

## INTELLECTUAL PROPERTY LOST PROFITS AND ECONOMIC DAMAGES ANALYSES

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### INTRODUCTION

This discussion summarizes the general approaches to the analysis of intellectual property (IP) for purposes of estimating lost profits and economic damages. The quantification of IP lost profits and economic damages arises in litigation claims related to infringement, expropriation, lender liability, breach of contract, bankruptcy, and other deprivation-related controversy matters.

In such controversy matters, IP owners need to know how—and by how much—their IP has been damaged in order to (1) assess the magnitude of their claim and (2) prove their claim when seeking judicial relief. The controversy defendants also need to analyze the alleged IP damages in order to present a credible defense and/or negotiate a reasonable settlement. And, the finder of fact needs to understand all alternative IP damages analyses in order to (1) assign liability and (2) award appropriate compensation to the aggrieved party.

In addition to damages-related controversies, there are numerous other reasons for conducting an IP economic analysis. These other reasons include the following:

1. transaction pricing and structuring, for either the sale, purchase, or license of the IP;
2. financing securitization and collateralization, for both cash flow-based financing and asset-based financing;
3. taxation planning and compliance, with regard to amortization, abandonment loss, and charitable contribution deductions; intercompany transfer pricing; and federal gift and estate tax compliance and estate planning;
4. management information and planning, including business value enhancement analyses, identification of licensing and other commercialization opportunities, identification of spin-off opportunities, and other long-range strategic issues;
5. bankruptcy and reorganization analysis, including the value of the bankruptcy estate, debtor-in-possession financing, traditional refinancing, restructuring, and the assessment of the impact of proposed reorganization plans; and
6. other litigation and dispute resolution, including marital dissolution, dissipation of corporate assets, shareholder disputes, and reasonableness of owner compensation matters.

The approaches and methods described below are relevant to IP economic analyses performed for any of these reasons.

### ATTRIBUTES THAT DISTINGUISH INTELLECTUAL PROPERTY

IP is a special class of intangible assets. IP manifests all of the economic existence and economic value attributes of other intangible assets. However, because of its special status, IP enjoys special legal recognition and protection. While intangible assets are often created in the normal course of business operations, IP is created by specific human intellectual and/or inspirational activity.

Because of this unique creation process, IP is generally registered under, and protected by, specific federal and state statutes. The protection of this legal registration provides economic motivation for IP innovators during the creative process. This legal registration also provides protection for IP creators during the commercialization process. It is believed that the information content of IP requires this special protection in order for an IP owner to realize economic value of these special intangible assets.

There are four legally recognized types of IP: trademarks, copyrights, patents, and trade secrets. For economic analysis purposes, these types of IP may be grouped into these five categories:

1. marketing-related, such as trademarks, trade names, and service marks;
2. technology-related, such as product and process patents and patent applications;
3. artistic-related, such as literary and musical copyrights;
4. data processing-related, such as computer software copyrights and computer chip masks and masters; and
5. engineering-related, such as industrial designs and trade secrets.

### HOW INTELLECTUAL PROPERTY ATTRIBUTES AFFECT THE ECONOMIC ANALYSIS

The various IP legal attributes affect the economic analysis in several ways. The IP legal attributes particularly affect the quantification of lost profits and economic damages.

First, most IP has a specified legal life. This legal life may not be the most important “life measure” with regard to IP economic analysis. However, while most general intangible

assets do not have a specified legal (i.e., determined by statute) life, most IP does.

Second, because of the special legal recognition and protection afforded to intellectual property, IP owners have more commercialization opportunities available. This is particularly true compared to the owners of general intangible assets. For example, IP owners often enter into license, joint venture, or other exploitation and development agreements. These agreements allow them to enjoy the economic benefits of commercializing their IP in a way that is external to their current business interests.

Such external commercialization opportunities could include licensing the use and/or development rights for the subject IP:

1. through geographic expansion—into new territories;
2. through industry expansion—into new industries; and/or
3. through product expansion—into new products.

These external commercialization opportunities are typically not available with respect to general intangible assets. For example, the owners of a favorable supplier contract, ongoing customer relationships, or a trained and assembled workforce generally may derive the economic benefits from these intangible assets by commercializing them only within their current business operations.

Third, there are more transactional data available for analysis with respect to IP (compared with general intangible assets). That is, there are more data available with regard to the sale, license, or other external commercialization of IP. There are more transactional data available for analysis because there are more reported sale/license transactions. There are more reported transactions because IP owners are more confident about entering into external commercialization transactions. This is because they know that their legal and economic interests are more likely to be protected by the laws associated with their particular IP.

Fourth, IP generally enjoys higher royalty rates and higher market value pricing multiples than do general intangible assets. Of course, this statement is true under the condition of *ceteris paribus*. And, in the real world, all other things are never equal. Generally, IP trades (i.e., is licensed or sold) for higher prices than general commercial intangible assets. This is because IP buyers—and IP licensees—are willing to pay more due to the protection afforded to them by IP laws. IP laws reduce the risk associated with IP commercial transactions. As a result of this reduced risk, IP buyers and licensees may feel

that they can afford to pay a bit more to enter into such transactions.

Fifth, there is substantially more judicial precedent regarding IP than there is regarding general intangible assets. This factor itself has three implications:

1. There is greater judicially determined definition of certain IP than of other intangible assets. For example, due to infringement and other litigation, U.S. courts have defined to some extent what is a trade name and what is a trade secret. Analysts can generally rely upon these definitions in the identification and analysis of IP. There is much less published precedent with regard to such intangible assets as an optimal distribution system or going-concern value. Therefore, there is somewhat less definition (at least judicial definition) as to what constitutes these general intangible assets.
2. With respect to certain IP, there have been more judicial decisions in the United States with regard to appropriate (and inappropriate) valuation methodology, with regard to reasonable ranges of royalty rates, and with regard to economic damage analysis methods and amounts. Again, such judicial precedent may provide valuable guidance to the analyst. This is not to suggest that analysts should naively apply pricing multiples or royalty rates in a specific analysis just because they are published in a judicial decision. Obviously, such pricing multiples and royalty rates would only be appropriate given the unique facts and circumstances of the specific court case. Nonetheless, a review of published precedent may provide the analyst with an indication of a reasonable range of pricing multiples, royalty rates, damages-related lost profit margins, and so forth.
3. Participants (that is, buyers, sellers, licensors, licensees) in the IP secondary market will be generally aware of the amount of judicial precedent. This precedent will inform market participants that federal and state laws exist and that the courts recognize and protect various types of IP. This level of judicial awareness and protection may motivate more market participants to enter into more market transactions. This is because market participants may consider the IP market to be relatively safe and protected.

*“ . . . because of the special legal recognition and protection afforded to intellectual property, IP owners have more commercialization opportunities available.”*

Sixth, it is noteworthy that these IP attributes can have a positive effect on both the active value and the passive value of IPs. Active value is generated when an IP is used proactively (that is, to increase prices, market share, or profits). Passive

value is generated when an IP is used defensively (that is, to protect prices, market share, or profits). Both active value and passive value may be positively influenced by IP legal attributes.

## IDENTIFYING INTELLECTUAL PROPERTY

For IP to exist from an economic perspective, it should possess certain attributes, such as:

- It should be subject to specific identification and recognizable description.
- It should be subject to legal existence and protection.
- It should be subject to the right of private ownership (and this private ownership must be legally transferable).
- It should have some tangible evidence or manifestation of the existence of the asset (for example, expanding a license, a registration document, a computer diskette, a set of procedural documentation, and so on).
- It should have been created or have come into existence at an identifiable time or as the result of an identifiable event.
- It should be subject to being destroyed or to a termination of existence at an identifiable time or as the result of an identifiable event.

While an IP may not possess all of these particular attributes, there should be a specific bundle of legal rights (and other natural properties) associated with its existence.

For IP to have economic value, it should possess certain additional attributes. Some of these additional attributes include the following:

- It should have the ability to generate some measurable amount of economic benefit. This economic benefit could be in the form of an income increment or of a cost decrement. This economic benefit is sometimes measured by comparison to the amount of income otherwise available to the owner if the IP did not exist.
- This economic benefit may be measured in any of several ways, including net income, net operating income, net cash flow, among others.
- An IP in commercial use should be able to enhance the value of other assets used in the commercial enterprise. These other assets may include tangible personal property, real estate, or other intangible assets.

Analysts recognize a distinction between (1) the economic existence of IP and (2) the economic value of IP. An example

of this distinction would be a copyrighted software system that, upon creation, is permanently locked in the company's vault. If the software is never used in the production of (or in the protection of) income, then it has no economic value—even though it has economic existence.

Economic phenomena that do not meet the attributes described above usually do not qualify as IP. Some economic phenomena are merely descriptive or expository in nature. Such "descriptive" economic phenomena that do not qualify as IP include:

- high market share,
- high profitability,
- positive reputation,
- market leader position,
- market potential, and
- first entrant in a new market category.

While these descriptive conditions do not qualify as IP, they may indicate that an actual IP has substantial economic value. For example, while these descriptive conditions do not qualify as a discrete IP, they may indicate the existence of a valuable trade name.

## BUNDLE OF LEGAL RIGHTS

One of the first steps in the IP analysis is to identify the specified bundle of legal rights. According to the bundle-of-rights theory, complete IP ownership, or title in fee, consists of a group of distinct legal rights. Each of these legal rights can be separated from the bundle and conveyed by the fee owner to other parties in perpetuity or for a limited time period. When a right is separated from the bundle and transferred, a partial or fractional property interest results. It is possible to examine property interests in an IP from several points of view. This is because the ownership, legal, economic, and financial aspects of IP overlap.

IP ownership interests can take various forms. And, widely different economic values can attach to the different ownership interests. The ownership interests related to the typical income-producing IP include the following:

- fee simple interests,
- term estate,
- license/franchise interests and sub-license/franchise interests,
- reversionary interests, and
- development/exploitation rights.

## ECONOMIC DAMAGES/LOST PROFITS METHODS

The most common methods for quantifying IP economic damages or lost profits are (1) the “before and after” method, (2) the “but for” method, and (3) the actual/opportunity cost method. Directly or indirectly, each of these damage analysis methods estimates a value by either (1) the decrease in the value of the IP (or the IP owner business enterprise) related to the damage event or (2) the value (albeit negative) of the IP damage event itself. In each of these methods, the damage event could be an infringement, breach of contract/license/joint venture agreement, breach of employment/noncompete confidentiality agreement, breach of a commercialization/development agreement, a business interruption or tort, a lender liability failure to perform, fraud or misrepresentation related to a sale/transfer, and so on.

The before and after method quantifies damages by comparing (1) the value of the subject IP before the damage event to (2) the value of the subject IP after the damage event. The difference, of course, is the economic effect of the damage event. This method requires a valuation of the subject copyright, patent, trademark, or trade secret just before the damage event (or series of events) occurs. Then, this method requires a valuation of the subject copyright, patent, trademark, or trade secret after the damaging event (or series of events) has occurred. Ideally, the “after” valuation is prepared as of a date after the damage event has ceased. The difference between the before and after values is one measure of the damage to the IP.

This difference in IP values between two dates may not be the only damage suffered by the IP owner. In addition to the decrease in IP value, the owner may have (1) lost profits during the period of the damage events, (2) incurred damage remediation costs during the damage event period, and (3) incurred legal/administrative costs to prosecute the party responsible for the damage event.

The but for method quantifies damages directly by estimating what amount of economic income would have been earned by the IP owner “but for” the damage event. The but for method typically involves (1) a backward looking projection of economic income that would have been earned from the IP use/ownership but for the damage event and (2) a forward looking projection of economic income that would have been earned from the IP use/ownership but for the damage event. The backward projection starts when the first damage event occurs and continues to the date of the analysis (often trial date in a litigation matter or the date of a damage expert’s report). The forward projection starts at the analysis date (for example, the trial date) and continues until both (1) the damage event stops and (2) there is no more expected residual effect of the damage event. Typically, the result of the back-

ward projection is future valued to the analysis date, and the result of the forward projection is present valued to the analysis date. The total amount of damages is the sum of (1) the future value of the backward projection and (2) the present value of the future projection.

The but for method is one measure of the damages to the subject IP. Again, the IP owner may have incurred other losses due to the damage event, such as legal fees, expert witness fees, court costs, and so on.

The actual/opportunity cost method quantifies damages to the IP owner by examining (1) the historical cost of developing and commercializing the IP through the analysis date, (2) the historical opportunity cost of not commercializing the IP through the analysis date, and (3) the prospective opportunity cost of not commercializing the IP from the analysis date. The analysis date is typically either the date of the expert’s damages report or the date of the trial/arbitration hearing.

The historical cost of patent, copyright, trademark, or trade secret development includes all (1) direct costs (for example, engineering, design, market research time and expenses), (2) indirect costs (for example, management time, support staff time, overhead expenses), (3) commercialization/promotional costs (for example, advertising, promotion, marketing expenses), and (4) entrepreneurial incentive (for example, a fair rate of return on all other development costs incurred during the development process). All of these actual historical costs should be restated to current costs as of the analysis date. This restatement procedure is usually accomplished by applying price inflation trend factors to the actual historical costs.

The historical opportunity cost includes the income the IP owner would have earned from the use of the IP, absent the damage event (for example, the infringement or expropriation). The historical opportunity cost is estimated from the date of the damage event through the analysis date. And, the historical opportunity cost is stated as a future value (that is, inflated to reflect current costs) as of the analysis date.

The prospective opportunity cost includes the income the IP owner would have earned in the future from the use of the IP absent the damage event. The prospective opportunity cost is estimated from the analysis date forward to the date when the damage event is no longer expected to affect the subject IP. And, the prospective opportunity cost is stated as a present value as of the analysis date.

The total damage indication of this method is the sum of the three cost components: (1) historical cost of development, (2) historical opportunity cost, and (3) prospective opportunity cost. In addition to this damage measure, the IP owner may have suffered other losses due to the damage event, such as legal fees, expert witness fees, court costs, among others.

*“The but for method quantifies damages directly by estimating what amount of economic income would have been earned by the IP owner ‘but for’ the damage event.”*

The three above-described IP economic damage methods are generally analogous to the three IP valuation approaches. Conceptually, this is not surprising. This is because IP economic damages are typically measured (1) indirectly—as a decrement in the value of the subject IP or (2) directly—as the value (albeit negative) of the damage event itself. The market approach to IP valuation is often used in the before and after damage method. The amount of the damages is the difference between (1) the “before” IP market value and (2) the “after” IP market value. The income approach is often used in the but for damage method. The income approach analysis estimates the present value of the economic income the IP owner could have earned but for the damage event. The cost approach to IP valuation is often used in the actual/opportunity damage method. The cost approach estimates (1) the actual cost as replacement direct and indirect cost, (2) the historical opportunity cost as developer’s profit, and (3) the prospective opportunity cost as entrepreneurial incentive.

In all three of the IP economic damage methods, economic income can be defined in many different ways. Economic income can be measured by increases/decreases in units (volume) sold, price per unit, market share (absolute or relative), market size, or by being/not being first to market. Economic income can be measured by increases/decreases in fixed/variable production expenses, fixed/variable selling and administrative expenses, or fixed/variable research and development expenses. And, economic income can be measured by increases/decreases in capital expenditures, working capital investments, or interest expenses. Finally, economic income can be measured by either (1) a change in the absolute dollar amount or (2) a change (acceleration or deceleration) in the timing of any of the above economic variables.

Since (1) IP valuation approaches are often used in IP economic damages analyses and (2) IP valuation approaches typically use the same measures of economic income as IP economic damages methods, the remainder of this discussion will illustrate the application of standard valuation approaches/methods to quantify IP economic damages.

## REMAINING USEFUL LIFE

There are several “determinants,” or factors, that affect the remaining useful life of IP. The following list presents some common life determinants, along with examples of IP that are often influenced by those determinants:

- Legal determinants—patents, copyrights.
- Contractual determinants—intellectual property development rights.
- Judicial determinants—computer software.
- Physical determinants—engineering drawings.

- Technological determinants—proprietary technology, technical documentation, trade secrets.
- Functional determinants—patented/unpatented proprietary technology, trade secrets, computer software.
- Economic determinants—proprietary technology, trademarks, trade names.
- Analytical determinants—engineering drawings, computer software.

Usually the type of IP influences the selection of the appropriate life estimation determinant. The type of data and information required, the amount and detail of analysis to be conducted, and the nature of the final remaining useful life conclusion are all influenced by the selection of the appropriate life determinant. Several of the factors that influence the selection of the life determinant are indicated in Exhibit I below.

**Exhibit I**  
**Life Analysis Determinants**

Type of Life Determinant	Type of Information or Data Required	Nature of Analysis and Life Estimate
Legal	Document	Definite
Contractual	Document	Definite
Judicial	Document	Definite
Physical	Engineering/Experience	Qualitative
Technological	Engineering/Technical	Qualitative
Functional	Engineering/Professional	Qualitative
Economic	Engineering/Economic	Quantitative
Analytical	Age (asset placement and retirement) data	Quantitative

Remaining useful life analysis is an integral component of the IP economic analysis process, regardless of which methods are used. This is particularly true with regard to lost profits and economic damages analyses.

While methods of life estimation range from totally qualitative to rigorously quantitative, the remaining useful life estimation involves a consideration of the following factors:

- functional analysis,
- technological progress,
- economic trends,
- management policy decisions,
- government and regulatory policies,
- present condition and use of the IP,
- character and amount of service historically rendered by the IP,
- character and amount of service expected from the IP,
- other pertinent information, and
- professional judgment on the part of the experienced analyst.

## INTELLECTUAL PROPERTY ANALYSIS METHODS

There are several methods and procedures used in the valuation and economic analysis of IP. These methods logically group into three categories of analysis: the cost approach, the market (or sales comparison) approach, and the income approach.

The cost approach is based on the economic principle of substitution. This principle states that an investor will pay no more for an asset than the cost to obtain—by either purchasing or constructing—a substitute asset of equal utility. For purposes of this principle, utility can be measured in many ways, including functionality, desirability, and so on. The availability of—and the cost of—substitute assets is directly affected by shifts in the supply and demand within the industry. Unlike fungible tangible assets, there are often no reasonable substitutes for IP. Accordingly, the use of the cost approach may be limited in the case of unique IP.

The market approach is based on the economic principles of competition and equilibrium. These principles conclude that, in a free and unrestricted market, supply and demand factors will drive the price of an asset to a point of equilibrium. The principle of substitution also directly influences the market approach. This is because the identification and analysis of equilibrium prices for substitute assets will provide important evidence with regard to the economic value of the IP.

The income approach is based on the economic principle of anticipation, also called the principle of expectation. The value of the IP is the present value of the expected economic income to be earned from its ownership. As the name of this principle implies, the investor anticipates the expected economic income to be earned from the IP. This expectation of prospective economic income is converted to a present worth—that is, the economic value of the IP. There are numerous definitions of economic income. If properly analyzed, they all provide a reasonable indication of value. In this approach, the analyst estimates the investor's required rate of return on the IP generating the prospective economic income. This required rate of return is a function of many variables, including the risk—or uncertainty—of the expected economic income.

Analysts generally attempt to value IP using all three approaches. This multiple approach analysis is performed in order to obtain a multidimensional perspective. The final estimate is usually based on a synthesis—or reconciliation—of the various indications.

### MARKET APPROACH METHODS

The general process to the market (or sales comparison) approach includes these five procedures:

1. Research the appropriate exchange market to obtain information on sales transactions, listings, and offers to purchase or license guideline (that is, somewhat similar) or comparable (that is, nearly identical) IPs. The selected guidelines or comparables are compared to the subject based on such factors as asset type, asset use, industry, age, or the date of the sale or license.
2. Verify that the sale/license transactional data are factually accurate and that the transactions reflect arm's-length market considerations. If the guideline transactions were not negotiated at arm's-length, then adjustments to the transactional data may be necessary. This verification procedure may generate additional information about the current market for the sale or license of the IP.
3. Select relevant units of comparison (for example, income multipliers, revenue multipliers, or dollars per unit—such as per engineering drawing or, for software, per line of code); develop a comparative valuation pricing analysis for each unit of comparison.
4. Compare the selected guideline sale/license transactions to the subject IP using these elements of comparison; and adjust the sale/license price of each transaction to the subject; or if such an adjustment is not possible, eliminate the sale/license transaction from future considerations.
5. Reconcile the various value indications into a single value indication—or into a range of values. In an insufficient market, a range of values may be more meaningful than a single value estimate.

*“This required rate of return is a function of many variables, including the risk—or uncertainty—of the expected economic income.”*

Information regarding IP sales/licenses is often obtained from (1) review of the SEC filings of publicly traded companies in the subject industry, (2) research of trade publications in the subject industry, (3) trade association surveys and other sources, (4) interviews with the subject IP owner who may be aware of industry transactions, (5) research of the numerous IP periodical publications, and (6) review of the IP litigation periodical publications. In order to verify the transactional data obtained from these sources, the analyst may have to personally contact one or both parties to the reported IP transaction.

The following list presents 10 elements of comparison for selecting and analyzing guideline sale/license transactions. While each element may be more or less important given the subject IP, all elements should be considered regarding each selection transaction.

1. the specific ownership of legal rights conveyed in the guideline transaction;

2. the existence of special financing terms or arrangements (for example, between the buyer and the seller);
3. whether the elements of an arm's-length sale or license existed;
4. the economic conditions that existed at the time of the sale/license transaction;
5. the particular industry in which the guideline IP is, or will be, used;
6. the age and expected remaining life of the guideline sale/license properties, compared to the subject;
7. the functional characteristics of the guideline sale/license properties, compared to the subject;
8. the technological characteristics of the guideline sale/license properties, compared to the subject;
9. the economic characteristics of the guideline sale/license properties, compared to the subject; and
10. the inclusion of other assets in the guideline sale/license transaction; an example is the sale of a bundle or a portfolio of assets, which could include tangible personal property, real estate, and other intangible assets.

The last procedure is the reconciliation. In this procedure, two or more value indications are synthesized into a final value estimate. In the reconciliation step, the analyst reviews the empirical data, the various analytical procedures, and the results of each analysis. The value indications are then resolved into a range of values, or a point estimate. In this phase, the analyst considers the strengths and weaknesses of each value indication, examining (1) the reliability of the market data compiled and (2) the appropriateness of the analytical procedures performed.

#### ILLUSTRATIVE MARKET APPROACH EXAMPLE

The following discussion provides a simplified example illustrating a market approach method (that is, the relief from royalty method) for estimating the economic damages to trademarks and trade names. Wellknown Service Company ("Wellknown") owns a trademark and trade name that is highly regarded in its industry. The trademark and trade name are associated with quality service and consumer loyalty. Wellknown Service Company (a new competitor in the industry) markets its service using a trademark and trade name that is deceptively similar to the Wellknown mark and name.

A judge has ordered that (1) Wellknown has infringed on the Wellknown trademark and (2) Wellknown must discontinue its use of the deceptive mark and name. However, Wellknown has already suffered damages as a result of (1) its association with the inferior Wellknown service and (2) its loss of customers, business volume, and reputation. This example will illustrate the before and after method for estimating the economic damages to Wellknown.

In this example, the economic damages to the Wellknown trademark are estimated by reference to the economic income it could generate if it was licensed to another company. The estimated royalty income would be based on an analysis of empirical guideline trademark license transactions. Sales and licenses of trademarks are fairly common. Therefore, the analyst was able to assemble the necessary empirical transaction data.

The analyst concluded that Wellknown would generate \$250 million of revenues if the trademark infringement had not occurred. This is the before the damage event scenario. As a result of the infringement, Wellknown will only generate revenue of \$150 million. This is the after the damage event. To simplify this example, we assume that the economic damage to Wellknown will continue indefinitely.

In the before and after damage analysis presented in Exhibit II, the value decrement to the Wellknown trademark is estimated by multiplying the projected revenue loss by a five percent market-derived royalty rate. The direct capitalization rate is calculated as the market-derived present value discount rate minus the expected long-term growth rate in the projected revenue loss. Capitalizing the projected royalty income by the market-derived 10 percent direct capitalization rate indicates an economic loss in the value of the Wellknown trademarks of \$50,000,000.

#### Exhibit II Wellknown Service Company Simplified Example of a Market Approach Analysis of a Trademark and Trade Name

Projected loss of annual revenues from the trademarked Wellknown services due to the Wellknown infringement (i.e., the difference between the "before" scenario revenues and the "after" scenario revenues)	\$100,000,000
Multiplied by: A market-derived license royalty rate (based on an analysis of guideline trademark licensing transactions)	_____ 5%
Equals: Projected annual royalty to the IP owner associated with a hypothetical license of the Wellknown trademark	\$5,000,000
Divided by: A market-derived direct capitalization rate	_____ 10%
Equals: Indicated economic damage related to Wellknown trademark and trade name infringement by Wellknown (rounded)	<u>\$ 50,000,000</u>

#### COST APPROACH METHODS

The theoretical bases of cost approach methods relate to the following principles:

- substitution—no prudent buyer would pay more for an IP than the cost to construct a substitute of equal desirability and utility;

- supply and demand—shifts in supply and demand (1) cause costs to increase and decrease and (2) cause changes in the supply of substitute types of IP; and
- externalities—gains or losses from external factors may accrue to IPs. External conditions may cause a newly created IP to be worth more or less than its original cost.

There are several cost approach methods. Each method uses a slightly different definition of cost. The most common definitions of cost include reproduction cost and replacement cost. There are important differences in the different definitions of cost. Reproduction cost contemplates the construction of an exact replica of the IP. Replacement cost contemplates the cost to recreate the functionality or utility of the IP. Functionality is an engineering concept that means the ability of the IP to perform the task for which it was designed. Utility is an economic concept that means the ability of the IP to provide an equivalent amount of satisfaction.

Some analysts also consider cost avoidance as a cost approach method. This method quantifies either historical or prospective costs that are not incurred as a result of IP ownership.

All cost approach methods include a comprehensive calculation of cost. The cost (whether replacement, reproduction, or other cost) of an IP includes: (1) hard costs (for example, materials), (2) soft costs (for example, engineering, design, labor, and overhead), (3) the IP developer's profit (return) on both the hard and soft cost investment, and (4) an entrepreneurial incentive—to economically motivate the IP development process. And, the total cost (however measured) of an IP should be reduced by all relevant forms of obsolescence, including economic obsolescence. While the cost approach is different from the income approach, there are economic analyses involved in the cost approach. These analyses, which involve historical or prospective income, provide indications of entrepreneurial incentive (if any), or economic obsolescence (if any).

Total cost is adjusted for losses in value due to: functional obsolescence, technological obsolescence, and economic obsolescence. Functional obsolescence is a reduction in value due to the subject's inability to perform the function (or yield the periodic utility) for which it was originally designed. Technological obsolescence is a decrease in value due to improvements in technology that make the subject less than the ideal replacement for itself. Economic obsolescence is a reduction in value due to the effects, events, or conditions that are external to—and not controlled by—the current use or condition of the IP. The impact of economic obsolescence is usually beyond the control of the owner and therefore is considered incurable. In estimating the amounts (if any) of functional, technological, or economic obsolescence, consideration

should be given to the IP actual age and to its expected remaining useful life.

#### ILLUSTRATIVE COST APPROACH EXAMPLE

This example will illustrate the analysis of certain proprietary technical documentation, engineering drawings, and manufacturing trade secrets (collectively, "the trade secrets") of Widget Company ("Widget"). The subject trade secrets include documents, records, drawings, schematics, procedures, and diagrams. This IP was developed by Widget based on the expectation that the IP will be used in a new joint venture that Widget had entered into.

In the joint venture, Widget contributed its IP and the other joint venture partner, Manufacturing Company ("Manufacturing") contributed plant and equipment. The joint venture obtained a financing commitment from Widget's bank. After all of the assets were contributed by the joint venture partners, the bank failed to honor its financing commitment.

Without the promised financing, the joint venture operations quickly deteriorated. Both joint venture partners lost the assets they had contributed. Widget is seeking compensation for its economic damages from its bank in a lender liability claim.

This example illustrates a cost approach analysis of the economic damages suffered by Widget as a result of the loss of its IP. The cost approach aggregates all the costs required to develop the IP. These development costs are based on:

- the amount of "unique" documentation of the subject trade secrets;
- the "fully loaded" salaries (that is, employee salaries plus employment benefits, employment-related taxes, and other employee-related costs) of the type of individuals who would be involved in the recreation of the trade secrets; and
- the estimated amount of time required to recreate the trade secrets.

In addition to the time required by Widget engineering and design employees to develop the documents, records, drawings, and procedures, there is a time "cost" associated with the conceptualization and development of the trade secrets. This time cost involves numerous individuals within the Widget organization and includes the time cost required to obtain Widget management approval.

Widget management provided the analyst with an estimate of average salary ranges for employees responsible for IP development. Widget management also provided the analyst with an overhead allocation factor of 21 percent (of total salaries). This overhead factor includes items such as employee

*"All cost approach methods include a comprehensive calculation of cost."*

perquisites, employee benefits (including life, health, disability and dental insurance, and pension and retirement plans) and employment-related payroll taxes. In addition, it includes an allocation of such overhead expense items as office space, equipment usage, office utilities, and development personnel management. Based on interviews with Widget management, the analyst estimated the amount of time required to develop, review, approve, and promulgate the trade secrets.

Because the subject trade secrets are constantly reviewed and updated, the analyst concluded that there was no evidence of technological obsolescence. The subject materials document the most current Widget trade secrets. The analyst concluded that there was no evidence of economic obsolescence. This is because the joint venture was projected to be a profitable business enterprise. In fact, its rate of return on assets was projected to be higher than the industry average for such manufacturing companies.

Exhibit III summarizes the cost approach analysis used in the actual/opportunity cost method to estimate the economic damages to the Widget IP. To simplify the example, we assume no developer's profit or entrepreneurial incentive.

Based on this cost approach analysis, the economic damage to the Widget Company as a result of the loss of its trade secrets IP is \$2,500,000.

#### INCOME APPROACH METHODS

Some of the alternative measures of economic income used in IP analysis include: gross or net revenues, gross income (or gross profit), net operating income, net income before tax, net income after tax, operating cash flow, net cash flow, and other measures (such as incremental income).

An essential element in this approach is to ensure that the present value discount rate or the direct capitalization rate is

calculated on a basis (for example, pretax versus after-tax) consistent with the measure of economic income used in the analysis. While there are different measures of economic income, all income approach methods may be grouped into the following categories:

1. methods that quantify incremental levels of income—the IP owner will enjoy a greater level of income by owning the IP as compared to not owning it;
2. methods that quantify decremental levels of costs—the IP owner will suffer a lower level of cost (such as required investments or operating expenses) by owning the IP as compared to not owning it;
3. methods that estimate a relief from a hypothetical royalty or rental payment—the amount of a royalty or rental payment that would be paid to a third party if the owner did not own the IP;
4. methods that quantify the difference in the value of the overall business (or similar economic unit) with—versus without—the use of the subject IP; and
5. methods that estimate value of the residual from the overall business value or a similar economic unit.

All of these methods use either direct capitalization or yield capitalization procedures. In direct capitalization, the estimate of the expected income is divided by an appropriate investment rate of return. The appropriate investment rate of return is called the capitalization rate. The capitalization rate is derived either for a perpetual period of time or for a specific finite period (depending on the expected remaining life of the IP). In a yield capitalization, the analyst projects economic income to be generated by the IP for several time periods (usually years). This projection of income is converted into a

**Exhibit III**  
**Widget Company**  
**Simplified Example of Cost Approach**  
**Analysis of Trade Secrets**

Trade Secrets Intellectual Property Materials	Estimate of Replacement Time (in person-hours)			
	Draftsmen	Engineers	Management	Total
Engineering drawings	5,000	4,000	1,000	10,000
Technical documentation	4,000	3,000	2,000	9,000
Trade secrets	1,000	5,000	4,000	10,000
Total estimated person-hours of recreation time				29,000
Weighted average cost of Widget personnel				\$ 70
Subtotal				\$2,030,000
Overhead allocation factor (at 21%)				1.21
Total replacement cost new				2,456,300
Less: obsolescence allowance				0
Replacement cost new less depreciation				\$2,456,300
Indicated economic damage to Widget Company trade secrets related to lender's failure to perform (rounded)				\$2,500,000

present value by the use of a present value discount rate. The present value discount rate is the investor's required rate of return (or yield capitalization rate), over the expected term of the income projection. The duration of the projection period (and whether or not a residual value is concluded) is based on the IP expected remaining useful life.

#### ILLUSTRATIVE INCOME APPROACH EXAMPLE

Let's assume research scientist Ed Employee of Big Dog Pet Food Company ("Big Dog") developed a drug that prevents fleas in cats and dogs. Based on years of research, Ed developed a process to include this drug directly in pet food. Ed filed for and received a patent both for the drug itself and the drug/pet food integration process. After extensive testing of this drug (called "Fleabegone") and the new pet food, Big Dog applied to the U.S. Food and Drug Administration (FDA) for approval to produce and sell the medicated pet food. The FDA approved the sale of the pet food containing the Fleabegone medication. Big Dog built a plant and is ready to produce and sell the medicated pet food.

Like all Big Dog scientific employees, Ed signed an employment/confidentiality agreement indicating that he would assign all patents obtained during his employment to the company. However, just before the new Fleabegone product was produced, Ed resigned from Big Dog and assigned his patent to his new employer (another major pet food manufacturer). Big Dog filed suit against Ed and his new employer. The lawsuit claims damages associated with the failure to assign the patent to Big Dog, as required by the employment/confidentiality agreement. This example will illustrate the income approach and the but for method to quantify the economic damages related to this IP dispute.

Big Dog marketing management prepared unit selling price, unit volume, and market share projections for the 10 years after the new product introduction. Big Dog manufacturing and engineering management projected (1) the cost of goods sold data and (2) the capital expenditures data for the 10-year period. And, Big Dog financial management projected all of the various selling, general, and administrative expenses related to this new product over the next 10 years. After a thorough review, the analyst concluded that the projections were reasonable.

Based on (1) the actual Big Dog experience and (2) research of the FDA approval process, the analyst concluded it would take Big Dog another nine years to obtain FDA approval for a new patentable version of a flea medicated pet food. Therefore, the analyst selected nine years as the remaining useful life of the economic damages associated with Ed's failure to assign the patent.

Based upon the speculative nature of this new product, the analyst selected 30 percent as the appropriate discount rate to

use in the analysis. A summary of the income approach analysis is presented in Exhibit IV. Based on this analysis, Big Dog suffered economic damages of \$2,400,000 as a result of Ed's failure to assign the Fleabegone patent.

#### SYNTHESIS AND RECONCILIATION

Typically, an IP lost profits or economic damages analysis follows the process summarized above. When more than one approach is used, each approach may result in a different conclusion. Even within the same approach, there may be different damage indications. For example, there may be different damage estimates indicated by alternative income approach methods. The synthesis procedure is an analysis of the alternative indicated conclusions—in order to arrive at the final estimate.

The final estimate is generally a number from the indicated range of conclusions. The final estimate may be one of the indicated conclusions, it may be the mathematical expectation (that is, the weighted average) of the indicated conclusions, or it may be based on another number within the indicated range.

Generally, it is not appropriate to simply average the indicated conclusions. A simple arithmetic mean implies that all of the indications have equal validity and deserve equal weight. While this is sometimes appropriate, it is usually not the case in the typical IP economic analysis.

The final estimate should be derived from the analyst's reasoning and judgment regarding (1) all of the relevant factors and (2) all of the available market evidence.

#### SUMMARY AND CONCLUSION

This discussion focused on the analysis of patents, copyrights, trademarks, and trade secrets for lost profits and economic damages purposes. These analyses are performed for various litigation support and dispute resolution purposes. This discussion also described the various factors that influence IP economic value. Particular attention was directed to the factors that affect IP remaining useful life.

The most common approaches and methods to IP economic analysis were summarized. And, simplified illustrative examples were presented. These analytical methods are commonly used to estimate IP lost profits and economic damages in claims related to infringement, breach of contract, lender liability, expropriation, bankruptcy, and various other deprivation-related matters.

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*"The synthesis procedure is an analysis of the alternative indicated conclusions—in order to arrive at the final estimate."*

**Exhibit IV**  
**Big Dog Pet Food Company**  
**Simplified Example of an Income Approach**  
**Analysis of Patent**

Economic Damages Analysis Variables	Projection Period								
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Projected case sales increase		100%	50%	40%	30%	20%	10%	5%	5%
Projected Fleabegone case sales	100,000	200,000	300,000	420,000	546,000	655,200	720,700	756,800	794,600
Sale price increase		5%	5%	5%	5%	4%	4%	4%	4%
Sale price per case of Fleabegone	\$ 40	\$ 42	\$ 44	\$ 46	\$ 49	\$ 51	\$ 53	\$ 55	\$ 57
Projected Fleabegone revenues	4,000,000	8,400,000	13,200,000	19,320,000	24,754,000	33,415,000	38,197,000	41,624,000	45,292,000
Cost of goods sold:									
Variable costs (@ 40%)	1,600,000	3,360,000	5,280,000	7,728,000	10,702,000	13,366,000	15,278,000	16,650,000	18,116,000
Fixed costs	<u>2,000,000</u>	<u>2,100,000</u>	<u>2,205,000</u>	<u>2,316,000</u>	<u>4,000,000</u>	<u>4,200,000</u>	<u>4,410,000</u>	<u>4,630,000</u>	<u>4,862,000</u>
Gross profit	400,000	2,940,000	5,715,000	9,276,000	12,052,000	15,849,000	18,509,000	20,344,000	22,314,000
SG&A expense (@ 20%)	<u>800,000</u>	<u>1,680,000</u>	<u>2,640,000</u>	<u>3,864,000</u>	<u>5,350,000</u>	<u>6,683,000</u>	<u>7,639,000</u>	<u>8,324,000</u>	<u>9,058,000</u>
Pretax income	(400,000)	1,260,000	3,075,000	5,412,000	6,702,000	9,166,000	10,870,000	12,020,000	13,256,000
Less: Income taxes (@ 40%)	(160,000)	504,000	1,230,000	2,164,000	2,680,000	3,666,000	4,348,000	4,808,000	5,302,000
After-tax income	<u>(240,000)</u>	<u>756,000</u>	<u>1,845,000</u>	<u>3,246,000</u>	<u>4,022,000</u>	<u>5,500,000</u>	<u>6,522,000</u>	<u>7,212,000</u>	<u>7,954,000</u>
Plus: Depreciation expense	400,000	400,000	400,000	400,000	600,000	600,000	600,000	600,000	600,000
Less: Capital expenditures	2,000,000	0	0	0	1,000,000	0	0	0	0
Less: Incremental net working capital (@ 10% of incremental revenues)	<u>400,000</u>	<u>440,000</u>	<u>480,000</u>	<u>612,000</u>	<u>743,000</u>	<u>666,000</u>	<u>478,000</u>	<u>342,000</u>	<u>366,000</u>
Net cash flow (NCF)	(2,240,000)	716,000	1,765,000	3,036,000	2,879,000	5,434,000	6,644,000	7,470,000	8,188,000
Less: Capital change on tangible and intangible support assets used in production of Fleabegone	<u>400,000</u>	<u>800,000</u>	<u>1,200,000</u>	<u>1,300,000</u>	<u>1,400,000</u>	<u>1,500,000</u>	<u>1,600,000</u>	<u>1,700,000</u>	<u>1,800,000</u>
Economic income NCF	(2,640,000)	(84,000)	565,000	1,736,000	1,479,000	3,934,000	5,044,000	5,770,000	6,388,000
Present value discount factor (@ 30%)	<u>.8696</u>	<u>.6689</u>	<u>.5145</u>	<u>.3958</u>	<u>.3045</u>	<u>.2342</u>	<u>.1802</u>	<u>.1386</u>	<u>.1066</u>
Present value of NCF	(2,296,000)	(56,000)	290,000	688,000	450,000	920,000	910,000	800,000	680,000
Total present value of economic income NCF	<u>\$2,386,000</u>								
Indicated economic damage related to Ed's failure to assign Fleabegone patent (rounded)	<u>\$2,400,000</u>								

Source: Robert F. Reilly and Robert P. Schweihs, *Valuing Intangible Assets* (New York: McGraw-Hill, 1999), p. 196.