

CAN WE RELIABLY VALUE IP RIGHTS: A MODEL PROCESS FOR VALUATION

RAYMOND J. FRIEL*

ABSTRACT

In the highly practical and commercially sensitive world of patent sales, the process of valuation lacks a huge degree of transparency or detailed process as to what price should be paid for the purchase of intellectual property (IP) rights. Although most agree such IP rights can be exceptionally valuable, there is little consensus as to how they can be valued.

In this article, Part I first deals with both the immense wealth that is to be found in IP rights as well as the significant divergence of valuations for these rights. Then, Part II deals with the traditional economic basis used to calculate such values. In particular, the drawbacks and difficulties with a system that is focused exclusively on economic factors are discussed. Part III proposes what is termed the Murphy-Orcutt model of valuation through a robust process that includes not only economic inputs but also technical and legal inputs. Finally, the article concludes by arguing that a robust method of IP valuation,

* Professor Friel is Head of the Law School at the University of Limerick in Ireland and is Director of the International Commercial and Economic Law Research Group there. He has lectured extensively in the United States, including Boston College Law School, University of Kansas and has been an adjunct Professor at the University of New Hampshire Franklin Pierce School of Law where he has taught a number of courses. The author gratefully acknowledges the renowned expertise of Professor William Murphy, University of New Hampshire Franklin Pierce School of Law, and the many conversations with him concerning this whole concept which led to this article. This article builds on a previous co-authored article by the author, Raymond J. Friel & William Murphy, *Valuing Patents in the Legal Context*, 20 COMM. L. PRAC. 51 (2013).

*Can We Reliably Value IP Rights: A Model Process for
Valuation* **251**

such as that proposed, could be used not only in calculating value in the sale and purchase of IP rights but also in the investment decisions regarding whether to register IP rights.

Abstract	250
I. Introduction	251
II. The Valuation Process	257
A. The Economic Input.....	258
1. Cost-Based	258
2. Income-Based	259
3. Market-Based.....	259
4. Conglomeration	260
B. The Technical Input	260
C. The Legal Input.....	262
D. Some Traditional Valuation Techniques	264
III. A Robust Valuation Process	267
IV. Conclusion	274

I. INTRODUCTION

During the COVID-19 pandemic, many governments around the world chose to “pre-pay” the risk involved in the development of a vaccine by ordering large quantities of the pharmaceutical company production line, even if ultimately the vaccine could not be licensed.¹ In

¹ For example, the United States committed in July of 2020 to purchasing 100 million doses of a vaccine jointly developed by Pfizer and BioNTech before the vaccine was finished, Sarah Kliff, *U.S. Commits to Buying Millions of Vaccine Doses. Why That’s Unusual*, N.Y. TIMES (July 22,

doing so, governments were taking a risk on the value of the potential vaccine, including elements such as the likelihood of success, the need for speedy distribution once approval had been obtained, and so forth. In essence, the governments were placing a value on their needs uncertain of the outcome: if the vaccine was successfully developed, the reward would be great, if not the loss would be significant. It is to be hoped that in making these decisions, the governments used robust valuation mechanisms that could be objectively scrutinised even if these mechanisms included inputs such as their desire to stay in power. It does, however, raise the issue of how we value things, and for the purposes of this article, how we value intellectual property rights, particularly from a legal perspective.

It is said that nearly 50% of the market value of most major corporations arises from their intellectual property rights, from trademark to patents.² There are numerous examples. In 2010, Novell sold some 861 patents at auction for \$450 million, an average value of just over \$510,000 per patent.³ Google paid an almost identical amount per patent figure when it acquired struggling phone maker Motorola

2020), <https://www.nytimes.com/2020/07/22/upshot/vaccine-coronavirus-government-purchase.html> [<https://perma.cc/KL79-V8SN>].

² ROBERT J. SHAPIRO & KEVIN A. HASSET, *THE ECONOMIC VALUE OF INTELLECTUAL PROPERTY*, 2, 13–14 (2005) (estimating that U.S. intellectual property was worth between \$5 trillion and \$5.5 trillion in 2005), available at <http://www.sonecon.com/docs/studies/IntellectualPropertyReport-October2005.pdf> [<https://perma.cc/UF5J-JJU6>].

³ Chris Kanaracus, *Details emerge of patents Novell is selling to Microsoft*, *COMPUTERWORLD* (Jan. 18, 2011, 3:44 PM PST), <https://www.computerworld.com/article/2512494/details-emerge-of-patents-novell-is-selling-to-microsoft.html> [<https://perma.cc/T2YX-S7V2>]; see also Novell, Inc., Proxy Statement Pursuant to Section 14(a) of the Securities Exchange Act of 1934 (Jan. 14, 2011), available at <https://www.sec.gov/Archives/edgar/data/758004/000119312511008402/ddefm14a.htm> [<https://perma.cc/44VU-GCUR>].

Mobility Holdings Inc. for \$12.5 billion.⁴ In July of 2011, some 6,000 patents were acquired from bankrupt telco Nortel Networks for an average price of \$750,000 for each patent.⁵

But that trend does not always hold true. During Eastman Kodak's Chapter 11 bankruptcy, the high-tech company's own valuation included the not-insignificant sum of \$2.6 billion for its intellectual property rights.⁶ This value consisted, for the most part, of patents owned by the company.⁷ The logical course of the bankruptcy was to divest these assets from the company and sell them separately.⁸ The auction attracted major players such as

⁴ Brian Womack & Zachary Tracer, *Google Agrees to Acquire Motorola Mobility for \$12.5 Billion*, BLOOMBERG (Aug. 15, 2011, 4:58 PM), <http://www.bloomberg.com/news/2011-08-15/google-agrees-to-acquisition-of-motorola-mobility-for-about-12-5-billion.html> [https://perma.cc/A7RH-X5F3].

⁵ Chris V. Nicholson, *Apple and Microsoft Beat Google for Nortel Patents*, N. Y. TIMES (July 1, 2011, 4:58 AM, updated 8:31 PM), <http://dealbook.nytimes.com/2011/07/01/apple-and-microsoft-beat-google-for-nortel-patents/> [https://perma.cc/TQ8W-EZ2Y].

⁶ Reuters, *Kodak May Abandon Patent Auction, Explores Options*, CHICAGO TRIBUNE (Sept. 14, 2012), http://articles.chicagotribune.com/2012-09-14/business/sns-rt-us-eastmankodak-patentsbre88d0zo-20120914_1_patent-auction-kodak-shares-sale-talks [https://perma.cc/KQ39-TMQF].

⁷ Jonathan Keehner & Jeffrey McCracken, *Kodak Said to Weigh Bankruptcy to Clear Path for Patent Sale*, BLOOMBERG (Sept. 20, 2011, 10:01 PM), <http://www.bloomberg.com/news/2011-09-30/kodak-said-to-weigh-bankruptcy-filing.html> [https://perma.cc/AC3N-FN8W].

⁸ The primary goal in bankruptcy is to maximise value. In this case if the IP rights could be transferred by themselves you maximise value. If you sell the IP rights tied to other assets, such as say obsolete manufacturing equipment, buyers will seek a discount for disposal costs arising from those assets whereas such disposal costs will lie in the bankruptcy if those assets cannot be disposed of. *See generally*, WESTON ANSON, THE INTANGIBLE ASSETS HANDBOOK: MAXIMIZING VALUE FROM INTANGIBLE ASSETS (2007).

Apple and Google, two companies with deep pockets.⁹ However, despite several attempts at a sale (and external valuation of the intellectual property rights reaching as high as \$4.5 billion), the patents were either sold or licensed for a mere total of approximately \$525 million.¹⁰ Across the Atlantic and at the other end of the scale, in *Sullivan v. Bristol Film Studios* the plaintiff, a rap singer known as Dappa Dred, claimed a loss of £800,000 for several claims, including copyright infringement.¹¹ The claim was based on a video of his singing, which was posted on YouTube by a third party.¹² The video was available for public viewing for a total of five days at which point it was removed.¹³ The trial court found, and the Court of Appeal affirmed, that the true damages for this infringement was £50.¹⁴ The difference between the singer’s ego and the real world was indeed quite profound. Importantly, these cases clearly illustrate that valuing IP rights is more art than science.

The disparity of the valuation of IP rights cases like Dappa Dred and Eastman Kodak demonstrates both the undoubted potential value of IP rights and also the potential gap between perception of that value and reality.

⁹ Ashby Jones et al., *Apple, Google Line Up to Bid for Kodak’s Patents*, THE WALL STREET JOURNAL (July 27, 2012, 6:23 PM ET), <https://www.wsj.com/articles/SB10000872396390443343704577553341769199960> [<https://perma.cc/Y5WX-6K9C>].

¹⁰ Mark Harris, *The Lowballing of Kodak’s Patent Portfolio*, SPECTRUM (Jan. 31, 2014, 7:37 PM GMT), <https://spectrum.ieee.org/at-work/innovation/the-lowballing-of-kodaks-patent-portfolio> [<https://perma.cc/R6JH-BH69>]; Reuters, *supra* note 6.

¹¹ *Sullivan v. Bristol Film Studios Ltd.* [2012] EWCA (Civ) 570, ¶¶14–15 [2012] EMLR 27 (Eng.).

¹² *Id.* ¶ 4.

¹³ *Id.* ¶ 13. During that period the video had 100 hits but because each “hit” did not necessarily indicate a view by an individual and unique person, the trial judge held that 50 hits was the more realistic number of unique persons who actually viewed the material.

¹⁴ *Id.* ¶¶ 15, 27.

In terms of financial decision making and advising for legal clients, is there a robust method for valuing IP rights available with which to work?¹⁵ This issue becomes important in terms of decisions to be made around all IP rights, but it becomes particularly important with respect to patents. The cost of securing a patent in the first place can be quite substantial.¹⁶ An investment of that magnitude requires a cost/benefit analysis for which the valuation of the patent must be a feature. In addition, accurate valuation mechanisms are required when patents are relied upon to secure financing, decide infringement action strategy, and value the sale/purchase or bankruptcy of a business.¹⁷ Finally, state subsidies or assistance may be available for patent registration.¹⁸ Any allocation of scarce government

¹⁵ For a general view from the ABA, see Krista F. Holt et al., *What's It Worth? Principles of Patent Valuation*, AMERICAN BAR ASSOCIATION (2015) (originally published in *Landslide*, Vol. 8, No. 1, Sept./Oct. 2015 by the American Bar Association), https://www.americanbar.org/groups/intellectual_property_law/publications/landslide/2015-16/september-october/what-s-it-worth-principles-patent-valuation/ [https://perma.cc/VH2H-4MLM].

¹⁶ See Gene Quinn, *The Cost of Obtaining a Patent in the US*, IP Watchdog (Apr. 14, 2015) (discussing various estimations for the fees associated with types of patents), <https://www.ipwatchdog.com/2015/04/04/the-cost-of-obtaining-a-patent-in-the-us/id=56485/> [https://perma.cc/JAF5-M59F].

¹⁷ See Robert P. Merges, *Intellectual Property Rights and the Institutional Economics*, 53 VAND. L. REV. 1857, 1859 (2000) (explaining the need for better applicability of intellectual property rights to the New Institutional Economics perspective).

¹⁸ For example, prominently displayed on the Irish Patent Office website is a subheading labeled “Commercialise Your IP,” under which can be found “Support and Resources for Business.” This webpage lists several entities, including Enterprise Ireland, who may, in appropriate cases, provide financial assistance for the registration of a patent, <https://www.ipoi.gov.ie/en/commercialise-your-ip/support-and-resources-for-businesses/> [perma.cc/2TJY-2P98]. In China, the National Patent Development Strategy (2011–2020), published by China’s State Intellectual Property Office (“SIPO”) on Nov. 11, 2010, envisages

resources should be based on an objective valuation of potential worth. The recent COVID-19 pandemic has seen pharmaceutical companies race to develop vaccines, many of which have benefitted from state investment.¹⁹ Yet, making the decision to invest state money in this process may have been driven more by fear than a rational cost/benefit analysis.

The purpose of this article is to examine the correct manner in which to value IP rights.

Although most focus is on the economics of valuation in IP rights,²⁰ this author suggests that there are in fact three inputs needed for a proper valuation of an IP asset: the economic input, the technical input and the legal input. The economic input is a quantitative input, while the technical and legal inputs are often presented together as qualitative inputs. Economic valuation deals with the rate of financial return on the right and is fundamentally an accounting mechanism. Technical valuation deals with the potential use of the IP right, the likelihood of alternatives, and the extent to which the right is likely to be superseded during its exploitation period. Finally, legal valuation values the enforceability of the IP right and its resistance to legal challenge. The economic valuation of the IP right has always been at the forefront. Little has been said of the technical or legal aspects of IP valuation. This article will review the process of IP valuation as it relates to patents and examine some recent models for IP valuation which seek to make it a more holistic process. Naturally, this will include

subsidising the cost of such patent registration, and an English language version of the strategy is available at <https://graphics8.nytimes.com/packages/pdf/business/SIPONatPatentDevStrategy.pdf> [<https://perma.cc/XR3U-VW6J>].

¹⁹ See *Kliff*, *supra* note 1.

²⁰ See generally Ted Hagelin, *Valuation of Intellectual Property Assets: An Overview*, 52 SYRACUSE L. REV. 1133 (2002) (elaborating on the economic valuation of intellectual property, generally, and various methods and mechanisms).

valuing these three inputs – economic, technical, and legal – discussed earlier.

II. THE VALUATION PROCESS

Valuing an IP right, such as a patent, requires due diligence regarding process. Valuation must be a robust process leading to the best assessment of potential value. Ultimately, the valuation itself may prove to be wrong in the marketplace because the only true value is what a real buyer would actually pay for the IP right.

As introduced above, the author suggests there are three primary inputs into valuation of an IP right, each of which are equally important:

Economic – the potential financial value derived from the IP right.²¹

Technical – the potential technical strength of the IP right.

Legal – the actual legal validity of the IP right.

Any due diligence in valuing an IP right should incorporate all three inputs. IP valuations based only on one or two of these inputs create the risk of not conforming to best practice, so it should be the aim of all professionals to meet or exceed best practice requirements. In practice, many professionals are engaged in valuation processes that concentrate on the economic input while excluding the technical and legal inputs does not offer the client a professional service.

²¹ See generally *id.*

A. *The Economic Input*

The economic input is by far the most prevalent and easily understood.²² It will suffice, therefore, to outline the process in general terms only.²³ The emphasis placed on this particular valuation input is readily apparent in the expansive structure for determining economic value. There are, within this process, many calculations, but it is useful to provide a relatively simple overview on the basis of economic valuation.

There are three possible options for economically valuing an IP right: cost-, income-, and market-based valuations.²⁴

1. Cost-Based

A cost-based economic valuation can be undertaken either on reproduction or replacement cost.²⁵ Reproduction cost looks toward the cost of replicating the IP right but without any enhanced utility.²⁶ Replacement cost examines the cost of developing a new IP right to serve the same utility but with any inadequacies of the existing right removed.²⁷ A cost-based valuation, whether reproduction or replacement, will usually cover five main areas: materials, labour, overheads, profit, and incentive.²⁸ Finally, the process

²² See generally, e.g., *Valuing Intellectual Property Assets*, WIPO, https://www.wipo.int/sme/en/value_ip_assets/ [<https://perma.cc/6LQW-YCBQ>].

²³ See generally GORDON V. SMITH & RUSSELL L. PARR, *VALUATION OF INTELLECTUAL PROPERTY AND INTANGIBLE ASSETS* (3d. ed. 2000) (discussing approaches to the valuation of assets and the procedures encompassed therein).

²⁴ *Valuing Intellectual Property Assets*, *supra* note 22; see generally Raymond J. Friel & William Murphy, *Valuing Patents in the Legal Context*, 20 COMM. L. PRAC. 51 (2013).

²⁵ SMITH & PARR, *supra* note 23, at 160.

²⁶ *Id.*

²⁷ *Id.*

²⁸ *Id.* at 161.

finishes with the necessary deduction for potential obsolescence of the IP right.²⁹

2. Income-Based

An income-based approach to IP economic valuation can be divided into two possibilities: a direct capitalisation basis or a discounted future economic benefit analysis.³⁰ Thus, the analysis may seek to determine the issue from among a number of potential models, for example:

What greater benefit will the purchaser have as a result of owning the asset?

What lower costs will the purchaser be able to achieve as a result of owning the asset?

In particular, any such analysis should take into account both the lifetime of the IP right and the potential or actual market which will utilise the IP right. Although most patents last for nearly twenty years, the very existence of a patent may encourage competitors to develop new technologies to circumvent the patent monopoly during that period.³¹ Thus, there must be an acceptance of potential built-in obsolescence of the original patent.³²

3. Market-Based

One of the best mechanisms for determining the value of any item is to compare it with the actual sale values of comparable items. In everyday life, buyers compare second-hand car prices with the typical price range for

²⁹ *Id.* at 164.

³⁰ For a comparison, see Wayne E. Etter, *Direct Capitalization Versus Discounted Cash Flow Analysis*, Real Estate Center at Texas A&M University (originally published in the Fall of 1994 in *Tierra Grande*, The Real Estate Center Journal), available at <https://assets.recenter.tamu.edu/documents/articles/1051.pdf> [<https://perma.cc/J5WP-USWL>].

³¹ See 35 U.S.C. § 154 (2013).

³² See SMITH & PARR, *supra* note 23, at 199 (discussing the income approach and factoring in future potential for obsolescence).

specific models from different years.³³ Naturally, one would adjust the price up or down from the average based on differentiating factors: high mileage, level of wear and tear, number of owners and so on. The resulting fluctuation in value will normally be found within a specific range, for example an automobile retains a certain base value, regardless of mileage, if it is still running. Finding truly comparable sales in IP valuations is more complex than the blue book valuations of automobiles. However, there is anecdotal evidence that in mass patent sales, market-based valuation tends to be a powerful factor.³⁴

4. Conglomeration

The experience of the author is that the best economic valuation of a patent right will involve a reconciliation of these three approaches to yield a single potential economic value. No one can say with certainty whether the valuation will prove to be truly prophetic in the marketplace, but this reconciliation does represent the best possible valuation through process – a process which is sufficiently robust because there are comparators or other objective inputs from which the calculation can be made.

B. The Technical Input

Establishing the technical strength of a patent constitutes an important part of the valuation process. There are, this author would suggest, three ways in which a patent

³³ BRIAN M. DANIEL ET AL., FINANCIAL ASPECTS OF LICENSING AGREEMENTS: VALUATION AND AUDITING, *in* ADVANCED LICENSING AGREEMENTS 2002, Ch. 3 (Ethan Horwitz & Steven M. Weinberg 2002), available at https://plus.pli.edu/Browse/Title?rows=10&fq=~2B~title_id~3A282B~365~29~&facet=true&qt=legal_boolean [<https://perma.cc/53Z5-UKLS>].

³⁴ See ROBERT F. REILLY, MARKET APPROACH IP VALUATION METHODS (2017), available at http://www.willamette.com/insights_journal/17/winter_2017_11.pdf [<https://perma.cc/4EJM-RXBS>].

can be classified, based on their content, purpose, and effect on the market: breakthrough, incremental, and disruptive. It will be useful to briefly outline what each of these categories actually mean.

First, a patent may fall into the breakthrough category when it exploits a wholly new area of technology or engineering. Thus, for example, breakthrough patents range from the electric light bulb to the touch screen.³⁵ Although few patents are truly breakthrough, for those that are, their value may be immense. This value may not actually be found in the original patent creation but in subsequent and incremental developments or follow-on innovations making use of the breakthrough technology.³⁶

Second, incremental patents are at the core of the patent world.³⁷ They provide small but measurable advancements on existing patents or technologies.³⁸ Often the unsung heroes of modern life, incremental patents represent potentially enormous value to the holder of the patent. Incremental development should arise as a result of competitive tension leading to improved products or production methods to the benefit of all.

Third, the disruptive category represents those patents whose worth is not immediately obvious but represent an unanticipated technology that may ultimately

³⁵ See generally CLAYTON M. CHRISTENSEN, *THE INNOVATOR'S DILEMMA: WHEN NEW TECHNOLOGIES CAUSE GREAT FIRMS TO FAIL* (1st. ed. 1997).

³⁶ See Kristina M. L. Aciri née Lybecker, *The Importance of Protecting Incremental Improvement Innovation*, IP Watchdog (Oct. 17, 2013), <https://www.ipwatchdog.com/2013/10/17/the-importance-of-protecting-incremental-improvement-innovation/id=45725/> [<https://perma.cc/75HG-49E6>] (discussing the importance of incremental improvement patents for pharmaceuticals).

³⁷ See *id.*

³⁸ See *id.*

displace existing technologies.³⁹ Initially, such disruptive patents may emerge as overnight success stories, but at the early stages they can often be characterised as potentially useless, unreliable, or having only limited technical appeal. Over time, these patent inventions are put to a new use not necessarily envisaged by the creators. Some of the best examples have been the use of the semiconductor to replace valves and data storage cards replacing film in photography and video.⁴⁰

C. *The Legal Input*

Arguably, the most overlooked area of patent valuation is the legal input.⁴¹ The value of a patent depends on the legal validity of that patent and the likelihood of a subsequent challenge for a number of reasons.⁴² Both the United States and Europe, among other jurisdictions, permit post grant challenge on patent validity.⁴³ Perhaps the most dominant form of challenge is that of prior art, but it is not the only possible challenge.⁴⁴ Under the European Patent

³⁹ Joseph L. Bower & Clayton M. Christensen, *Disruptive Technologies: Catching the Wave*, HARV. BUS. REV. (Jan.–Feb. 1995), <https://hbr.org/1995/01/disruptive-technologies-catching-the-wave> [<https://perma.cc/P57A-J4Z2>].

⁴⁰ See generally CHRISTENSEN, *supra* note 37.

⁴¹ See Malte Köllner, *The Journey is the Reward*, INTELLECTUAL ASSET MANAGEMENT MAGAZINE, Feb. 2008, 59, available at <https://www.iam-media.com/journey-reward> [<https://perma.cc/E7B8-89G6>].

⁴² For an Irish commentary on IP Law, see generally, ROBERT CLARK ET AL., INTELLECTUAL PROPERTY LAW IN IRELAND (4th. ed. 2016); ROBERT CLARK & MAIRE NI SHUILLEABHÁIN, INTELLECTUAL PROPERTY LAW IN IRELAND (1st. ed. 2010).

⁴³ For the United States provisions, see 35 U.S.C. §§ 311–29; for oppositions of patentability in the European Patent Office, see EUR. PAT. CONV. art. 100 (17th ed. Nov. 2020).

⁴⁴ See generally *What is prior art?*, EUROPEAN PATENT OFFICE, <http://www.epo.org/learning-events/materials/inventors-handbook/novelty/prior-art.html> [<https://perma.cc/L48A-BJX3>]. Title

Convention,⁴⁵ post patent invalidation can be sought *inter partes* on a number of limited grounds.⁴⁶ These grounds include (1) unpatentable subject matter,⁴⁷ (2) insufficient disclosure of the invention,⁴⁸ or (3) that the subject matter of the patent extends beyond the scope of the filed application.⁴⁹

A prior art challenge, however, is perhaps the most important issue that impacts the legal validity of a patent right. In the United States, a prior art challenge for lack of novelty, a requirement of patentability, occurs where there is public information which compromises the patent's claim to originality in its filing.⁵⁰ A prior art challenge for obviousness will succeed if it can be shown that "the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains."⁵¹ In *Graham v. John Deere Co.* the Supreme Court addressed standards for challenges to obviousness and noted that attacking the validity of a patent

35 of the United States Code permits an ex parte reexamination by the USPTO as an alternative to court action, see 35 U.S.C. §§ 301–07 (2011).

⁴⁵ See generally GERALD PATERSON, *THE EUROPEAN PATENT SYSTEM: THE LAW AND PRACTICE OF THE EUROPEAN PATENT CONVENTION* (2d. ed. 2001).

⁴⁶ EUR. PAT. CONV, *supra* note 43. A similar provision arises in Irish law under the Patents Act of 1992, which adds two additional grounds which are of no import for the current discussion, see Patents Act 1992 s. 58(d)–(e) (Act No. 1/1992) (Ir.), available at <http://www.irishstatutebook.ie/eli/1992/act/1/section/58/enacted/en/html#sec58> [https://perma.cc/R7RS-LH22].

⁴⁷ EUR. PAT. CONV., *supra* note 43, at art. 100(a).

⁴⁸ *Id.* at art. 100(b).

⁴⁹ *Id.* at art. 100(c).

⁵⁰ See 35 U.S.C. § 102 (2011) (describing the categories of prior art which can be used in a novelty challenge).

⁵¹ *Id.* § 103.

must present clear and convincing evidence establishing facts that lead to the legal conclusion of invalidity—certain factual predicates are required before the legal conclusion of obviousness or nonobviousness can be reached.⁵²

The factual predicates outlined in *Graham* (known colloquially as “the *Graham* factors”) are:

- (1) the scope and content of the prior art;
- (2) the differences between the claimed invention and the prior art;
- (3) the level of ordinary skill in the art; and
- (4) objective evidence of non-obviousness, such as commercial success, long-felt but unsolved need, failure of others, copying, and unexpected results.⁵³

Should a prior art challenge against a patent succeed for either lack of novelty or obviousness succeed, or should the patent be invalidated another way, it will no longer hold legal weight, and, consequently, provide no value to the owner. Patent valuation should therefore include an examination of the legal validity for the grant of the patent right. Curiously, a patent which has withstood a challenge is often more secure than one which has not been the subject of challenge.⁵⁴

D. Some Traditional Valuation Techniques

Many valuation methods used today are focused only on the economic value of the IP right. They tend not to deal with either the technical or legal inputs to the overall

⁵² *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966).

⁵³ *Id.*

⁵⁴ Where a patent has undergone a legal challenge, it essentially means that the patent will have been reviewed by at least two legal teams and a court. Weaknesses in the patent, if present, will have been exposed in a way that a patent which has not been subject to such challenge may still have undiscovered flaws.

valuation. Valuers assume either the patent is legally valid or it is not; either it is technically valid or it is not. In that regard, legal and technical validity are excluded from any input into the actual valuation matrix. With respect, this is not a useful approach – which shall be discussed later – but at this point it is useful to survey the fairly well-developed field of economic valuation.

In the view of this author, existing economic valuation techniques for patents can be divided into three basic models.⁵⁵ Each model has a number of advantages coupled with a corresponding set of difficulties, and often, the choice of which model to use becomes somewhat arbitrary and personal to the entity undertaking the valuation. It will be useful to briefly introduce each model with their own specific criticisms before collectively criticising them as somewhat lacking intellectual and analytical rigour.

First, there is the 25% model which essentially states that the licensor should receive 25% of the licensee's gross profit from the patent.⁵⁶ Although this method does not value the patent *per se*, it permits an extrapolation of economic value. Certainly, the value would have to be adjusted in line with the factors described earlier. A refinement on the 25% rule can be found in the Monte Carlo method, where instead of a single value, varying values with modified by corresponding probabilities of occurrence can be used.⁵⁷

⁵⁵ *But see* Hagelin, *supra* note 20. Hagelin suggests there are seven such models or measures. However, this author suggests that four of Hagelin's models or measures (Monte Carlo, Options, Industry Standards, and Rankings) are simply variants of either the 25% model or the comparative model.

⁵⁶ *See* SMITH & PARR, *supra* note 23, at 366.

⁵⁷ For information regarding Monte Carlo simulations, see generally NICK T. THOMOPOULOS, *ESSENTIALS OF MONTE CARLO SIMULATION: STATISTICAL METHODS FOR BUILDING SIMULATION MODELS* (2012).

Second, the comparative model seeks to value the royalty rate for patents by comparing other similar patents in past transactions.⁵⁸ There are several difficulties with this approach. First, there may be an information deficit between the parties.⁵⁹ Second, it may be excessively time consuming to collect the correct dataset. Third, patents generally do not lend themselves to direct comparisons, since by their nature a patent protects innovation and novel ideas.⁶⁰

Third, there is the so-called surrogate model, which uses comparative values from surrogate inputs to establish the value attaching to the patent: for example, the level of patent registration by the company together with prior art citations are particularly useful for valuing a bundle of patents.⁶¹ However, this could be expanded, say for example one could use the market value of the company as a guide to the value of its patents. A further refinement would rely on the market value of the firm, less the net value of its tangible or non-patent assets. This model runs the risk of allocating an unwarranted speculative risk premium on the value of the

⁵⁸ See ROBERT C. MEGANTZ, *HOW TO LICENCE TECHNOLOGY* 56 (1st. ed. 1996).

⁵⁹ For example, prior transactions may not be in the public domain, or even where the price may be in the public domain, additional non-price terms and conditions may not be known which would impact upon the value or price being paid. For a discussion on information asymmetry and resultant problems it can bring to markets, see generally, George A. Akerlof, *The Market for “Lemons”: Quality Uncertainty and the Market Mechanism*, 84 Q. J. OF ECON. 488 (1970) (introducing and explaining the “lemons problem” and explaining its potential for the disruption of the purchase of goods).

⁶⁰ Two of the necessary requirements for patentability in the United States are novelty and nonobviousness, among others, see generally 35 U.S.C. §§ 101, 102, 103, and 112.

⁶¹ Hagelin, *supra* note 20, at 1135–36. Surrogate valuation methods are inappropriate for single patents but can be useful for patent portfolios held by a company in its entirety.

company to the IP rights.⁶² A similar process would look at the income of the company and calculate the percentage of the revenue of the company attributable to the patent.

All of these models have become the subject of small variations which seek to make each model more sophisticated, more costly, and less accessible.⁶³ For most patent valuation, these models have become the preserve only of the accountants, providing ever more statistically complex and one-dimensional valuations which ignore the legal and technical valuation elements. Yet in substance, the refined models are based on one of the three models referred to above.

Unfortunately, the concentration on economic value fails to establish a global or holistic view of valuation. Technical and legal valuation inputs are excluded on the false assumption that these issues raise only binary inputs. Part III of this article further addresses this issue.

III. A ROBUST VALUATION PROCESS

Creating a robust valuation process should accommodate all three valuation inputs: the economic input, the technical input, and the legal input. Therefore, the issue of technical and legal inputs must be addressed. Few lawyers could absolutely guarantee that no prior art exists with respect to a given patent. A limitless investigation may reveal that there is a low probability that such prior art exists.

⁶² The value of the company will be influenced by many factors, including potential takeovers, and the inflated value of the company could be due to potential buyers of the company, rather than the owned IP assets of that company.

⁶³ See, e.g., SMITH & PARR, *supra* note 23, at 164, for the Monte Carlo variation on the income model; PETER F. BOER, THE VALUATION OF TECHNOLOGY, 302–06 (1999), for the use of the option method and variants such as the Black-Scholes formula; Hagelin, *supra* note 20, at 1137–39, for Hagelin’s analysis of the Competitive Advantage Valuation® (CAV) model.

Of course, the probability of this being true depends upon the level and resources invested in the investigation. Lawyers should be able to quantify that chance as a percentage probability, as should technical experts in the field regarding the science.

As Hagelin suggests, successful models for valuation should be specific, understandable, repeatable, scalable, affordable, and flexible.⁶⁴ What do these individual terms actually mean, according to Hagelin?

1. *Specific* requires that the model must be able to value a single patent within a group of patents.

2. *Understandable* to all professionals dealing with IP, including not merely the accountants but also lawyers and IP specialists.

3. *Repeatable* requires that a model is not based on the subjective choice of one or more individuals.

4. *Scalable* means that the model can be varied to the level of sophistication required of the client.

5. *Flexible* requires that it can be used across most types of intellectual property

6. *Affordable* as the name suggests, means that it should not incur excessive cost in making a valuation.⁶⁵

An emerging valuation model has been suggested by Murphy, Orcutt and Remus, or what will be hereinafter termed the Murphy-Orcutt model.⁶⁶ This model satisfies all Hagelin's criteria and characteristics that one would expect to find in a worthwhile valuation model for all intellectual property.

The Murphy-Orcutt model relies on decision tree analysis in a structured and rigorous manner to holistically value a patent using all relevant data from the different

⁶⁴ Hagelin, *supra* note 20, at 1137–39.

⁶⁵ *Id.* at 1137–38.

⁶⁶ *See generally*, WILLIAM J. MURPHY ET AL., PATENT VALUATION: IMPROVING DECISION MAKING THROUGH ANALYSIS (2012).

constituent elements.⁶⁷ The Murphy-Orcutt model requires assembling the necessary information from the different professionals involved. This will involve a diverse group, typically accountants, engineers, and lawyers. Other professionals may be added if required. The information can be obtained independently, so that there is no need for any liaison between the various professionals. Each professional inputs the information from their own sphere of expertise. The parameters of the information gathered can be applied to either individual or multiple patents.

The information is aggregated within a decision tree process. The inputs may again be scaled to reflect the needs of the valuation. In certain situations, only a simplified valuation may be required, for example where speed matters or where the nature of the patent requires a less complex analysis. If a more comprehensive analysis is required, then the specificity and nature of the inputs can be increased. The decision tree process is flexible regarding the order or sequence of the process. In some situations, a client might wish to prioritize economic worth over legal validity, while in others they may want the patent to pass a threshold of legal validity before analysing its economic worth. The process can be extremely simplistic – not requiring complex math or statistical analysis once such input has been gathered from the relevant professionals. On the other hand, the process may be amended to become increasingly complex if that is what is required. Such complexity may require a computer programme or at least an increased amount of mathematical calculation, to provide a valuation. The driving force behind the level of complexity is the comfort level of the professionals tasked with inputting the information, as they

⁶⁷ *See generally id.* On decision tree analysis, see generally DAVID SKINNER, INTRODUCTION TO DECISION ANALYSIS (3d. ed. 2009). Decision tree analysis is not dissimilar to the flowchart analysis which has more popular currency than decision tree analysis outside the business world.

are only required to input and process the data at a level they are comfortable with. Subsequent calculations after the event may not be their concern.

Murphy-Orcutt use the example of a University Technology Transfer decision evaluating whether or not to invest in the patenting of a particular device which has arisen from research activity.⁶⁸ This article will now present a modified version of that example.

As a first step, the decision maker approaches the relevant parties needed for the process. In this case the relevant parties are those within the University for whom the potential patent has some value or cost. Some possibilities could be the financial department of the University, but there could be many others, for example the research office, the student recruitment division, and so forth. Where the patent might impact reputational issues, the relevant parties may include the communication and marketing divisions. In the case of a patent arising from a funded programme, the donor or funding government entity may also be a relevant party.

Each relevant party would input a specific set of direct and indirect benefits from their perspective and from within their knowledge set. For example, patenting the research might be valued exclusively in terms of direct benefit by the finance department. On the other hand, the student recruitment division may be concerned about the potential benefit it could add to graduate recruitment and so on. Each benefit would then be evaluated as the percentage it would provide to the overall benefit if the device were patented. Obviously, this cannot exceed 100%. Then, that benefit might be worth more to one division than to another, so each division is required to allocate a weighted value between 1 and 5, with 1 being of the lowest importance and 5 being of the highest importance.

⁶⁸ See MURPHY ET AL., *supra* note 66, at 78–83.

*Can We Reliably Value IP Rights: A Model Process for
Valuation 271*

The tables below set out what some of the possible inputs might look like in such an example. In a real-world context, one would expect these tables to be as simple or as complex as the circumstances require.

Direct Benefits

Division	Description	Percentage Benefit (max 100)	Weight	Total
Finance	Royalties	100	1	1.0

Indirect Benefits

Division	Description	Percentage Benefit (max 100)	Weight	Total
Research office	Link with local industry	30	1	0.3
	Help secure further research	50	4	2.0
	Attract more students	20	1	0.2

Division	Description	Percentage Benefit (max 100)	Weight	Total
Student recruitment	Royalties	20	1	0.2
	Attract more students	80	3	0.4

This would be repeated by each of the other relevant parties.

Gathering information in this way requires each relevant party to analyse their perspective, forcing them to assign a subjective valuation on the decision to patent. Each relevant party is contributing to the final decision within the realm of their own expertise.

The ultimate decision maker now has information which is robust in that it has arisen from the considered views of the all the relevant parties. From the tables we can

see that although the indirect benefit of attracting more students, if the device is patented, is a common indirect benefit to both the research office and student recruitment, the percentage of that benefit and the importance of it differs substantially, i.e., 20:1 versus 80:3. Each of the relevant parties has had to express and quantify the perceived benefit of patenting the device from their perspective.

This information can now be used in a decision tree analysis by the decision-maker to render determination as to whether the device should be patented or not. Use of the decision tree analysis requires that, following the disaggregation of inputs, there is what is known as a rollback calculation so the final, arrived-at figure should indicate whether to patent the device or not.

Murphy and Orcutt themselves use this model to suggest how governments who wish to invest in patent cost subsidisation could rationally make their decision based on objective analysis evaluation.⁶⁹ Essentially, if as might be advocated, the Irish state were to assist inventors in Ireland by subsidising the cost of patent approval, then the model could be used to rationally justify the efficient allocation of scarce resources.

The given example uses the decision of whether or not a device should be patented for the purposes of simplicity, but essentially, such a decision is based around value. Although, in this case, the value is not merely monetary. If the task were estimating the commercial value of an existing patent, the disaggregated information from the three relevant inputs might look something like this:

⁶⁹ See, e.g., William J. Murphy & John L. Orcutt, *Using Valuation-Based Decision Making to Increase the Efficiency of China's Patent Subsidy Strategies*, 2013 DE NOVO 116 (2013).

Economic Input

Description	Percentage Significance (max 100)	Weight	Total
Income method	50	3	1.5
Cost method	10	0	0.0
Market method	40	1	0.4

Technical Input

Description	Percentage Significance (max 100)	Weight	Total
Breakthrough	20	2	0.4
Incremental	70	2	0.4
Disruptive	10	1	0.1

Legal Input

Description	Percentage Significance (max 100)	Weight	Total
Encumbrance	40	1	0.40
Prior art	35	3	0.05
Insufficient disclosure	25	1	0.50

Here, however, the decision tree moves from a yes/no application to a decision tree with values inserted for the economic analysis part of the model. The decision tree analysis then rolls back these quantitative values in the same way to provide an objectively-verifiable evaluation. Where the decision tree becomes more complex, software is available to perform the roll back calculations.⁷⁰

⁷⁰ *E.g.*, TreeAge Pro 2020 and Lumenaut Excel Software both provide the capability for the creation of decision trees.

IV. CONCLUSION

The Murphy-Orcutt model of patent valuation satisfies all of the characteristics that one would be looking for in any putative model. However, it provides an additional advantage. By providing a framework which is accessible to, and required from, all the professional inputs in the valuation process, it is not merely more comprehensive, but it permits the owner of the patent and the professional team a rigorous structure to analyse the potential value of the patent, something not normally available in the other models.

Given the importance of patent and other IP valuation in a number of significant areas of legal practice (e.g., investment, lending, sales, insolvency, etc.), it is virtually inexplicable that this area has not received much legal attention. The failure to base advice on robust methodology and analysis of patent valuation opens significant potential for professional negligence. Reliance upon one group of experts who use models that – although may be commonplace – suffer significantly in intellectual foundation, completeness, and simplicity to be understood by other professionals is a questionable approach. The Murphy-Orcutt approach represents an opportunity to finally provide a robust, understandable, and logical framework within which valuation can occur.