

# BVR's Guide to Intellectual Property Valuation

Second Edition



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## **Chapter 3**

### **About IP Valuation**

IP valuation is not easy, and it requires a broad range of expertise. It represents the integration of a set of skills that requires the valuation analyst to have more than a cursory understanding of marketing, accounting, finance, scientific and/or applied science, the applicable intellectual property law, statistics, financial modeling, and report writing. Continual changes in each of these fields present a high barrier to an IP valuation analyst seeking to perform IP valuation credibly. To the extent possible, the IP valuation analyst must keep up with the state of the art for all of these knowledge areas concurrently. In the end, intellectual property valuation is similar to other valuation forms in that it is part science, part art. It is important that a valuation analyst maintain a mastery of both the science and the art to generate credible, repeatable results.

#### **Applying the Science**

The science in IP valuation relates to the fundamental mathematics that surrounds the quantification and distillation of the value proposition into dollars and cents. It includes things such as financial formulas and the ability to perform quantitative analysis. Proper knowledge of basic math, discounting, calculating revenues, calculating profits, and calculating cash flows are all important. Quantitative analysis also requires the valuation analyst to perform meaningful statistical analysis to support an engagement. Statistical analysis may include seemingly complex mathematical operations such as linear regression computations, linear programming, or Monte Carlo-type simulations. The science results are unequivocal and should be exactly repeatable, regardless of the valuation analyst. Further, the science is independent of the analyst's background, certifications, education level, schooling, or other factors.

For example, a \$100 cash flow received one year from today is worth \$80 today with a 25% discount rate. Every valuation analyst should come to the same conclusion given these inputs. It does not matter where the analyst went to school, whether it was Harvard, a community college, or even no college. It does not matter if the valuation analyst has an accounting certification, a finance certification, or even no certification. That said, a valuation analyst's improper use of the science could lead to erroneous valuation conclusions.

For example, consider a cell phone that contains some new, patented technology for handing calls off between cell phone towers such that the phone never drops a call again. It is straightforward to calculate that if one sells one million cell phones at \$200 per phone, the total revenue would be \$200 million.<sup>13</sup> However, this revenue model includes many different valuation assumptions. For example, the valuation analyst would at least have to know that the technology works, that it is durable in the market (i.e., difficult to design around), that the market is willing to buy at \$200 per phone (if at all), and how aggressively the market will adopt the technology. If the market will buy only 100,000 units and it refuses to pay more than \$50 per unit, then the total revenue, which drives the valuation, would be \$5 million or about 2.5% of the other revenue indication. Even though the valuation analyst initially applied the science correctly to arrive at a \$200 million revenue indication, the science might not detect whether the parameters used were reasonable or achievable. Further, the valuation analyst may have to anticipate changes that could render the technology obsolete. Only the art of IP valuation would illuminate such issues. Thus, the art of how to apply the science becomes very important in an IP valuation engagement.

This is not to say that a valuation analyst can produce a valuation free of scientific defects. With today's technological solutions (e.g., spreadsheets), it is relatively easy to produce a scientific and sophisticated valuation model that looks impressive, yet generates a wrong value indication because there is an error in a formula. There is a simple correlation between model complexity and the possibility for model errors: the more formulas and cells in a spreadsheet, the greater the likelihood that the valuation analyst will introduce an error into the spreadsheet. Consider Exhibit 6 as an example.

In Exhibit 6, the model is relatively simple. Yet there are six different formulas in the model (indicated by the boxed text), meaning six cells where a valuation analyst can enter a wrong formula. There are five additional places for data entry errors in the total sales for the U.S. market. In short, even if the science is unequivocal, the

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13 1 million phones x \$200 per phone = \$200 million.

| Exhibit 6. Example of Spreadsheet Errors                  |               |
|---|---------------|
|   | Year 1        |
| Total units sold in the U.S. market                       | 8,536,312     |
| Net revenues (reachable market * \$117.50 price per unit) | 1,003,016,660 |
| Less Research & Development Costs at 15% of revenues      | (150,452,499) |
| Less General & Administrative Costs at 5% of revenues     | (50,150,833)  |
| Earnings before income taxes (EBIT)                       | 802,413,328   |
| Less income taxes at 45% of EBIT                          | (361,085,998) |
| After tax net income                                      | 441,327,330   |

valuation analyst must ensure that the science is operating correctly for the engagement. Model checks and audits by valuation analysts that are independent of the valuation model's creator will help reduce the types of valuation errors that result from incorrect application of the science.

Some simple audit checks that a valuation analyst may want to make before the delivery of any valuation models for review include the following:

- Does the value result calculate correctly (i.e., no #DIV/0!, #NAME, or #REF errors)?
- Are the formulas correct (i.e., parentheses in correct places, logic statements correct)?
- Are cross-worksheet references correct (i.e., do worksheets refer correctly to the cells on other worksheets that hold values of interest)?
- Does the balance sheet balance?
- Does the income statement include all revenues and expenses?
- Does the valuation model capitalize a negative free cash flow number (which would be nonsensical)?
- Does the valuation model account properly for income taxes?
- Does the valuation model account properly for loss carry-forwards and carry-backs?
- Does the valuation model capitalize a free cash flow amount that includes depreciation in excess of net capital reinvestment (which would mean that, eventually, accumulated depreciation would exceed total acquisition cost of assets)?

- Does the valuation model account properly for the timing and magnitude of planned expenditures (i.e., are salaries coming in at the correct months, are monthly payroll costs calculating correctly)?
- Does the valuation model calculate depreciation correctly for the various asset classes (which affects non-cash expenses added back to after-tax net income to determine free cash flow)?
- Does the valuation model use the appropriate discount rate (i.e., using an annual discount rate when looking at annual free cash flows, using a quarterly discount rate when looking at quarterly free cash flows)?

An average valuation model may have more than 10,000 cells containing formulas. That means that there may be more than 10,000 ways that a valuation analyst can introduce an error into a valuation model that results in an improper value conclusion! So how does one reasonably defend against seemingly innocent errors that nonetheless generate catastrophic results? A valuation analyst typically employs several defensive measures to reduce the risk of such errors:

- ***Keep it simple:*** Contemporary modeling tools can be remarkably powerful. With this power comes responsibility to use the tools properly. Sometimes, valuation analysts generate extremely complex models. For example, they may generate complex expense allocation algorithms or revenue calculations that may not effect a material change in valuation outcome. Yet, with this complexity comes the increased chance to introduce valuation model error. Formulas may be more complex to debug or understand. Further, it may be difficult to revisit a complex model six months later or more and understand quickly what the formulas are doing. Keeping the models simple reduces error potential.
- ***Automated checks:*** One way to protect against possible math errors is to develop automatic dashboards to verify proper model calculation. For example, if every valuation model includes a balance sheet, an appropriate check is to verify whether the balance sheet balances in each period modeled. If the valuation model has five years under consideration, then the valuation check should test each year's calculation independently. A sophisticated valuation model may include a dashboard that tests hundreds of different value conclusions to ensure internal model consistency. Exhibit 7 is an example of what an automated valuation model consistency check dashboard might look like:

### Exhibit 7. Example of an Automated Valuation Model Consistency Check Dashboard

Number of Issues Diagnostic Checklist Indicates:

14

#### Calculation Checks

The value is calculating correctly (i.e., no #REF!, etc.)  
Revenues are positive in at least one year  
There is net income in year 10  
There is positive gross margin in year 10  
There is positive free cash flow in year 5  
Capitalized growth rate less than WACC

Check  
Okay  
Check  
Okay  
Check  
Okay

Lack of marketability discount value is set  
Lack of marketability discount mean value is set  
Lack of marketability discount median value is set  
Minority interest discount value is set  
Minority interest discount mean value is set  
Minority interest discount median value is set

Check  
Okay  
Check  
Okay  
Okay  
Okay

PIS revenue wired for at least 1 product in for all years

Check

Year 1 total expenses match on SoOE and PIS  
Year 2 total expenses match on SoOE and PIS  
Year 3 total expenses match on SoOE and PIS  
Year 4 total expenses match on SoOE and PIS  
Year 5 total expenses match on SoOE and PIS  
Year 6 total expenses match on SoOE and PIS  
Year 7 total expenses match on SoOE and PIS  
Year 8 total expenses match on SoOE and PIS  
Year 9 total expenses match on SoOE and PIS  
Year 10 total expenses match on SoOE and PIS

Okay  
Okay  
Okay  
Okay  
Okay  
Okay  
Okay  
Okay  
Check  
Okay

3-year fixed assets match on SoFA and SoCA  
5-year fixed assets match on SoFA and SoCA  
7-year fixed assets match on SoFA and SoCA  
10-year fixed assets match on SoFA and SoCA  
15-year fixed assets match on SoFA and SoCA  
39-year fixed assets match on SoFA and SoCA  
Land fixed assets match on SoFA and SoCA

Okay  
Okay  
Okay  
Okay  
Okay  
Okay  
Okay

Model has been checked and verified by analyst  
Model has been checked and verified by reviewer  
Model reviewer name is set

Check  
Check  
Okay

Amortized SoFA costs match capitalized SoOE costs

Okay

#### General Configuration Checks

Fixed asset upgrade path is not empty  
Long-term debt and capital is fully allocated to 100%  
Inventory on cash flow statements is not empty  
Monthly operating contingency is not empty  
Federal income tax rate is not empty  
State income tax rate is not empty  
SIC code for project is not empty  
Useful life for the valuation is not empty

Check  
Okay  
Okay  
Check  
Okay  
Okay  
Okay  
Check

Primary valuation analyst is not empty  
Primary valuation analyst office street is not empty  
Primary valuation analyst city/state/ZIP is not empty  
Primary valuation analyst phone is not empty  
Primary valuation analyst fax is not empty  
Primary valuation analyst email is not empty  
Valuation model type is set  
Inflation rate is set  
Interest income rate is set

Okay  
Okay  
Check  
Okay  
Okay  
Okay  
Okay  
Check  
Okay

- **Use style guides:** Ralph Waldo Emerson wrote, “a foolish consistency is the hobgoblin of little minds.” While Emerson’s point may have been that the mundane is boring, the mundane can be the savior of a valuation analyst. Consistency works. Walk into a McDonald’s restaurant and the experience is, on average, consistent regardless of the restaurant’s location. Work product consistency is a remarkable defensive measure against valuation calculation error. Tools like Microsoft Excel provide features to apply consistent formatting to all cells of a particular type in a valuation model. Strategic use of cell formatting (fonts, colors, etc.) may provide quick visual indication of what a cell’s contents should be. For example, a valuation analyst may code all user-changeable cells with a yellow background, making it easy to determine visually which cells the valuation analyst should modify. The valuation analyst may use other cell colors to differentiate between calculated cells, total rows, total columns, etc. The goal of using such styles is to make it easy for reviewers (and the valuation analyst) to recall the intended purpose of the cell in question.
- **Peer review process:** Regardless of how good a valuation analyst may be, a valuation analyst is human. Humans make mistakes. An inadvertent

keystroke; an improper cell reference; transposed numbers all create conditions that one may reasonably miss in reviewing one's own work. The ideal solution is to have an independent party perform an objective peer review of the valuation model. This independent party does not have to be outside of the valuation analyst's firm; rather, the reviewer only needs to be independent of the original valuation model creation activity. The sometimes obvious items that a peer review process may discover can save a valuation analyst embarrassment and preserve the valuation analyst's credibility and reputation. Further, if the valuation analyst does use a valuation model style guide, the peer review process may discover violations of the style guide.

Granted, a valuation analyst can employ all of these strategies and still introduce errors into the final work product (again, it is a human process); however, such strategies have proven to reduce the impacts of any possible residual errors.

### **Practicing the Art**

The art in IP valuation relates to the qualitative judgments a valuation analyst renders to generate a final result. It is not a "gut" feeling a valuation analyst relies upon to render a conclusion in a valuation engagement. Frankly, clients would likely find little solace knowing their value opinion depends on what the valuation analyst had for lunch that day. Further, "gut" feelings do not stand up well to cross-examination (more on this in a Chapter 4 discussion of *Daubert* considerations). Thus, the artful application of valuation principles becomes crucial to generating a credible valuation report. Several important principles include the following:

- Understanding and scoping the valuation engagement correctly;
- Selecting appropriate valuation methods for the engagement;
- Performing credible due diligence;
- Properly constructing the valuation models;
- Picking the appropriate time horizon for consideration;
- Generating a credible, professional valuation report; and
- Knowing and admitting when you are in over your head.

The next sections explore these principles in detail as well as the value impacts of artfully performing the valuation engagement.

#### ***Understanding the Valuation Engagement***

While a seemingly simple thing to “get right” in a valuation engagement, coming to a mutual understanding of what exactly constitutes the valuation engagement between the client and the analyst is not necessarily as simple as it seems. The client and the valuation analyst need to understand and agree on several factors to scope the IP valuation engagement correctly. This is where generic business valuation and IP valuation engagements diverge. Business valuation engagements typically constitute consideration of the entire enterprise, including all historical and reasonably prospective value propositions. For example, a business owner wants to have a gas station appraised for estate planning purposes. It is straightforward to specify this job and come to a mutual understanding of the work effort. For IP valuation, the specification of the engagement can be more difficult.

Problem specification for IP is more difficult because IP represents a right that may comprise a unique set of restrictions. Restrictions may include a geographic restriction (a national border at the broadest level or a geographic region at a contractual level), a market restriction (perhaps through a trademark specification), or a product restriction (perhaps through a patent specification), among others. For example, U.S. patent #6,082,054 relates to a retractable-roof sports stadium that opens during good weather and closes during inclement weather. The patent for this valuation engagement inherits a natural geographic restriction (only in the United States), which occurs because the patent is a U.S. patent, which has no jurisdiction outside of the United States. Further, the patent represents a product restriction, which limits protected usage of the invention, as it applies to sports stadiums. Thus, applying a retractable roof to a commercial office building would not create enforceable value for the patent owner, as the patent’s claims provide the patent owner with no coverage for commercial office buildings. This naturally limits the market analysis as well to that of stadiums. However, the valuation of a broader patent, perhaps filed under the Patent Cooperation Treaty (PCT) or a global brand, is decidedly more complex to digest.

Consider the example where one is valuing a global brand for a fictitious company, Global Electric, a conglomerate that builds a variety of products in consumer, transportation, and heavy industrial markets across 10 different countries. For the purposes of this example, assume Global Electric manufactures 100 different products for the consumer market, 20 different products for the transportation market, and 50 different products for the heavy industrial market. The engagement is to generate a value for the Global Electric brand. For brevity, assume the average brand valuation per target market, defined by product type and geography, will require 100 hours of



| Exhibit 8. Total Project Hours for Global Electric |                   |                         |                           |                       |                     |
|--|-------------------|-------------------------|---------------------------|-----------------------|---------------------|
|  | Consumer Products | Transportation Products | Heavy Industrial Products | Total Market Analyses | Total Project Hours |
| Country 1  | 100               | 20                      | 50                        | 170                   | 17,000              |
| Country 2  | 100               | 20                      | 50                        | 170                   | 17,000              |
| Country 3  | 100               | 20                      | 50                        | 170                   | 17,000              |
| Country 4  | 100               | 20                      | 50                        | 170                   | 17,000              |
| Country 5  | 100               | 20                      | 50                        | 170                   | 17,000              |
| Country 6  | 100               | 20                      | 50                        | 170                   | 17,000              |
| Country 7  | 100               | 20                      | 50                        | 170                   | 17,000              |
| Country 8  | 100               | 20                      | 50                        | 170                   | 17,000              |
| Country 9  | 100               | 20                      | 50                        | 170                   | 17,000              |
| Country 10   | 100               | 20                      | 50                        | 170                   | 17,000              |
| Totals   | 1,000             | 200                     | 500                       | 1,700                 | 170,000             |

work to perform. How many hours will it take to generate a comprehensive, credible valuation for the Global Electric brand? The answer may be shocking, but it is 170,000 hours, as Exhibit 8 demonstrates

Why does the project require so many hours to complete? The answer is simple and a function of the labor hours the valuation analyst needs to value the brand with the greatest confidence and credibility. The valuation analyst must study the specific application of the Global Electric brand for each product, in each market segment, for each country where Global Electric sells its products. Perhaps the value of the Global Electric brand is very high for consumer products in Country 1. However, suppose the Global Electric brand commands no premium for transportation products in Country 10. The only way to make such a determination with any measure of confidence is to perform a thorough market analysis for each application of the brand in each market, in each target country. Global Electric may require the level of analysis just described, but Global Electric may be unwilling to pay the valuation analyst to perform that level of analysis. This can create problems for the valuation analyst’s delivery of a final valuation work product that meets Global Electric’s expectations.

Further, suppose Global Electric needs the valuation completed in 90 days. To meet that delivery schedule, a valuation analyst who works 200 hours per month will be able to handle six of the 1,700 total required market analyses. Thus, the project would require a team of 284 analysts to perform the work. At an average billing rate of \$200 per hour, Global Electric may expect to spend \$34 million to have this

analysis performed, which may be well outside its budget. Establishing these facts early in the engagement is important, so Global Electric and the valuation analyst can come to some mutual understanding of the project scope, schedule, and cost.

As the example demonstrates, it becomes very important to gain quickly an exact understanding of the valuation engagement and its specific scope. One who can appropriately apply the art of IP valuation will avoid misunderstandings that lead to an erroneous value conclusion or to a value conclusion that does not match the client's understanding of the engagement, project timing, or budget.

#### ***Selecting Appropriate Valuation Methods***

Selecting the appropriate valuation method for an IP engagement is not necessarily as easy as it is with other types of valuation engagements. IP generally belongs in a class of its own for several reasons. First, intellectual property is intangible and has no intrinsic value in a fixed form like other assets one may value, which negates the applicability of asset- or cost-based approaches for IP valuation. For example, an inventor may attempt to build a continuous steel casting machine and fail miserably in its creation. Yet there is still intrinsic value in the steel and other components the inventor could sell for scrap in liquidation. In many instances, there is no such recourse for intellectual property, particularly IP with no working prototype. However, a novice valuation analyst may mistakenly assume that an asset approach, such as tabulating accumulated costs, is an appropriate value indication for intellectual property.

The selection of the appropriate valuation method relies in part on the experience of the valuation analyst. Novice intellectual property valuation analysts may immediately jump to traditional business valuation methods, such as the market approach, for valuing intellectual property. These novice analysts may decide, erroneous as it may be, that intellectual property is “comparable” to other products already in the market. However, intellectual property is unique and novel by definition. Thus, in many instances, using a comparable is not an appropriate course of action for generating a credible value indication. The artful application of an IP valuation process would avoid such errors.

Alternatively, a valuation analyst may choose to use an income-based approach to value, yet fail to apply it in a manner that is appropriate to the engagement. For example, suppose an analyst is valuing a patent for a new molecule used in a therapy for attention deficit hyperactivity disorder (ADHD) for a large, publicly traded pharmaceutical company named PharmaCo. The new therapy is at a discovery stage and PharmaCo has not yet initiated its preclinical studies. PharmaCo's weighted average

cost of capital (WACC) in the public markets is 15%. A novice may think it appropriate to use PharmaCo's WACC for the discount rate for future income attributable to the therapy or perhaps an average of the WACC of several companies that offer ADHD therapies. This is an erroneous valuation assumption to make because the company that owns the ADHD therapy under consideration, in this case, PharmaCo, achieves portfolio diversification through other income sources. Except for platform technologies, IP typically does not have multiple disparate income sources—IP is typically a single-source income model.<sup>14</sup>

A skilled artisan in IP valuation would not make the WACC determination described above, as the risk profile for the new therapy is much higher than that of a diversified pharmaceutical company such as PharmaCo. The lower discount factor for PharmaCo reflects this diversification. A skilled artisan would use a discount factor higher than the parent company's WACC, adjusted to account for the relative riskiness of the investment in the new therapy.

Chapter 10 explores in detail the impacts of risk analysis on the discount rate, and Chapter 4 provides a thorough discussion of appropriate valuation methodologies.

### ***Performing Credible Due Diligence***

The art of performing due diligence for an IP valuation engagement is crucial to generating a credible work product. Yet, a preponderance of the education and analysis common to IP valuation reports focuses on performing forensic analysis of the historical income-generating ability of the intellectual property. In doing so, the valuation analyst misses many of the key value-creating considerations for the IP. This can lead a valuation analyst to the wrong IP valuation conclusion.

Consider that the company ValveCo owns a U.S. patent for a valve train mechanism for a car. The company has been monetizing that patent for five years and it has 10 years remaining for patent protection. ValveCo licenses the rights to produce embodiments of the patent to the top six automobile original equipment manufacturers in the U.S. market. These top six OEMs comprise 85% of the cumulative market share and consist of General Motors, Toyota, Ford, Chrysler, Honda, and Nissan. The OEMs each pay ValveCo a 5% royalty on the value of the total engine system, which, according to a 2007 study by Merrill Lynch, has a nominal value of \$2,350

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<sup>14</sup> To make the analysis more complex, which is what happens in practice, IP exploitation strategies may generate income from several sources for the same IP, each with a different risk attribute. In such cases, the valuation analyst should use a different, risk-adjusted discount rate for each income source or a composite discount rate based on the weighted average risk of the investment, perhaps weighted by contribution margin from each income source.

per vehicle. Thus, each OEM pays ValveCo a royalty of \$117.50 per vehicle for the rights to use ValveCo's design. Industry watchdog Frost & Sullivan indicated engine sales from 2003 to 2007 in the U.S. market are shown in Exhibit 9.<sup>15</sup>

ValveCo is an IP holding company. It does not make products itself. Instead, it maintains its IP portfolio and expends 15% of revenues per year on research and development for new products. All other expenses represent a de minimis impact, amounting to less than 5% of total revenues. Thus, ValveCo is highly profitable (as many IP holding companies are) generating a pre-tax net margin of 80%. ValveCo is in a tax jurisdiction that has a combined effective income tax rate of 45%. Exhibit 10 is a summary of the historical financial performance of ValveCo from 2003 to 2007.

| <b>Exhibit 9. Engine Sales from 2003 to 2007</b> |             |             |             |             |             |
|--|-------------|-------------|-------------|-------------|-------------|
| <b>Research Source</b>                           | <b>2003</b> | <b>2004</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> |
| Frost & Sullivan                                 | 8,536,312   | 8,449,473   | 8,588,244   | 8,758,010   | 8,940,376   |

| <b>Exhibit 10. Historical Financial Performance of ValveCo</b> |               |               |               |               |               |
|--|---------------|---------------|---------------|---------------|---------------|
|  | <b>2003</b>   | <b>2004</b>   | <b>2005</b>   | <b>2006</b>   | <b>2007</b>   |
| Total units sold in the U.S. market                            | 8,536,312     | 8,449,473     | 8,588,244     | 8,758,010     | 8,940,376     |
| Top 6 OEM market share of 85% (total reachable market)         | 7,255,865     | 7,182,052     | 7,300,007     | 7,444,309     | 7,599,320     |
| Net revenues (reachable market * \$117.50 price per unit)      | 852,564,138   | 843,891,110   | 857,750,822   | 874,706,249   | 892,920,053   |
| Less research & development costs at 15% of revenues           | (127,884,624) | (126,583,667) | (128,662,630) | (131,205,937) | (133,938,008) |
| Less general & administrative costs at 5% of revenues          | (42,628,208)  | (42,194,556)  | (42,887,543)  | (43,735,312)  | (44,646,003)  |
| Earnings before income taxes (EBIT)                            | 682,051,329   | 675,112,893   | 686,200,696   | 699,764,999   | 714,336,042   |
| Less income taxes at 45% of EBIT                               | (306,923,098) | (303,800,802) | (308,790,313) | (314,894,250) | (321,451,219) |
| After-tax net income   | 375,128,231   | 371,312,091   | 377,410,383   | 384,870,749   | 392,884,823   |

<sup>15</sup> *Advances in Engine Technologies*, Frost & Sullivan, San Antonio, Texas, 2007.

As the financial data suggest, ValveCo has been a huge success, generating revenues of nearly \$2 billion from 2003 to 2007 from the top six automobile OEMs at an average after-tax net income rate of \$380,321,255. Suppose a valuation analyst looks at this income stream and determines that ValveCo may receive an average future income stream of \$380,321,255 for the next 10 years. At a 25% discount rate, the present value of the after-tax cash flows for those 10 years is \$1,357,938,286. If due diligence consisted merely of measuring historical performance and projecting it forward with some nominal macroeconomic and marketing analysis, then the valuation analyst would render a value indication of about \$1.3 billion. There is one problem, however, and it will only become apparent with a credible due diligence process. ValveCo did not pay its periodic maintenance fees three and a half years after the patent award, as is required under 35 U.S.C. §41(b) to keep the patent in effect. Further, ValveCo missed the grace period to pay its fees after the statutory requirement of three and a half years. The result is that ValveCo inadvertently abandoned its patent, effectively releasing it to the public domain. As such, ValveCo's licensees are no longer required to pay ValveCo a royalty for the use of ValveCo's design. The bottom line: ValveCo's patent is worthless, despite a forensic, historical review, which would have otherwise indicated that the patent was worth \$1.3 billion. Further, there is no residual value to the patent. GM, Toyota, and all the other OEMs can now use ValveCo's design without fear of legal recourse. Patent owners abandon patents continually, sometimes intentionally and sometimes accidentally. Patent abandonment, whether deliberate or inadvertent, also happens at large companies. For example, Fields Hybrids, LLC sued Toyota Motor Corp. and Toyota Motor Sales, U.S.A. Inc. for infringement of Fields Hybrids' hybrid engine patents. Fields Hybrids inadvertently abandoned its patents in the process and ultimately lost its infringement suit against the two Toyota corporations.<sup>16</sup> It is up to the valuation analyst to verify that patent rights are in force. A credible due diligence process is essential to that verification.

Such administrative oversights are not unique to patents. Consider the registered trademark for the phrase "A diamond is forever." At the time of this writing (September 2011), diamond company De Beers registered two different standard character marks with the USPTO related to this phrase. De Beers registered its marks in U.S. classes 002, 021, 023, 026, 027, 028, 036, 038, 050, 100, 101, 102, 103, 106, and 107. Most of these classes deal with jewelry and diamond processing. However, suppose that a new company called Diamond Tool manufactures forged hand tools with unlimited lifetime warranties. Diamond Tool decides to use the phrase "A

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<sup>16</sup> *Field Hybrids, L.L.C. v. Toyota Motor Corp.*, 2005 WL 189710 (D. Minn. 2005).

diamond is forever” and registers it under U.S. class 029. A valuation analyst hired by De Beers to quantify possible damages for the use of the phrase “A diamond is forever” will not have a viable damage model.<sup>17</sup> Diamond Tool happens to use its trademark selling forged hand tools, not jewelry and diamond-processing equipment. Thus, trademark law does not provide any relief, as sales of Diamond Tool’s wares would not create confusion among buyers with respect to De Beers’ products, unless De Beers’ mark was famous, since the buyer knows beforehand if he or she is buying diamonds or hand tools.

Empirically, this distinction with consumers about the goods or services they are buying is visible in practice. Caterpillar Inc., a Peoria, Illinois-headquartered company, is one of the largest producers of heavy equipment, selling products across the world that range from common bulldozers to generator sets. It uses the registered trademark “CAT” with its products regularly and uses the colors black and yellow routinely to designate its products. The following is a sample of the wordmark “CAT” that Caterpillar has filed under IC 007, US 013, 019, 021, 023, 031, 034 and 035, which relates generally to earth moving, earth conditioning, and materials handling equipment:



Cat Scale Company is an Iowa-based company that operates one of the largest truck scale networks in the world. Cat Scale maintains more than 1,000 locations where over-the-road truck drivers can go to weigh their loads to ensure compliance with road weight restrictions imposed by government law. It uses the registered trademark “Cat Scale” with its products regularly and uses the colors black and yellow routinely to designate its products. The following is a sample of the wordmark “CAT SCALE” that Cat Scale registered under IC 042, US 100, which relates generally to weighing vehicles:

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<sup>17</sup> This would be true unless De Beers can prove that its trademark is famous, as defined in 15 U.S.C. §1125, which it may likely attempt to do. Interestingly, another company, Ecommerce Innovations LLC, registered the trademark “A Diamond May Be Forever But a Cubic Zirconia Is for Right Now” for use in jewelry stores and retail stores selling jewelry. There is no record of De Beers contesting this trademark.



By inspection, it is obvious that both companies are using similar words and colors, yet both can participate in unrelated markets without creating confusion because of the difference in application. This is where skillful application of IP valuation principles is crucial. A novice may mistakenly form a value conclusion for damages where such damages do not exist. This guide explores many more of the nuances in IP research that materially affect IP value during the due diligence process for each of the primary IP valuation types. A skilled artisan considers these factors, as failure to consider them may lead a valuation analyst to a wrong conclusion.

### ***Properly Constructing the Valuation Models***

Constructing an appropriate IP valuation model is as much an artistic creation as a painting by Van Gogh or a book by Mark Twain. Constructed properly, a valuation model will reflect a reasonable and probable reality of value for the value standard and premise for the engagement. An improperly constructed valuation model will be as much a work of fiction as *Moby Dick*.

IP valuation is difficult. An IP valuation analyst must consider many value drivers, sometimes consisting of hundreds or thousands of exogenous inputs. This is not to say valuation models need to be complex. To the extent possible, the valuation analyst should follow the KISS principle (Keep It Simple, Stupid!), as doing so reduces the chance of mathematical or other propagation errors. Parsimony, as long as it is appropriate for the valuation engagement, is a good thing. However, insisting on simplicity in the face of a complex problem is unacceptable. A quote widely attributed to author H. L. Mencken captures it best, "For every complex problem, there is a solution that is simple, neat, and wrong."

What are some examples of improper valuation models? Using an income-capitalized valuation approach (e.g., Gordon Growth Model) for a patent valuation that has a 15-year remaining economic life is not appropriate, as income capitalization determines value of a perpetuity, which clearly does not apply to patents. Patents have finite economic lives (in many cases, shorter than their statutory lives) and no residual value beyond the statutory life. Consider top-down revenue models, which make the gross assumption that a company will capture a certain percentage of the market. These revenue models actually capture what one may call the “China Syndrome.” With the China Syndrome, an analyst projects some infinitesimally small percentage of the total market capture of a large market, like China’s billion-plus population. The revenue models indicate that the inventors are fantastically wealthy. It is easy to diagnose entrepreneurs, inventors, and valuation analysts who suffer from the China Syndrome.

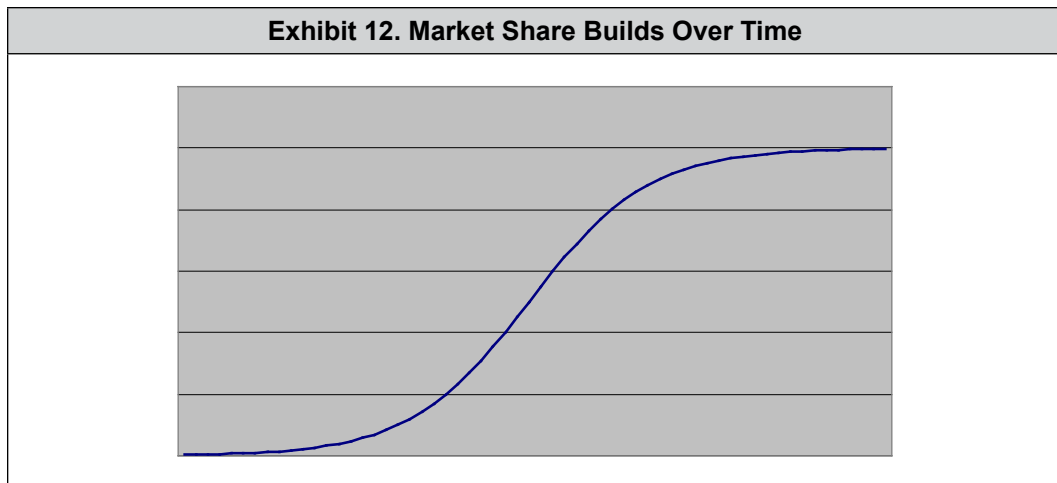
Contemplate an example in the commercial lawnmower industry with the fictitious company MowerCo, which manufactures midsize zero-turning-radius (ZTR) commercial-grade mowers. A quote from MowerCo’s principals usually sounds something like this:

The projections by Outdoor Power Equipment Institute (OPEI), an international trade association representing the manufacturers and suppliers of consumer and commercial outdoor power equipment, forecast positive sales for ZTR mowers up to 2009, despite a downturn in the housing market. OPEI projects a contraction in sales for all other comparable products, such as walk-behind mowers, riding garden tractors, and lawn tractors. OPEI estimates annual shipments between 2005 and 2009 of 203,271; 201,615; 180,518; 176,793; and 190,527 units, respectively, for a total of 952,724 units. Assuming that we capture just 5% of this market and we sell our commercial mowers at \$9,000 per unit wholesale, we will generate revenues of \$428 million over the next five years. We project a conservative pre-tax net income of 19%, and a total value of \$24 million, as the revenue model in Exhibit 11 demonstrates.

On paper, the idea looks to generate a value indication for MowerCo of \$24 million (with the simplifying assumption of no segregation of value components for intellectual property and other assets). However, the valuation model is fundamentally wrong for several reasons. First, it is rare that a company will achieve its target market share in the first year. Market share builds over time, typically along a sigmoid curve of the general shape in Exhibit 12.

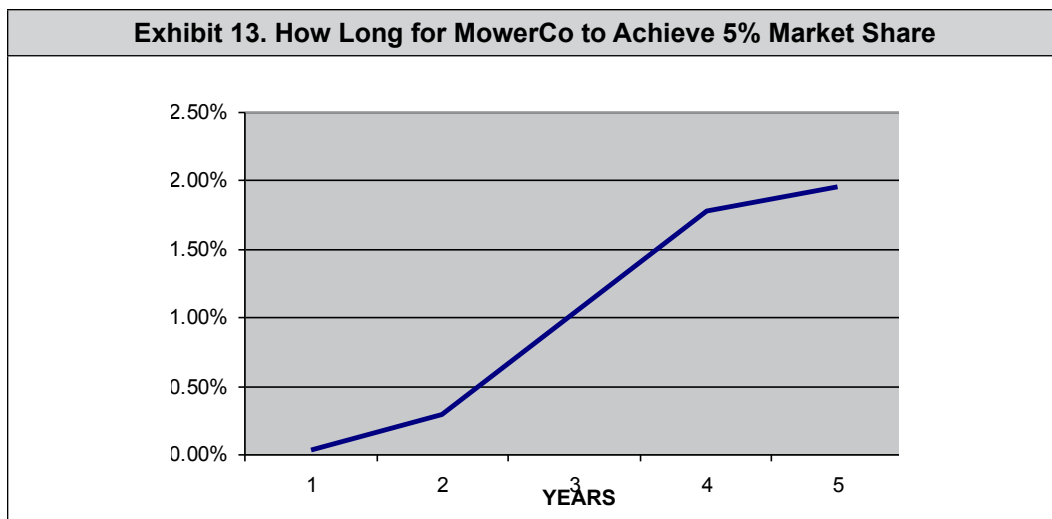


| <b>Exhibit 11. Revenue Model</b>                             |              |              |              |              |              |
|--|--------------|--------------|--------------|--------------|--------------|
|  | <b>2005</b>  | <b>2006</b>  | <b>2007</b>  | <b>2008</b>  | <b>2009</b>  |
| Total units sold in the U.S. market                          | 203,271      | 201,615      | 180,518      | 176,793      | 190,527      |
| Market share of 5% (total reachable market) (rounded figure) | 10,164       | 10,081       | 9,026        | 8,840        | 9,526        |
| Net revenues (reachable market *\$9,000 price per unit)      | 91,471,950   | 90,726,750   | 81,233,100   | 79,556,850   | 85,737,150   |
| Less direct and indirect costs at 81% of revenues            | (74,092,280) | (73,488,668) | (65,798,811) | (64,441,049) | (69,447,092) |
| Earnings before income taxes (EBIT)                          | 17,379,671   | 17,238,083   | 15,434,289   | 15,115,802   | 16,290,059   |
| Less income taxes at 45% of EBIT                             | (7,820,852)  | (7,757,137)  | (6,945,430)  | (6,802,111)  | (7,330,526)  |
| After-tax net income   | 9,558,819    | 9,480,945    | 8,488,859    | 8,313,691    | 8,959,532    |
| Discount rate  | 25%          |              |              |              |              |
| Net present value of after-tax net income                    | 24,402,303   |              |              |              |              |



Thus, while MowerCo might actually capture a market share of 5% by the end of Year 5, a proper accounting for the time it takes to reach that market share has a dramatic effect on the value. Exhibit 13 is a more reasonable approximation of how long it may take for MowerCo to ultimately achieve its 5% ending market share.

Exhibit 14 demonstrates the impact.



| Exhibit 14. Updated Valuation Model                      |             |              |              |              |              |
|--|-------------|--------------|--------------|--------------|--------------|
|  | 2005        | 2006         | 2007         | 2008         | 2009         |
| Total units sold in the U.S. market                      | 203,271     | 201,615      | 180,518      | 176,793      | 190,527      |
| Market share % (total reachable market)                  | 2.00%       | 15.00%       | 52.00%       | 89.00%       | 98.00%       |
| % of total market share captured in each year            | 0.10%       | 0.75%        | 2.60%        | 4.45%        | 4.90%        |
| Total reachable market                                   | 203         | 1,512        | 4,693        | 7,867        | 9,336        |
| Net revenues (reachable market * \$9,000 price per unit) | 1,829,439   | 13,609,013   | 42,241,212   | 70,805,597   | 84,022,407   |
| Less direct and indirect costs at 81% of revenues        | (1,481,846) | (11,023,300) | (34,215,382) | (57,352,533) | (68,058,150) |
| Earnings before income taxes (EBIT)                      | 347,593     | 2,585,712    | 8,025,830    | 13,453,063   | 15,964,257   |
| Less income taxes at 45% of EBIT                         | (156,417)   | (1,163,571)  | (3,611,624)  | (6,053,879)  | (7,183,916)  |
| After-tax net income                                     | 191,176     | 1,422,142    | 4,414,207    | 7,399,185    | 8,780,342    |
| Discount rate  | 25%         |              |              |              |              |
| Net present value of after-tax net income                | 9,231,034   |              |              |              |              |

As Exhibit 14 demonstrates, merely accounting properly for the time it takes to get to market share impaired value in this example by almost \$15 million. But wait, there's more. At \$9,000 wholesale, MowerCo is one of the most expensive providers of commercial, midsize mowers on the market. At that pricing structure, even the best-run companies are commanding no more than several thousand mowers per year, which equates to about 1% of the total market. The market sees little incremental value from premium pricing relative to other products. At 1% of the total market, the value drops off significantly to \$1.8 million, as Exhibit 15 demonstrates.

Next, consider the situation where the company may have to delay its product launch by a year because of design or marketing problems. The one-year delay generates a value impairment of more than 20%, as shown in Exhibit 16.

One can even consider the situation that MowerCo is projecting a net income that is more than four times that of the market in general. Perhaps it is possible because MowerCo has some IP that allows it to operate more efficiently (not likely, since most of the value in a mower is in the engine and hydrostatic motors and pumps,

| <b>Exhibit 15. Valuation Model at 1% of Total Market</b> |             |             |             |              |              |
|--|-------------|-------------|-------------|--------------|--------------|
|  | <b>2005</b> | <b>2006</b> | <b>2007</b> | <b>2008</b>  | <b>2009</b>  |
| Total units sold in the U.S. market                      | 203,271     | 201,615     | 180,518     | 176,793      | 190,527      |
| Market share % (total reachable market)                  | 2.00%       | 15.00%      | 52.00%      | 89.00%       | 98.00%       |
| % of total market share captured in each year            | 0.02%       | 0.15%       | 0.52%       | 0.89%        | 0.98%        |
| Total reachable market                                   | 41          | 302         | 939         | 1,573        | 1,867        |
| Net revenues (reachable market * price per unit)         | 365,888     | 2,721,803   | 8,448,242   | 14,161,119   | 16,804,481   |
| Less direct and indirect costs at 81% of revenues        | (296,369)   | (2,204,660) | (6,843,076) | (11,470,507) | (13,611,630) |
| Earnings before income taxes (EBIT)                      | 69,519      | 517,142     | 1,605,166   | 2,690,613    | 3,192,851    |
| Less income taxes at 45% of EBIT                         | (31,283)    | (232,714)   | (722,325)   | (1,210,776)  | (1,436,783)  |
| After-tax net income                                     | 38,235      | 284,428     | 882,841     | 1,479,837    | 1,756,068    |
| Discount rate  | 25%         |             |             |              |              |
| Net present value of after-tax net income                | 1,846,207   |             |             |              |              |

| Exhibit 16. Value Impairment After 1-Year Delay   |           |           |             |             |              |
|---|-----------|-----------|-------------|-------------|--------------|
|   | 2005      | 2006      | 2007        | 2008        | 2009         |
| Total units sold in the U.S. market               | -         | 203,271   | 201,615     | 180,518     | 176,793      |
| Market share % (total reachable market)           | 0.00%     | 2.00%     | 15.00%      | 52.00%      | 89.00%       |
| % of total market share captured in each year     | 0.00%     | 0.02%     | 0.15%       | 0.52%       | 0.89%        |
| Total reachable market                            | -         | 41        | 302         | 939         | 1,573        |
| Net revenues (reachable market * price per unit)  | -         | 365,888   | 2,721,803   | 8,448,242   | 14,161,119   |
| Less direct and indirect costs at 81% of revenues | -         | (296,369) | (2,204,660) | (6,843,076) | (11,470,507) |
| Earnings before income taxes (EBIT)               | -         | 69,519    | 517,142     | 1,605,166   | 2,690,613    |
| Less income taxes at 45% of EBIT                  | -         | (31,283)  | (232,714)   | (722,325)   | (1,210,776)  |
| After-tax net income                              | -         | 38,235    | 284,428     | 882,841     | 1,479,837    |
| Discount rate                                     | 25%       |           |             |             |              |
| Net present value of after-tax net income         | 1,476,965 |           |             |             |              |

and in steel, which provides little opportunity for cost reductions, but let us assume this is the case).

What is the value impact if MowerCo understates its expenses by 15% of revenues and overstates its profit expectation by 15% of revenues? The only way to establish the value impact is to model it. As the following valuation model in Exhibit 17 demonstrates, the value impact was about \$1.1 million, indicating that MowerCo is now worth \$388,000, as opposed to \$24 million as the initial valuation model indicated.

Finally, consider that MowerCo's management is not sure it is right on any of these value drivers. After all, each value driver represents MowerCo management's best guess of how MowerCo will perform, and these guesses carry the baggage of management or market biases. Accounting for the uncertainty in key valuation assumptions, such as ending market share, the wholesale price, operating margin, and time has a huge value impact.

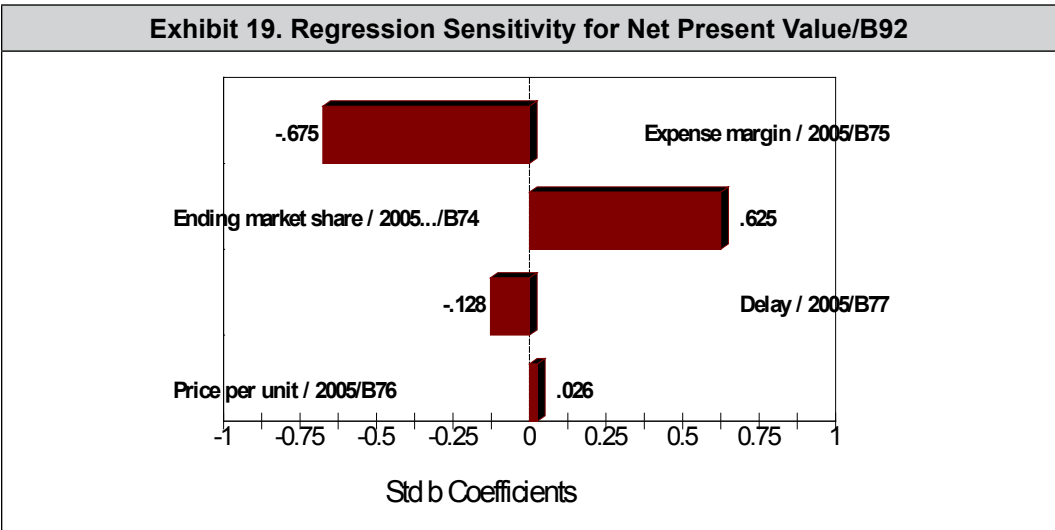
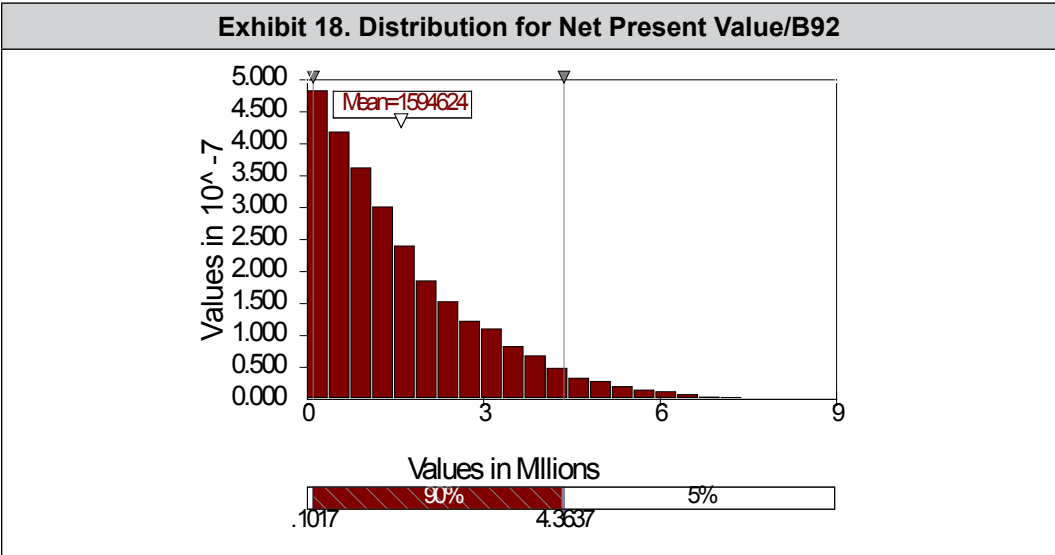
| <b>Exhibit 17. Value Impact Model</b>            |             |             |             |             |              |
|--|-------------|-------------|-------------|-------------|--------------|
|  | <b>2005</b> | <b>2006</b> | <b>2007</b> | <b>2008</b> | <b>2009</b>  |
| Total units sold in the U.S. market              | -           | 203,271     | 201,615     | 180,518     | 176,793      |
| Market share % (total reachable market)          | 0.00%       | 2.00%       | 15.00%      | 52.00%      | 89.00%       |
| % of total market share captured in each year    | 0.00%       | 0.02%       | 0.15%       | 0.52%       | 0.89%        |
| Total reachable market                           | -           | 41          | 302         | 939         | 1,573        |
| Net revenues (reachable market * price per unit) | -           | 365,888     | 2,721,803   | 8,448,242   | 14,161,119   |
| Less direct and indirect costs                   | -           | (347,593)   | (2,585,712) | (8,025,830) | (13,453,063) |
| Earnings before income taxes (EBIT)              | -           | 18,294      | 136,090     | 422,412     | 708,056      |
| Less income taxes at 45% of EBIT                 | -           | (8,232)     | (61,241)    | (190,085)   | (318,625)    |
| After-tax net income                             | -           | 10,062      | 74,850      | 232,327     | 389,431      |
| Discount rate                                    | 25%         |             |             |             |              |
| Net present value of after-tax net income        | 388,675     |             |             |             |              |

An IP valuation analyst typically captures the complex model interactions in the face of uncertain estimating assumptions in the valuation model using simulation methods. Doing so does not constrain the valuation model to any single value prediction of key values such as ending market share, wholesale prices, or time variance. The valuation analyst would program the valuation model to recalculate itself repeatedly to create a distribution of outcomes to then analyze and interpret. With a sample size that large, the value indications that the valuation model generates can turn out statistically significant results. In complex situations that involve uncertainty, this simulation methodology allows the valuation model to generate meaningful estimates that would otherwise be impossible to model using discrete methods such as best-, expected-, and worst-case modeling. The histogram in Exhibit 18 captures the results of performing such a simulation analysis on the MowerCo valuation model.

At a 90% confidence interval, the valuation model indicates a value between \$101,000 and \$4.3 million. Yet the central tendency in the data is around \$1.2 million (thus nullifying the simple solution common among business valuation analysts of using

the average of minimum and maximum value indications to arrive at a value conclusion). A stepwise linear regression analysis of the four factors modeled is equally illuminating, as the tornado chart (so named for its general shape) in Exhibit 19 demonstrates.

As the chart suggests, managing expenses should be the number one priority for MowerCo, as expenses have the largest value impact. Expenses have an inverse relationship with value, as one would expect. A lower expense ratio yields a higher after-tax net income and ultimately results in a higher value. The chart also suggests that maintaining market share is the second most important factor for MowerCo to



consider. It has a direct relationship with value, as one would expect. The greater the market share, the greater the net income that is available, resulting in a higher value. It is interesting to note that price is the least important in the sample. Thus, MowerCo could likely lower its prices to generate a higher demand and market share and drive a higher value than that it would obtain by sticking with its premium-pricing model and limited market share.

While this example somewhat simplifies what a true analysis entails, it is emblematic of the types of considerations a valuation analyst should model to reflect a truer picture of the IP's value prospects. In the end, it is important to get the valuation model right. If the valuation model is wrong, then the value conclusion will be wrong. Despite the added complexity, the artful and careful design of the valuation model should generate more credible and defensible results, particularly for contested situations.

### ***Picking the Appropriate Time Horizon for Consideration***

IP valuation differs from many engagements, such as real estate or business valuations, in that the selection of the appropriate time horizon has a material value impact. Oftentimes, business valuation analysts calculate a perpetual value for the business as a going concern. Commercial real estate appraisers do the same thing when they capitalize earnings from a building to arrive at a value determination. Yet it is erroneous to do so for intellectual property in general. Patents and copyrights have defined statutory lives. In many cases, the economic life of the IP will be less than its statutory life. For example, the statutory life for the copyright on this guide is the life of the author plus 70 years. Yet this guide will likely be out of print long before its statutory life expires. Trademarks and trade secrets do not necessarily have defined statutory lives, meaning they could persist perpetually. However, practically, this may be rare as market preferences and tastes change over time.

Much in current valuation literature suggests intellectual property may retain some type of residual value. For example, use of a market approach or a market multiple may assign a perpetual life to the IP. A valuation analyst that uses a yield capitalization method for an income approach valuation makes the same presumption. This is confusing in general to a novice, because the IP's time horizon depends on the definition of life the valuation analyst considers (e.g., statutory, technological, etc.). Take for example a patent that has a remaining economic life of five years. As the current theoretical residual value models suggest, the residual value would account for value that a patent owner would have after the statutory period, which is Year 6

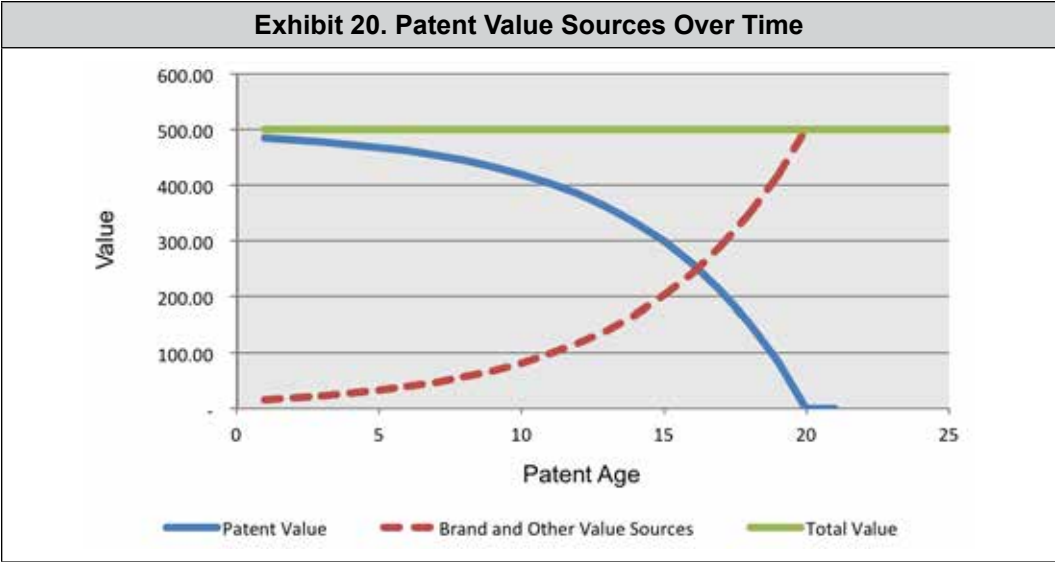
and beyond. Unfortunately, residual valuation analysis is pointless for IP types such as patents and copyrights, which have defined statutory lives. There are fundamental flaws in the theoretical basis for residual valuation models for several reasons.

First, recall that a patent or copyright is nothing more than a legal right to prevent others from exploiting the same property in the market. Thus, a patent provides the patent owner with the legal right to sue someone who is using a product in the market without authorization. The teeth in the laws provide statutory damages and injunctive relief. However, once beyond the statutory life of the intellectual property, there is no further value proposition derived from the legal protection. Thus, there is no sustainable value proposition the moment a patent or copyright expires. This is why companies with sustainable intellectual properties fight hard to maintain and extend statutory protections for their products. For example, the Walt Disney Co. lobbied Congress on behalf of the Copyright Term Extension Act of 1998 to extend the statutory life for copyrights to preserve Mickey Mouse and other Disney creations because they were due to come off copyright protection. Without the protection, the patent or copyright owner has no legal rights to sue or seek injunctive relief from a competitor. Thus, the patents and copyrights, which are nothing more than legal enforcement rights, become worthless when the statutory life ends. Any attempted dispute of the claim that the economic life ends when the statutory life ends is trivial to dismiss in practice. One can merely attempt to enforce an expired patent or copyright in court. The likely outcome is that the action would not survive summary judgment.

Second, residual value analysis confuses the things that drive value for a product, which change over time. Consider a new drug that the pharmaceutical company PharmaCo has developed to address hypertension, which we will call NewDrug. Initially, the value source for the drug is patent protection, since the patent provides PharmaCo with the right to sue any competitor that builds a competing product based on information from PharmaCo's FDA filings and published clinical trials. Recall that patent value declines each day on a present value basis until the patent expires. Yet, NewDrug maintains its value. Why? Brands and other tangible and intangible factors provide the continued value proposition for NewDrug once patent protection ends. Exhibit 20 depicts the theoretical basis for NewDrug's value sources over the duration of the patent (assuming a constant value over the life of the patent).

Empirically, this theoretical model is easy to prove in the market. Consider Prozac, a former blockbuster drug for Eli Lilly & Co. (Lilly) used to treat depression. Lilly had patent protection for Prozac under two different patents and sold Prozac on

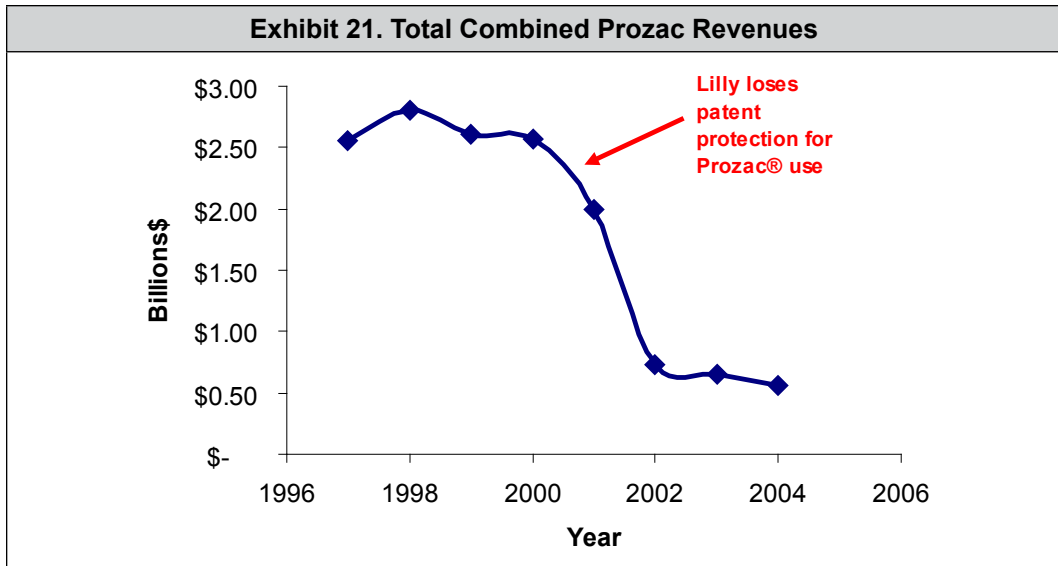




the market for years. Its patent protection was in two forms: one patent covered the compound that Lilly created (U.S. patent #4,314,081), which expired in 2001. The second patent (U.S. patent #4,626,549) covered the use of the compound as a mechanism of action (i.e., the method for how the drug worked), which was set to expire in December 2003. In 2001, Lilly lost its protection for the '549 Prozac patent two years prematurely. The impact for Prozac sales was immediate and unequivocal, with sales dropping off more than 80% within a year as consumers flocked to generic substitutes that had the same active ingredients.<sup>18</sup> However, Lilly did still maintain some sales level for Prozac, though those sales did not relate to patent protection, since Lilly lost that. Lilly unwillingly had a new, different business model for Prozac—namely selling a branded product against generic competition. Its business model is much like that of selling branded aspirin against the generic version in a CVS drugstore (more on this subject in Chapter 8). The source for Lilly’s continued sales related to the Prozac brand and other value sources that Lilly possesses (e.g., weekly reformulation, sales and distribution networks, low required rate of investment return, etc.). Exhibit 21 outlines the value impact for Prozac before and after Lilly’s patent protection loss.

A valuation analyst valuing the Prozac product would naturally study the after-tax free cash flows before and after the loss in patent protection. The difference between the two clearly indicates the patent’s value to Lilly. For brevity, the valuation model in this example is necessarily simpler than what a real-world USPAP-compliant

<sup>18</sup> Gardiner Harris, “Market Place: Despite Missteps, Lilly Remains a Hard Stock to Bet Against,” *The New York Times*, February 25, 2004.



appraisal would require. However, this simplification does not affect the credibility of the example. The simplifying assumptions are as follows:

- A discount rate of 15%;
- A variable revenue stream calculated using a linear regression forecasting algorithm based on 1997-2000 Prozac revenues for the duration of the remaining economic life for the Lilly patent, which generated revenues of \$2.59 billion, \$2.57 billion, and \$2.56 billion for years 2001, 2002, and 2003, respectively;
- A 64.8% expense ratio consistent with that reported in Lilly's annual report for the last full year before the loss of patent protection for Prozac;
- A 20.77% income tax ratio consistent with that reported in Lilly's annual report for the last full year before the loss of patent protection for Prozac; and
- A consideration of after-tax net income as opposed to free cash flow to avoid having to determine allocated interest, depreciation, amortization, and changes in working capital and investment.

Exhibit 22 is the hypothetical valuation model for Prozac before Lilly lost patent protection.

Exhibit 23 is the hypothetical valuation model for Prozac after Lilly lost patent protection.

| <b>Exhibit 22. Hypothetical Valuation Model for Prozac Before Lilly Lost Patent Protection</b> |                   |                   |                   |
|--|-------------------|-------------------|-------------------|
|  | <b>2001</b>       | <b>2002</b>       | <b>2003</b>       |
| Prozac revenues  | \$2,595,000,000   | \$2,578,000,000   | \$ 2,561,000,000  |
| Less direct and indirect costs   | (\$1,681,560,000) | (\$1,670,544,000) | (\$1,659,528,000) |
| Earnings before income taxes (EBIT)  | \$913,440,000     | \$907,456,000     | \$901,472,000     |
| Less income taxes at 20.77% of EBIT  | (\$189,721,488)   | (\$188,478,611)   | (\$187,235,734)   |
| After-tax net income   | \$723,718,512     | \$718,977,389     | \$714,236,266     |
| Net present value of after-tax net income  | \$1,642,592,583   |                   |                   |

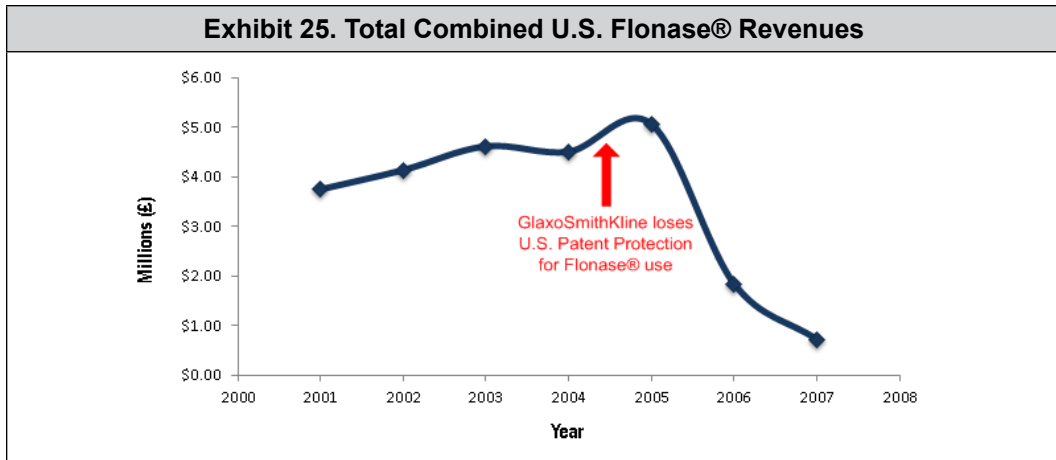
| <b>Exhibit 23. Hypothetical Valuation Model for Prozac After Lilly Lost Patent Protection</b> |                   |                 |                 |
|---|-------------------|-----------------|-----------------|
|   | <b>2001</b>       | <b>2002</b>     | <b>2003</b>     |
| Prozac revenues   | \$1,990,000,000   | \$730,000,000   | \$650,000,000   |
| Less direct and indirect costs  | (\$1,289,520,000) | (\$473,040,000) | (\$421,200,000) |
| Earnings before income taxes (EBIT)   | \$700,480,000     | \$256,960,000   | \$228,800,000   |
| Less income taxes at 20.77% of EBIT   | (\$145,489,696)   | (\$53,370,592)  | (\$47,521,760)  |
| After-tax net income  | \$554,990,304     | \$203,589,408   | \$181,278,240   |
| Net present value of after-tax net income   | \$755,736,491     |                 |                 |

| <b>Exhibit 24. Differences Between the Two Valuation Models</b> |                         |
|---|-------------------------|
|   | <b>Value Indication</b> |
| Prozac value with patent protection                             | \$1,642,592,583         |
| Prozac value without patent protection                          | \$755,736,491           |
| Prozac patent value   | \$886,856,092           |

Exhibit 24 captures the summary differences between the two valuation models.

The difference between the value indications for Prozac before and after patent protection indicates the value of the patent as well as the value of the brand and other intangibles.<sup>19</sup> The total value of patent-protected Prozac in this model was \$1.642 billion. The patent value was 53.99% of the total, or \$886 million, with the Prozac brand and other factors explaining the balance of the difference. If one were interested in the value of the brand, he or she could then compare the market premium for Prozac to the generic comparables (see examples of how to do this in Chapter 8).

<sup>19</sup> The analysis is slightly more complicated, as Lilly had more than seven months of sales in 2001 and launched Prozac weekly. Both items tend to inflate the value without patent protection (thus understating value slightly). However, for the purposes of this example, such a transgression is acceptable.



As an aside, it is interesting to note that Lilly lost nearly \$35 billion in market value in one day when its stock crashed on the day of the adverse Prozac patent announcement, or about 40 times the simplified total intrinsic value of the patent to Lilly at the time. The market overreacted to the adverse ruling with the precipitous drop in Lilly's market value, overselling the stock by a wide margin, in part because it did not understand the true economic value impact of the ruling for Lilly.

A skilled IP valuation artisan considers the appropriate economic life for the IP and the associated rights unique to that IP and nothing more. As seen in our analysis, Prozac does retain value on a forward basis; however, none of this continued value relates to Lilly's patent since there is no residual value associated with expired patents. Any continued value for Prozac relates to the strength of its brand and other factors that Lilly brings to bear selling Prozac in the market. The trend is similar for other products that have lost patent protection. For example, GlaxoSmithKline experienced a similar value drop when it lost patent protection for its Flonase product, as Exhibit 25 demonstrates.

### ***Generating Credible, Professional Valuation Reports***

The skilled master approaches the professional valuation report as Michelangelo approached the canvas, *not* as one approaches a wall to slap on a coat of generic latex paint. The professional valuation report is a work of art that needs deliberate painting with care and professionalism. The IP valuation analyst should articulate key parts of the valuation process in a form so obvious that one skilled in the art could reasonably reproduce the same results given the same inputs. This can only occur when the valuation analyst expresses all aspects of the valuation development process fully.

Valuation analysts must be sensitive to the intended use and the intended users of the report. In many cases, the report is an integral part of a formal set of proceedings, such as a lawsuit or a tax proceeding. Thus, there will be critical review of the report from the moment the IP valuation analyst delivers it. Weak reports, typical of the novice valuation analyst, do not have the credibility or integrity to stand up to such critical review. As such, the valuation analyst must transparently state and quantify all assumptions and describe all methods, tools, and analytical processes in the report. Detailed description of data collection methods must be included. The report must share entire series of data collection methods, data analysis methods, and inferences made without opacity so that other valuation analysts may be able to repeat the study for reliability purposes. Without such transparency, the valuation report cannot stand alone, and reviewers may question any conclusions.

Authoring professional valuation reports is not for the faint of heart. It takes a strong command of writing skills and a creative mind to digest the very complex technical and financial details of IP valuation engagements into comprehensible, concise, and defensible prose. While it can be tempting to take the easy or short route and produce a work product representing the absolute minimum (what one may produce under the summary format described by USPAP), such a work product lacks the depth and breadth to convey a strong and confident message that the valuation analyst has competence to perform the analysis. This means that most IP valuation reports should not conform to the summary format, but should instead be self-contained, explaining fully all relevant and material aspects of the engagement. With considerable sums of money oftentimes at stake, the report must stand on its own and its valuation processes must be repeatable.

### ***Are You in Over Your Head?***

IP valuation, especially patent valuation, is hard. In most cases, to perform an IP valuation engagement competently, a valuation analyst must demonstrate aptitude in science or engineering, as well as in finance, accounting, marketing, operations, and intellectual property law. Despite such heady competence requirements, some who practice in the profession unfortunately do not have the technical competence to perform an IP valuation engagement. Worse, they sometimes are not aware of what is required in performing the engagement and wind up committing to a project for which they cannot meet competence provisions inherent in valuation standards. Part of this unfortunate state of affairs relates to a body of knowledge that has, to date, largely ignored major components of IP valuation analysis, such as legal, scientific, engineering, and marketing analyses. Another part of it relates to a basic lack of understanding of key technical concepts. As a result, using current

analytical methods, such as the comparable profits method specified in 26 U.S.C. §482, a valuation analyst concludes that a patent accounts for some portion of a company's market value, when it in fact may not for several reasons.<sup>20</sup>

For example, consider a company that owns two related software patents. The first patent (Patent A) describes a method for speaking by a computer to a remote user by way of an Internet connection. The second patent (Patent B) describes a software application for speaking using a computer to a remote user by way of an Internet connection. To the untrained, nontechnical valuation analyst, the patents appear to be "comparable" under conditions described in 26 U.S.C. §482 and an analysis based on comparables is acceptable. However, to the trained valuation analyst, the patents are starkly different.

It is important to note that Patent A excludes unauthorized use of the technology described in Patent A by end users. Patent B excludes unauthorized use of the technology described in Patent A by companies that will sell products or services in the market. This is a subtle, yet important distinction. For example, Patent B would apply to a software company that authors and markets a product that allows one to speak to a remote user by way of an Internet connection (e.g., Skype). Patent A would apply to customers who purchase software sold by vendors that implement claims described by the second patent.

As a practical matter, Patent A would be much more difficult and expensive for a company to enforce. Identifying possible infringers for products that mimic the functionality described by Patent A could number literally millions of people. Further, it would be extraordinarily difficult and expensive to do unless the company had access to or knowledge of the operations of many companies and households. Further, possible infringers may be casual users or those who have no assets to make an infringement pursuit worthwhile. This type of challenge mirrors that of the recording industry in enforcing copyright protections for illegally downloaded music. It would be substantially easier for the company to defend Patent B, as fewer companies author such software and detection of infringing companies and their products is easier.

To demonstrate further the subtlety in the analysis process that a valuation analyst may have to consider, suppose that Patent C describes a method for speaking using a computer to a telephone exchange of a phone company user by way of an Internet connection. Patent C is identical to Patent A except for the audience at the other end

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<sup>20</sup> There are a variety of theoretical errors with methods that 26 U.S.C. §482 prescribes for IP valuation; however, a discussion of these theoretical errors is beyond the scope of this guide.

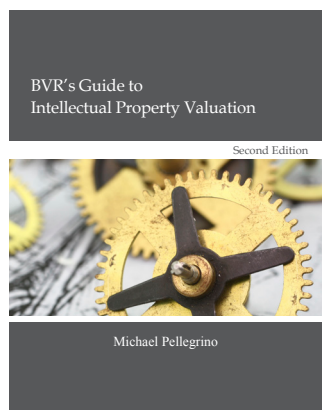
of the connection. Yet Patent C may be quite valuable. First, Patent C represents a much smaller applicable market, as a relatively small number of owners of telephone exchanges exist. Thus, the prospects of enforcing Patent C are much brighter than they are for Patent A. It is easier to identify possible infringers and the patent owner will have fewer infringers to sue. Second, the incremental cost savings for a telephone company multiplexing thousands of conversations over a single connection could be huge, establishing a large economic income base to use as a royalty base. Such qualitative analysis is generally outside the expertise of the traditional valuation analyst who lacks a formal technical education.

IP valuation difficulties do not end there. Valuation analysts often consider statistics and parameters in IP valuations, including simulations where a model containing dozens of independent variables generates thousands of data points. These cases are likely to prompt statistical or econometric considerations, such as heteroskedasticity, skewness, multicollinearity, or nonrandom samples, which can threaten the validity of the results. Using large amounts of data in formulating valuation conclusions requires a level of statistical and mathematical seasoning that transcends the capabilities of many traditional valuation analysts who have formal education only in accounting.

In short, the details matter in IP valuation and existing methods. Those prescribed in the current body of knowledge can lead a valuation analyst to erroneous results. Without offense to those in the esteemed CPA profession, who at times face engineering-related IP valuation engagements, IP valuation has less to do with accounting and more to do with science, engineering, marketing, and logic. To avoid unforeseen liability from errors and omissions, CPAs without demonstrated technical competence should seek help with technology-heavy IP valuations.

### **The Science-Art Continuum**

When it comes to IP valuation, the question is “which is more important, the science or the art?” One may argue that both are equally important. If the science is wrong, then the ending value indication is not going to be correct. However, applying the science in an artful manner is not easy. As the various examples in this chapter demonstrate, seemingly innocuous items or oversights can have a material value impact. So the art of rendering qualitative judgments to arrive at an appropriate valuation demands—as with any art—imagination and skill.



Authored by  
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