

An Overview of Intellectual Property and Intangible Asset Valuation Models

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ABSTRACT

This paper reviews the economic models most commonly applied to estimate the value of intellectual property and other forms of intangible assets. It highlights the key strengths and weaknesses of these models. One of the apparent weaknesses of the most commonly used valuation models is the failure to incorporate legal rights into their calculations. Creation, maintenance, and enforcement of legal rights of ownership and control for intangible assets form a critical component of the total economic value of those assets. The failure to account for the value of those rights undermines the accuracy and the utility of the overall asset valuation process. This paper advocates a concerted effort by professionals involved in intellectual property law and intangible asset development and management to integrate more effectively the legal aspects of intangible asset creation, protection, and transfer into asset valuation models. Absent such integration, all intangible asset valuation models will continue to be incomplete. For research administrators involved in contract negotiation, intellectual property, and technology transfer, an understanding of these models is useful for job performance and professional development.

COMMON VALUATION MODELS

For the purposes of this paper, intellectual property includes all material that can be protected and managed under traditional legal principles of patents, copyrights, and trademarks. Intangible assets are those intangible materials that have commercial value, but are not in a form eligible for traditional intellectual property law protection. For example, while computer programs and music recordings can be characterized as intellectual property, as they are protected under the traditional intellectual property law rights, databases and other factual compilations may be more appropriately characterized as intangible assets, as they are not widely protected by intellectual property law. Developers and users of intellectual property and other intangible assets commonly apply a range of different economic models to estimate the value of that property. The choice of

model for that valuation is largely driven by the goals and concerns of the party developing the valuation. The most common models are: cost-based, market-based, income-based, and options.

Cost-Based Models

A cost-based valuation model focuses on the costs incurred to develop the intellectual property and intangible assets. It provides an estimate for the value of the asset that is tied to the cost to create or acquire the asset (Pitkethly, 2002). The cost-based model does not generally address the potential future benefits that can be derived from the asset (e.g., licensing revenue). A cost-based model is generally backward looking and often includes some form of adjustment for depreciation of the asset over time. Different companies will likely choose to incorporate different costs into their model. For this reason, cost-based models commonly vary from industry to industry and from company to company.

Cost-based valuation models are generally not intended to provide a true estimate of the value of intangible assets. Instead, these models are often applied in response to specific regulatory requirements. For example, cost-based valuation is commonly applied when intangible asset valuation is needed for accounting purposes. This approach to valuation is also often used for tax purposes. Cost-based valuation models have the virtue of being simple and accepted by regulators for tax or audit purposes.

The utility of cost-based models is limited, however, as the models do not present a complete picture of the potential applications for the assets. Most significantly, because of their historical perspective, these models do not account for future benefits that can be derived from the intangible asset. For example, revenues derived from licensing and value created through direct use of the asset are not effectively captured or recognized in most cost-based valuation models.

Cost-based models do not capture the full impact of legal aspects of intangible asset management. Although cost-based models account for legal costs associated with obtaining and maintaining intellectual property rights (costs of patent protections and maintenance, for example), they do not reflect the impact of other legal activities on the value of the asset. For example, cost-based valuation models do not evaluate, in any way, the future enforceability of patent or other intellectual property rights.

Market-Based Models

Market-based valuation models estimate the value of intellectual property assets by looking to the marketplace (Pitkethly, 2002). Assets that are comparable to those in question are identified, and the licensing revenue actually derived from those comparable assets in the marketplace is used as an estimate of the value of the new assets. When comparable intangible assets can be readily identified, market-based valuation models are relatively easy to apply, and can yield accurate projections. Different companies choose different markets as the basis for the valuation; there is substantial variety from company to company even when they each apply a market-based valuation approach.

A significant problem associated with market-based valuation models is appropriate choice of comparable intangible assets. The accuracy of a market-based estimate is largely driven by selection of a model asset that provides an appropriate point of comparison. It is often difficult to

identify an appropriate, and truly comparable, asset. For this reason, market-based models work well when there is an established marketplace for the asset in question, and they are ineffective when there is no clearly defined marketplace relevant to the asset.

The market-based models fail to account for the full range of legal activities that affect intangible asset value. To the extent that the comparable assets that form the basis for the valuation model have legal characteristics comparable to those of the company applying the model, the legal attributes included in the model are more likely to be valid. For instance, if the asset in question is a patent for a pharmaceutical product, and if the product used as the market model was commercialized by a company with access to resources comparable with those of the company applying the model, then the model may be appropriate as to the impact of legal rights on the asset value. If, however, the model product was commercialized by a very large pharmaceutical company, but the new asset was developed by a small company with access to far more limited resources, then the model will be far less appropriate. Patent rights obtained by the large company are more likely to have greater value, as that company will have the resources to enforce those rights in the future, than will similar rights held by the smaller company which is less likely to be in a position to enforce the patent rights. A patent held by a company with resources adequate to enforce the patent in the future has greater economic value than that same patent held by a company lacking the resources to enforce it.

Income-Based Models

Income-based valuation models make use of forecast future revenues to develop a current estimate of asset value (Pitkethly, 2002). Under this valuation model, an intellectual asset's value is primarily established by the royalty revenue it can generate in a licensing structure. These models adopt a forward-looking perspective, estimating future earnings that can be derived from commercial use of intangible assets. Different companies apply different definitions and projections regarding revenue forecasting. As a consequence of this diversity, the income-based valuation model differs, in practice, from company to company.

Basic income-based models can be expanded into models that assess asset value based on estimates of cash flow. Cash flow calculations take the cash receipts of a company or a product (net profits plus amounts deducted for depreciation, amortization, and depletion) over a given period of time and subtract all cash payments over that same period of time. Cash flow figures provide a sense of the financial health of a business over a specific time period. Income-based models are commonly built on future cash flow estimates associated with a particular asset. These models project future earnings and expenditures attached to the asset. Those estimates are also discounted to account for the time value of money and the uncertainty as to the accuracy of the projected cash flow. The net present value of the future earnings is calculated so that the estimated potential value of the asset can be compared with similar estimates for other potential projects, and current resource allocation decisions can be made based on comparative future value of different projects.

As is the case with market-based models, income-based models function best when there is accurate information to support the future income and cash flow projections. Such information is more likely to be available when the asset in question is very similar to one already in the commercial marketplace or when the asset will reach a clearly defined and well-established

market. Income-based models are less effective when market information is sketchy or speculative.

An important challenge associated with use of income-based models that apply a discount rate for uncertainty is the selection of an appropriate discount rate. The discount rates should address both the time value of money and the risk that the estimated income flow will be inaccurate. Selection of an appropriate discount rate poses a major challenge, particularly with regard to the estimate of risk. The accuracy of the overall forecast hinges significantly on the accuracy of the selected discount rate.

Income-based models do not fully account for the impact of legal rights on intangible asset value. Those models can effectively capture the costs associated with obtaining and maintaining intellectual property rights. However, they do not assess the costs associated with enforcement of the legal rights that are tied to the asset. While these models may capture the costs of patent prosecution and maintenance, for example, they do not incorporate costs of future litigation to enforce the patent (including risks associated with enforceability of the patent) or to enforce licensing agreements built around the patent.

Option Models

Another approach to estimating intellectual property value makes use of the concept of options. An option is a choice that can be exercised at a specific time, but need not be exercised. Owners of intellectual property have a variety of choices about the development and commercial use of their property. Those options include: what form of intellectual property rights to invoke, whether to license the asset, how to price the asset, and when to apply legal means to enforce rights associated with an asset. Option models attempt to estimate economic values for each of those choices (Van den Berg, 2002). The estimated economic values of the different options can be combined and compared, thus providing an analytical framework for selecting a commercialization strategy. Companies commonly define and identify options differently; thus, the versions of the option model applied by any two different organizations may be quite varied in structure and result.

Option models are most effective when the various options can be readily identified and valued. The models are more effective when the values for the options are stable, and not subject to dramatic shifts in value. Option models also perform more effectively when the options have set terms and cannot be exercised before they mature. Unfortunately, in the realm of intangible assets, these factors are difficult to satisfy.

There are several important challenges to effective use of option models for intangible asset valuation. For example, the risks associated with the various options associated with commercialization of the asset change continuously over time. For maximum accuracy, the discount factor applied to the option pricing process should, accordingly, be adjusted as the risks shift. It is not feasible to adjust the discount factor continuously; thus, that factor will never be able to reflect precisely the true character of the risks associated with the options.

It is also difficult to structure an option valuation model so that it effectively accounts for the actual future cash flow associated with commercialization of the asset. Over time, exploitation of the asset will generate cash, yet it is very difficult to develop an effective estimate of those

earnings. In addition, those earnings will affect the value of the options associated with the asset, yet it is also extremely difficult to introduce the estimated earnings from the asset, over time, into the option valuation model. This inability to project the evolving future returns from the asset, and to integrate those evolving estimates into the option model, presents another major challenge to the option model.

Advanced forms of option models could capture many of the costs associated with legal rights affecting intangible assets. Integration of those legal activities into the already complex option models is, however, a difficult challenge. The option models already face the disadvantage of being the most complex of the valuation systems. Incorporation of the legal factors into the option model could overwhelm the model, undermining its effectiveness.

Comparison of the Valuation Models

It is helpful to illustrate how application of the different valuation models to one asset can generate different value assessments. Assume, for example, that a pharmaceutical company invested \$200 million to develop and ready a new drug for the marketplace. In addition, assume that the company is confident that the new drug is comparable (as to market size, pricing, and production costs) to a drug previously developed and marketed by the company, and that the previous drug provided \$800 million in profits to the company, from \$1.2 billion in total revenues, when its earnings were adjusted for the time value of money. Let us say that the value of the company's stock rose by \$400 million when the news that the new product was ready for the marketplace was released to the public, and that a competitor has offered to purchase the patent for the drug for \$500 million, at this moment. If we apply the different basic valuation models to this simple hypothetical situation, we generate grossly over-simplified results.

However, the exercise serves to illustrate how the different models can produce dramatically different estimates of asset value. In this case, a cost-based valuation model would estimate the value of the asset at \$200 million. The income-based model would present a valuation of \$1.2 billion. A market-based model could yield an estimate of \$800 million (the value of anticipated future profits from the drug, based on the prior experience with a similar product), \$400 million (the value of the increase in the company's market capitalization after the investment community became aware of the availability of the new product) or \$500 million (the price that another drug company is willing to pay to purchase the asset). Finally, the asset value could be identified, using some version of an options valuation model, as a figure that reflects the economic value to the company of having the current option of choosing between marketing the drug on its own for an estimated return, over time, of \$800 million or selling the asset to the other company for an immediate return of \$500 million.

There is no definitive correct or incorrect answer in this comparative example, and the same is true when valuation models are selected in actual practice. Each of the different basic models can be justified under many different circumstances. Within each of the basic valuation models, there are different variations that can be applied (as we see in the example with regard to the market valuation model). The choice of model significantly influences the valuation estimate that is ultimately derived. At least in part, the choices we make when we select an asset valuation model reflect our goals and concerns regarding the development and use of the asset.

IMPACT OF LEGAL FACTORS ON VALUATION

The value of intellectual property is largely influenced by several different legal considerations. In many instances, the impact of these legal considerations on the valuation of intellectual property and intangible assets is not fully appreciated or considered. Some observers are now beginning to recognize that the legal aspects of intellectual property protection can have a significant impact on the actual value of the assets, and that the strength of the legal rights of ownership and control over those assets should be incorporated into the asset valuation models (Benintendi, 2003).

For example, some now suggest that different elements of patent rights should be evaluated as part of the valuation process. Among the patent elements identified as having the most direct potential influence on the value of the patented asset are: the scope of the patent's coverage, the relationship of the patented invention to the prior art (i.e., pre-existing technology), and the inventiveness of the device covered by the patent (Reitzig, 2002). This approach suggests that the broader the scope of coverage of a patent and the more the patented invention represents a significant advance beyond the prior art, the greater the economic value of the intellectual asset associated with the patent.

Another consideration when assessing the economic value of an intangible asset is the ability of the owner of the property to enforce its rights against other parties. Although a particular asset may qualify for some form of legal protection (e.g., patent, copyright, trademark), effective enforcement of the legal right is not always feasible. For example, a patent may be obtained by an organization that ultimately does not have the resources to maintain the patent or to litigate to enforce the patent. Under those circumstances, the economic value of the patent and the associated intangible assets is significantly less than the value of those same assets when controlled by an entity with the economic resources to maintain and enforce them. Scope of ownership rights has little value if the owner of the rights is unable or unwilling to monitor the rights and act to enforce them, as necessary.

It thus appears that there are at least two key components of effective valuation of legal rights of ownership for intangible assets. The first is the scope of the rights associated with those assets. Generally, it seems that the broader that scope, the more valuable the asset. The second key component is the enforceability of the ownership rights. On this issue, it appears that the more likely it is that the owner will have the resources and the will to maintain, monitor, and enforce (through litigation, if necessary) the ownership rights, the more valuable those ownership rights will be. Accordingly, a broad proprietary right held by a resource-rich owner seems to present a setting in which the potential value of the intangible asset is maximized.

Even when the owner of an intangible asset is able to assert clear legal rights over the asset, however, there is no guarantee that the legal rights will retain full value for the duration of their effective life. For example, in the United States patents can be obtained for computer programs. Although there is a set effective term for patents, advances in the computer software industry move at a far more rapid pace. The value of a patent in the software industry, particularly in the later years of the patent term, is thus not comparable with the value of a patent in an industry in which the market changes less quickly and there are greater barriers to entry for new products and technologies (e.g., the pharmaceutical industry). Thus, the value of even clearly enforceable legal

rights associated with intangible assets varies from market to market and from one time period to another. An effective intangible asset valuation model should reflect that diversity.

Additionally, some intangible assets with significant potential economic value are not readily protected by traditional intellectual property rights or other legal principles. For example, compilations of data in the United States receive minimal intellectual property law protection, and inconsistent protection under alternative legal theories, including property law, contract law, and competition law theories. However, in Europe developers of factual compilations have enforceable legal rights to control access to, and reuse of, their content under legislation that grants specific database ownership rights. Efforts to assess the economic value of this type of intangible asset should recognize that some level of enforceable right of ownership and control can be applied, but the extent and enforceability of that legal right is notably limited in the United States.

Another legal factor affecting intellectual asset valuation is the ability of the owner of the asset to establish enforceable commercial relationships to facilitate commercial use of the asset. Some valuation models for intangible assets assume that the commercial transactions necessary to move the assets into commercial applications can be readily developed and have minimal transaction costs. This assumption may not always be correct. Intangible asset valuation models should, accordingly, include assessments of the feasibility of establishing enforceable asset transfer and access mechanisms, as the value of the asset is significantly lower if those transactions cannot be effectively managed.

Example: The Music Industry. A current example of the potential economic impact on intangible assets when rights of ownership, control, and access for those assets become difficult to enforce is provided by the music industry's ongoing struggles with online distribution of its content. The rise of the MP3 format for digital recordings and the dramatic development of peer-to-peer file-sharing technologies have made widespread circumvention of the traditional music distribution infrastructure a common occurrence. Growth of these technologies has made it far easier for music consumers to obtain and share pirated copies of music recordings. In effect, the controls on access to content and the mechanisms for enforcement of legal rights associated with the content have significantly eroded. This condition has a direct impact on the economic value of music industry assets. If one attempts to estimate the future economic value of music, an intangible asset, that estimate, reflecting the current and anticipated online distribution capabilities, should be less than the valuation associated with the former distribution system in which the record companies had far more control over content distribution and a greater ability to enforce effectively their rights of ownership and control over the content.

In some ways the music industry's struggle to manage online distribution of its content provides a useful laboratory for intangible asset valuation principles. This industry faces a situation in which the costs associated with enforcing its proprietary rights have increased dramatically. In addition, the industry now confronts an environment in which a notable portion of its customers appears to question the ownership rights of the industry. This condition leads one to question whether it might be possible for the future value of an intangible asset to be significantly eroded even when the legal rights of ownership remain valid and the asset owners continue to act aggressively to enforce them, as seems to be the case in the music industry. If this is possible, it could mean that asset valuation models should account not only for the scope and likelihood of legal enforcement of intangible asset ownership rights, but also for the potential impact of technical and market forces on the actual enforceability of those rights. In a market where consumer conduct is chaotic,

legal rights of ownership may lose their value, even when their owners are willing and able to invest significant resources in enforcement.

Each of the most commonly used intangible asset valuation models captures some, but not all, of the legal factors that affect the value of intangible assets. It is possible to introduce at least a rough estimate of the value of those legal factors into each of the different models. Estimates of the costs of establishing, monitoring, and maintaining legal rights of ownership for the assets can be readily developed and introduced into each of the models. Estimating the value of the ownership rights is more challenging. Identifying the scope of the ownership rights and assessing the ability and willingness of the owner to police and enforce the rights will likely involve a more complex analytical process. Estimating the potential for a runaway market where the rights become essentially unenforceable may also be a complicated task. Yet, even if the projections of the impact of these legal factors on asset valuation are very rough, the process of evaluating that impact and the introduction of some estimate for their value will improve the accuracy of the overall valuation effort.

Example: Open Source Software. Another interesting context for intangible asset valuation is presented by the open source software community. Open source software distribution generally involves licensing of the software subject to terms that permit the licensee to access and modify the source code, in exchange for a commitment to preserve the open source nature of the original source code, and in many instances, to make the modified code available on an open source basis. With the dramatic commercial success of Linux and other open source software products, the open source approach has had a significant impact on the computer marketplace. Open distribution models for intangible assets, such as the open source approach, raise interesting questions regarding asset valuation. Traditional intangible asset valuation models are likely to place a very low value on assets that are commercialized through a liberal licensing framework, such as open source. The relatively low value would be established as most open source licenses assess no license fee. It is, however, possible that the models would undervalue assets distributed using open distribution models. The models may not, for instance, effectively account for non-monetary value derived from open source distribution. Such value could include more rapid market penetration and reduced costs of product refinement. As open source and other alternative distribution systems for intangible assets grow in popularity, valuation models should evolve to recognize different forms of value generated by those alternative systems.

The online music distribution and open source licensing experiences illustrate an important lesson for intangible asset managers. Rapid changes in technology and commercial markets have a significant impact on legal rights of ownership and control over intangible assets. To the extent that the asset valuation models are eventually modified to reflect more effectively the impact of legal ownership rights on the valuation estimates, those models must be continuously updated, as the value of those ownership rights will continue to shift as new technologies and new market dynamics alter the relationships between the developers of intangible assets and their customers.

CONCLUSION

A variety of different analytical models are presently applied to estimate the economic value of intellectual property and intangible assets. All models have important strengths and weaknesses. One weakness common to all models is the failure to account adequately for legal aspects of intangible asset development, protection, and transfer. To account for those legal aspects

effectively, the valuation models should include estimates of the costs associated with creation and enforcement of the legal rights. In addition, the models should estimate the value of the legal rights of ownership and control of the assets.

Current valuations models can be readily modified to include estimates of costs of creation and maintenance of legal rights associated with intangible assets. More diligent evaluation of costs of patent prosecution and maintenance should not be difficult, and can be incorporated into the basic valuation models. Costs of enforcement of rights appear to be more difficult to integrate into the models, and estimates of the value of the legal rights seem to be the most difficult aspect of this effort.

Observers who have suggested that the value of legal rights of ownership of intangible assets can be estimated, at least in part, through evaluation of the inventiveness of the asset and the scope of any associated intellectual property protection (Reitzig, 2002) raise an important point. An intangible asset that can be protected under traditional intellectual property law principles and that represents a significant inventive advance over prior art should generally be valued at a level higher than that of an asset that does not have those attributes. However, in addition to the legal strength of the asset itself, valuation should also account for the ability of the owner of the asset to enforce the rights it possesses.

An intangible asset that carries strong legal rights of ownership is more valuable when controlled by an owner that has access to resources sufficient to support monitoring of the rights and litigation to enforce the rights. Broad intellectual property law rights for a highly inventive asset may not carry significant value if the owner of those rights does not have the resources to maintain or enforce them. Intangible asset valuation models should, accordingly, integrate assessments of the costs of development and maintenance of legal rights of ownership and control into their calculations. Those models should also include assessments of the value of the legal rights of ownership and control, and that assessment should evaluate both the scope of the legal rights and the likelihood that they will be effectively enforced. Legal rights of ownership and control form a critical component of the value of intangible assets. The costs of developing and maintaining those rights should, accordingly, be included in estimates of the value of the assets. The value of the legal rights themselves should also be reflected in asset valuation estimates. That value is directly tied to the scope of the rights and the likelihood that they will be effectively enforced. Intangible asset valuation models should, as a result, attempt to assess the scope of ownership rights and the extent to which their owner possesses the resources and the will to enforce them.

Finally, the valuation models should also assess the extent to which technical and market forces could overwhelm legal rights of ownership, even when the owners of those rights have both the resources and the will to use legal means to enforce them. The current experience of the music industry suggests that even financially strong and legally aggressive owners of intangible assets can see the value of their assets eroded by runaway customers. Intangible asset valuation models should be structured to recognize when that type of threat to asset value is present.

For research administrators involved in contract negotiation, intellectual property, and technology transfer, an understanding of asset valuation models is essential for at least two reasons: 1) research administrators would have a greater understanding of the true value of intellectual assets created on their campuses; and 2) research administrators can educate the faculty on what the true

economic value of their research is. As a result, research administrators can work with faculty more effectively while simultaneously advancing institutional interests.

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