Valuing Pharmaceutical I.P.

By **Mark Pohl**

Overview

Everyone senses intuitively that intellectual property ("I.P.") affects pharmaceutical company valuations. Quantifying how much value is involved, however, is not always straightforward. This paper will provide you with some tools to aid in this inquiry. I will first review some recent examples of pharmaceutical intellectual properties that were broadly valued by the financial markets. Then, I will discuss specific tools to provide more finely tailored valuations. I conclude with some practical suggestions for you to use in the future, should you become involved in a pharmaceutical licensing or technology transfer project.

Intellectual Property Value Affects Corporate Value

Intellectual Property Value Affects Pharmaceutical Company Market Capitalization

"Size has a quality all its own."

– Lenin

Financial markets rarely give a specific value to a specific intellectual property. When they do, these rare instances often provide somewhat conclusory information on the value of a specific technology. Thus, these examples often do not shed much light on specific techniques for valuing one's own technology. What these examples lack in finesse, however, they make up for in raw size, and provide an encouraging—or sobering—picture of the value at stake here.

The amount of value at stake is illustrated, for example, by the effect of a new patent on the stock price of Human Genome Sciences:

> "At 8:13 a.m. on Feb. 16, a news release from Human Genome Sciences Inc. crossed news wires, and instantly its shares began soaring in premarket trading. The company said it had just received a U.S. patent giving it commercial ownership of a gene that HIV, the AIDS virus, exploits when it infects a cell. The news release excited a hyperbolic Wall Street already powering biotech shares to unprecedented highs, and within two days, HGS shares had leapt 41%, adding $3.8 billion to the little company's value." [1].

A $3.8 billion jump in corporate value in any industry is spectacular, even as a single, unique event. Significant, however, is that this kind of corporate value change is not at all unusual. Rather, patents add—and subtract—enormous amounts of corporate market value, often suddenly.

For example, magnetic resonance imaging equipment-maker Fonar obtained an award *ten times* bigger than its total annual operating revenues, as a patent infringement award from General Electric. The award—$128.7 million—was so big that Fonar could not use it; it was paid out to

Fonar shareholders as a one-time "patent infringement dividend." Similarly, the day after Affymetrix settled its patent infringement suit against Incyte, Affymetrix's common stock price shot up 28%. The dollars at issue are significant.

> "The fact that Xerox is now aggressively capitalizing on its intellectual property is extremely important.... It's a real change to how they're doing business, and I'd estimate that it's going to be worth [nearly $5 billion] to them over the period ahead" [2].

Faced with value of this magnitude, intellectual property is becoming recognized as a significant driver of corporate transactional activity (*i.e.*, "corporate take-overs"). For example, EndoVascular was purchased in October 1997 for $170 million by Guidant Corporation, the maker of the Multi-Link® coronary stent. At the time, "[t]he deal surprised analysts because EndoVascular doesn't even make stents" [3]. Guidant had, however, just been sued by market leader Johnson & Johnson for infringing J&J's coronary stent patents. Guidant, in acquiring EndoVascular, acquired EndoVascular's portfolio of unused, but pioneering, stent patents—patents that could potentially block J&J itself from the market.

Just as intellectual property can add value, it can also create heart-stopping declines in value. For example, on December 7, 1999, the U.S. International Trade Commission found that Visx's eye surgery laser patent did not cover rival Nitek's product. Visx's market capitalization immediately dropped over $2 billion, cutting the corporation's market value 41%.

Similarly, Eli Lilly's August, 2000 Prozac® patent invalidation cut Lilly's global market capitalization by a third *in one day*. This cost Lilly $36 billion in market capital. Thus, in one day, Lilly lost the entire corporate value it had built over the previous two years.

It is clear that I.P. significantly contributes to pharmaceutical company value. How does I.P.'s value compare to that of other potential value-creating aspects?

The Value Creation Index

To evaluate the macroeconomics at work here, an analysis of the sources of corporate value was done by The Wharton School of Business, Forbes Magazine and Ernst & Young. The study examined eight factors thought to increase corporate market capitalization. For durable manufacturing firms (of all industries, not just pharmaceutical firms), the study found that the relative importance of these eight factors is: (1) innovation (new technology), (2) talented employees, (3) alliances, (4) product quality, (5) environmental, (6) brand investment, (7) office IT and (8) customer satisfaction [4].

Thus, of the eight parameters measured, "innovation" has the most important statistical effect on stock price. Its effect exceeds that of investments in brand marketing, in office information technology, or even in customer satisfaction. In fact, the "use of [office] technology and customer satisfaction," and "investment in building brand awareness, have "no statistical association with [corporate] market values," [4] while innovation (and alliances) had the strongest correlations with increasing corporate market capitalization.

So, how do you decide the worth of innovations—your own or those of your potential drug-development partner? Modern corporate financial theory provides some tools.

Specific Technology Valuation Methods

Modern legal and corporate finance theory provides a rationale for rejecting certain valuation tools, and for using other tools in their place. I will thus discuss two approaches—reproduction cost and market comparables—only briefly, to explain why they should not be relied on. Then, I review some more reliable tools—discounted cash flow valuation and options valuation—noting some aspects peculiar to the pharmaceutical industry.

Reproduction Cost

Reproduction cost is the cost required to reproduce something today. Reproduction cost is often used to value homes. It has also been used to value new biotechnology or pharmaceutical technology. In doing so, the cost includes all costs allocatable to the technology, including salaries, patent expenses, facility overhead, regulatory approval. Typically, there is no allocation to the cost of one technology or the expenses for "failed" research into other technologies.

Reproduction cost may work to value real estate. In valuing technology, however, it has a significant problem. This is because reproduction cost assumes that $1 spent reproducing a technology must yield $1 of future value. This assumption is wrong when applied to intellectual property, on two counts.

> [Sunk cost] "assumes that $1 invested in R&D yields a return of only $1. Economic data indicate that the return is more like ten to one" [3].

First, reproduction cost underestimates gross economic values. For the United States economy as a whole, $1 spent on research generates about $10 of future value. Thus, the value of research appears to be not the current reproduction cost, but the historical production cost, *times ten.* This under-estimation of value may be addressed somewhat by increasing the "cost" basis of a given technology by allocating to that technology the sunk costs expensed pursuing other "failed" research projects.

Second, and most importantly, the reproduction cost approach does not help identify which, among various technologies, hold the $10 (or more) of real economic value. The 10:1 economic returns, remember, are for the economy as a whole, on average. Among several different research projects, however, several may be completely valueless, and others worth significantly more than the average $10 return. Reproduction cost value does nothing to help distinguish which, among various available technologies, is the likely "winning lottery ticket."

Comparable Market Transactions

Another valuation approach is to copy values from "comparable" market transactions. Comparable market transactions are transactions made between unrelated parties with no coercion or pressure to transact for "comparable" assets. By using market "comparables," one assumes that what the other guy paid was fair (*i.e.*, one assumes that the other guy did his homework, and did it correctly). While you may accept this as sound, for technology, finding "comparability" is a problem.

> "A patent is a thing unique. There can be no contemporaneous sales to express the market value of an invention that derives from its novelty its patentable quality"[5].

Thus, comparable market transactions are generally difficult to find, to value drug and biotechnology patents. This is because, by definition, patents are "novel," *i.e.*, unique. Thus, there should be no "comparable" assets. Thus, U.S. courts generally do not use comparable market values.

Nonetheless, one may use market transactions to get insight into what other people think of the market (as a whole, in the abstract) by looking at their valuations for similar-class technologies. Sources of information on comparable market values include AUS Consultants (New Jersey), pharmalicensing.com, and recap.com.

To value new drug technology, it is more accurate to first compile projected income statements, and then "discount" these projections to a net present value, or value them as real options.

Projected Income Statement / SCF

In projecting income and expenses, use cash basis projections. To estimate sales, one can use industry specific actuarial tables to generate an expected product life cycle. Sales and expenses may also be assessed using Price-Demand curves. Pharmaceutical industry consultants, such as Mazier Partners (Morristown, New Jersey) or the Mattson-Jack Group (Rochester, New York) may be of assistance here. The likelihood and size of industry-specific non-COGS expenses (regulatory affairs, PDMA compliance and patent enforcement expenses) may be material. After these future income projections are made, they can be "discounted" to a present value.

Discount Rates

Discounted cash flow (DCF) analysis entails making projections of future financial performance and then "discounting" these future projections back to arrive at a value stated in today's dollars. DCF analysis is eloquently explained in Brealey & Meyers, *Principles of Corporate Finance*.

Discounting projected future cash flows requires using an appropriate discount rate. To calculate a proper aggregate discount rate, include component rates for specific risks. For example, the risk of patent invalidity and the risk of patent narrowness (non-infringement) should be added to the basic discount rate, if the valuation is done before a patent infringement "Markman hearing." This raises the aggregate discount rate, and decreases the ultimate value. Valuations done after a court finds a patent valid and infringed, however, should exclude these risks. The resulting valuation should consequently be higher [6].

Similarly, less "transplantable" technology may merit a "liquidity risk" premium. For example, M-CAM Inc. (Charlottesville) appraises the value of intellectual property collateral for secured commercial loans. In doing so, M-CAM looks at whether the technology is owned or merely licensed, and examines how reliant the technology is on the current owner's specific management team (*i.e.*, if the current owner/debtor defaults on the loan and the collateral repossessed, is the technology collateral "transplantable" and useable by another company) [7].

Projected revenues and expenses and discount rates are not constant over the life of a research project. Rather, pharmaceutical research has predictable, discreet decision points (the end a clinical study, for example). Given such discreet decision points, decision tree analysis may prove useful as an adjunct to DCF analysis.

Incremental Value

To determine the value of a given new pharmaceutical technology, it is crucial to value not the project as a whole, but the *incremental* value of the technology, compared to the next most valuable alternative. That is, one must value the project using the patented technology, and again, without the patented technology. The difference in value is the value of the technology.

> "Incremental value may derive from the probable increase of [manufacturing] efficiency or savings of expense" *vis* alternative approaches" [8].

If the project DCF value, when using the patented technology, is not greater than the DCF value using non-patented alternatives, the patented technology is easily valued—it is worth nothing (see [9], for example). If, however, there is no alternative technology (*i.e.*, if the patent covers the entire market), then the incremental value of the technology can be the entire net present value obtainable from the entire market (see [10], for example).

This incremental value can be broken down into several discreet components. For example, one can look at the discreet values of the patent obtainable from licensing to willing licensors, collecting infringement awards from infringers, and from increased operating income due to selling into a less crowded market. In any case, you will need to make some assumptions regarding sales levels, discount rates and the like.

Real Options

The projected future cash flows may additionally, or alternatively, be valued using real options valuation models. In applying options valuation analysis, one needs to choose an appropriate valuation model. For example, the classic Black-Scholes model assumes a lognormal (a lopsided "bell curve") outcome distribution. This distribution is arguably not appropriate for unproven clinical compounds. Such

technology may suddenly (*e.g.*, on completion of Phase II clinical trials) change value to only one of two discreet outcomes—the compound either does or does not work. Such outcomes are not lognormal. Thus, it may not be best to analyze such projects using a Black-Scholes model. Consider using an alternative, such as a binomial or "jump-diffusion" valuation model.

Similarly, use the appropriate (European or American) exercise assumption. Options on financial products are valued assuming the option is never exercised before the expiration date. In contrast, an option on a "real" project, like clinical research, will very likely be exercised before expiration—*e.g.*, before commercial launch.

Action Plan

Models are Models

Financial modeling is precise. It is, however, only as accurate as the data and assumptions it employs.

> "EPO is probably the kind of drug that Amgen would pass on today, as it had neither obvious blockbuster appeal nor any net present value" [11].

A financial model is, after all, just a model. Thus, temper your financial modeling with a dose of scientific and marketing intuition.

Patents are Marketing Assets

Patents have value in creating incremental profit. If it does not cover features that generate increased sales or decreased expenses, a patent is valueless. Thus, to maximize the value of your patents, help assure that they cover product aspects valuable in the marketplace, with your customer. To this end, it is extraordinarily important that your patent counsel have a close working relationship, not just with your R&D department, but also with your marketing and strategic planning departments.

Challenge and Opportunity

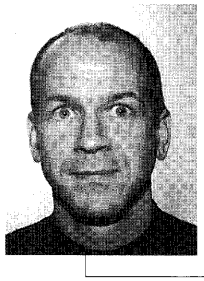
Intellectual property now accounts for over 85% of aggregate, all-industry corporate market value in the United States [12]. In the pharmaceutical industry, the figure approaches 98%. Being able to assess this value more accurately may provide you with a competitive advantage, enabling you to negotiate better pharmaceutical licensing and technology transfer deals.

> "underutilization of technology assets represents either a stinging indictment of corporate myopia regarding intellectual property, or the greatest opportunity to be handed to chief financial officers in a generation. Indeed, the current run-up in intellectual asset values ... suggests that patent rewards may be as great as the rewards the leveraged buyout kings obtained 20 years ago when they capitalized on the undervalued real estate and pension holdings of corporate America" [3].

Valuing pharmaceutical intellectual property is difficult. You can treat this difficulty as a burden, or as an outstanding opportunity to find hidden value.

References

1. M. Waldholz, "Rights to Life: Genes are Patentable; Less Clear is if Finder Must Know their Role; AIDS Discovery Spurs Some to Challenge a Filing that Boosted HGS Stock; Why a Few Can Resist HIV." *Wall Street Journal* A:1 (2000).
2. D. Kunstler, Quoted in: *Wall Street's View of IP*, The IPC Group, p. 4 (2000).
3. K.G. Rivette and D. Kline, Discovering New Value in Intellectual Property, *Harvard Business Review*, pp. 54-66 (Jan. 2000).
4. G. Baum, *et al.*, Introducing the New Value Creation Index, *Forbes ASAP*, **2000**:140-144 (Apr. 3, 2000).
5. The United States Supreme Court, Sinclair Refining Co. *v.* Jenkins Petroleum Processing Co., Reprinted in *U.S. Reporter*, **289**:689, 697 (1932).
6. S. H. Kalos and J. Punam, *Journal of Proprietary Rights*, 9:2-3 (1997).
7. P. Hise, *Inc.*, **2000**:84-89 (Jan. 2000).
8. The U.S. Supreme Court, Sinclair Refining Co., Reprinted in *U.S. Reporter*, **289**:697 (1932).
9. F. Easterbrook, Grain Processing Corporation *v.* American Maize-Products Company, Reprinted in *Federal Supplement*, **185**:1238-39 (1995).
10. Georgia-Pacific Corporation *v.* United States Plywood Corporation, Reprinted in *Federal Supplement*, **318**:1116 (1970).
11. *Red Herring*, 78:160 (May 2000).
12. G. Smith and R. Parr, Patent Valuation and Royalty Rate Development, In: *Proceedings of the Licensing Executives Society Annual Meeting*; Arlington, Virginia, p. 3 (Summer, 2000).



Mark Pohl *was a molecular biologist before attending N.Y.U. Law School. He now practices pharmaceutical industry patent law and licensing in Morristown, New Jersey.*
You may e-mail him at licensinglaw@juno.com.