7 (specifying the international requirements enacted).
\textsuperscript{597} See TRIPS, supra note 585, at art. 30 (identifying the requirements for limited exceptions).
\textsuperscript{599} See supra Part II (arguing for a range of acceptable prices).
\textsuperscript{600} See TRIPS, supra note 585, at art. 30 (providing exceptions to the exclusive rights protected by national patent laws).
\textsuperscript{601} See Panel Report, supra note 598, ¶ 7.54 (defining “exploitation” for the purposes of its use in Article 30 of TRIPS).
\textsuperscript{602} See supra Part V (discussing development of reasonable price limitations under the proposed theory).
un-proportional and exaggerated licensing fees. To prevent this from happening, the patentee’s exclusive right to determine the ultimate price of his patent is being limited in a reasonable manner that is consistent with his patent’s quality traits.

The third requirement under Article 30 compares the legitimate interests of the patent owner with that of third parties. “The ‘legitimate interest[s]’ that can be considered include those that reflect ‘widely recognized policy norm[s].’ It is this Article’s contention that the proposed price limitations adequately balance the legitimate interests of the patent owner with those of third parties. In particular, the proposed theory expresses concern for the patent owner’s interest to choose the licensee and to negotiate the licensing price. While it imposes limitations over the ultimate licensing price, the proposed theory nonetheless allows some leeway for independent negotiations. Moreover, the proposed theory also shows concern for rewarding patent owners for high quality innovation. Indeed, the higher the quality of the issued patent, the higher its valuation under the proposed theory.

On the other hand, the proposed price limitations express adequate concern for the interests of the potential licensee and those of the public as a whole. Specifically, the proposed price limitations protect potential licensees from abusive acts of price manipulation that may impaire their incentive to invent for the detriment of society as a whole. By limiting the patent owner’s ability to charge dis-

603 See supra Part V (explaining how price limitations comply with Article 30 of TRIPS and only activate in extreme circumstances).
604 See supra Part V (identifying the competing interests the exceptions seek to protect).
605 See Cotropia, supra note 526, at 562.
606 See supra Part V (proposing a flexible pricing limitation scheme).
607 See supra Part 0 (identifying a degree of equalization of bargaining power between licensees and licensors as an objective of the proposed pricing scheme).
608 See supra Part 0 (outlining a licensing regulatory scheme that considers both licensee and licensor interests).
609 See supra Part III (arguing that higher quality patents will inevitably be afforded higher priced licenses).
610 See supra Part III (linking patent quality directly to patent licensing fees).
611 See supra Part III.B (discussing the social benefit of dampening success of patent trolls via the propose scheme).
612 See supra Part III.C (describing how the propose scheme combats abusive acts of price manipulation).
proportional fees for licensing his invention, the proposed theory ensures access to socially beneficial technology. Consequently, it warrants the continuous development of science and promotes innovation for the benefit of the general public. Finally, by creating a strong linkage between a patent’s price and its quality traits, the proposed theory encourages high quality innovation that is socially advantageous to society as a whole.

To conclude, while the proposed price limitations inevitably interfere with the patent owner’s freedom of contract, they nonetheless constitute a justified model of compulsory licensing. By aiming to maintain the incentive to invent and improve patent quality, the proposed theory promotes significant countervailing interests that override the patentee’s right of exclusivity.

VII. CONCLUSION

Up until now, the valuation of patents for licensing purposes pertained solely to the realm of economic literature. As this Article demonstrates, existing patent valuation methods are ex post, positive-economic methods that apply different mathematical calculations to predict the financial value of a given patent. This proposal effectively establishes the foundation for a social-normative dialogue over patent value. In this regard, its proposed, ex ante perspective of valuing patents in accordance with their quality traits is pioneering.

This Article shows that regulating the process of patent valuation by setting ex ante, flexible price limitations, which limit the ultimate licensing price the negotiating parties may set in accordance with the patent’s quality traits, could promote at least four intertwined objec-

613 See supra Part IV.B (arguing the reasons for orienting the patenting scheme toward social benefit).
614 See supra Part IV.B (justifying the social-normative perspective of patent regulation).
615 See supra Part IV.B (arguing that the proposed scheme still incentivizes technological innovation and development).
tives. First, by translating patent quality into patent value, it could encourage high quality innovation and improve patent quality. Second, by limiting the license price patent owners could ultimately demand, it could improve the access of small inventors to licensing opportunities and downgrade patent trolling. Third, by determining the price of a patent upon issuance, it could limit the ability of patentees having strong bargaining power to obtain un-proportional licensing fees that impede future research and hinder innovation. Finally, in the long term, this proposal could also reduce litigation and related costs for the overall benefit of the public.

Effectively, this proposal advances a two-step method of patent valuation: first, determining the quality of an issued patent according to the proposed quality indicators, and then, assigning flexible price limitations that reflect the quality of the patent. To implement these steps, this Article suggests a list of quality indicators that reflect the degree of compliance of any given patent with the statutory requirements of patentability. It also recommends how to set the proposed price limitations, including what sort of resources should be taken under consideration to define price limitations that are not only appropriate, but also realistic and reasonable. This Article further proposes to nominate a special division within the USPTO that would be responsible for setting the proposed limitations and managing their implementation. It explains the required qualifications of this division’s members and how to finance its operations. Finally, this Article suggests considering the proposed, ex ante price limitations as a legitimate imposition of compulsory licensing used to encourage socially beneficial innovation. Proving that these limitations comply with the international requirements governing the use of such licensing, this Article concludes that they constitute a defensible governmental intervention; notwithstanding the regulatory boundaries they impose on patentees’ freedom of contract.