

Investment Theory for Royalty Rates

Value of intellectual property can be determined by use of suggested quantitative methods

BY RUSSEL L. PARR*
and GORDON L. SMITH*

The valuation of intellectual property and determination of an appropriate royalty rate can be accurately accomplished by utilizing investment theory fundamentals. The discussion which follows is the subject of an upcoming book concerning the valuation of intellectual property, including technology and trade names, and the means by which a fair royalty can be determined based upon application of investment theory.

Only when the value of the intellectual property is known can an appropriate royalty be derived. The royalty represents a return on an investment. The amount of return that would be considered proper for any intellectual property investment is determined in much the same way that a proper rate of return is established for any type of capital investment. At all times, the amount of return is related to the amount of investment risk associated with the investment.

Fundamental concepts to keep in mind throughout this discussion are:

- An appropriate royalty reflects achievement of a fair rate of return on the value of the property to be licensed.
- The value of technology is dependent upon the income that can be earned from its employment.
- The potential for income requires demand for the output of the technology at a price level which allows a profit to remain after satisfying production, operating, and administrative expenses.
- And, a fair rate of return must be provided from the profits to compensate the investor for the commitment of working capital, and physical plant, as well as the commitment of the intellectual property.

A business investment is not worthwhile unless a certain level of return can be achieved equal to the amount that is available from alternate forms of investment with identical risk. This principle is true for investments in common stock, real estate, and complexly integrated investments that companies make in projects that are composed of different types of assets. Figure 1 presents the basic composition of a business enterprise.

The total amount of invested capital equals the equity that is contributed and long-term debt obligations. This amount is used to purchase the physical plant and

COMPOSITION OF ENTERPRISE

$$\begin{aligned}
 \text{Business Enterprise Value} &= \text{Shareholders' Equity} + \text{Long Term Debt} \\
 &= \text{Working Capital} + \text{Truck Fleet} + \text{Land} + \text{Work Force} + \text{Buildings} + \text{Intangible Assets} + \text{Machinery} + \text{Technology}
 \end{aligned}$$

Figure 1

to create intellectual property. In the same way that individual securities contribute to the rate of return for a portfolio, individual assets contribute to the overall return on a business enterprise. Each component of the overall business carries with it varying degrees of investment risk which are weighted to equal the risk of the total organization.

If the business earns a return that is above a normal market return, then the incremental profits must be attributed to ownership by the business of a unique asset which allows above average profit. Typically, we find that intellectual property is the key to above-average profits.

Before a proper royalty can be determined, the value of the intellectual property must be known. Once the value is known, the annual amount that represents a fair return on the property can be calculated. In turn, this amount can be expressed by a royalty. The payment for the use of intellectual property can of course take many forms. The illustrations in this article will assume that payment is in the form of a running royalty, expressed as a percentage of sales.

An overview is provided about generally accepted valuation methodologies and how they can be applied to value specific assets within a business enterprise and the enterprise itself. The ultimate goal is to value specific intellectual property. Then, a rate of return can be allocated to all of the assets of the business enterprise including the intellectual property.

GENERALLY ACCEPTED VALUATION METHODS

There are three accepted methods used for determining the fair-market value of property; cost approach, market approach, and income approach.

The cost approach develops an indication of value by considering the cost that would be required to create a similar asset with equivalent utility. The process begins with an indication of the amount needed to develop the asset in brand-new condition. From this amount, adjustments are made to reflect depreciation of the asset from physical wear, technological obsolescence, and economic obsolescence. While this approach is very useful in valuing a specially designed industrial build-

*Associated Valuations Technologies, Inc., Moorestown, New Jersey.

ing is rarely useful for valuing many form of intellectual property because it does not capture the amount of income that may be generated by the property, nor the risks associated with the potential income. While a summation of the historical research expenses that ultimately developed instant photography technology might be an interesting number, a better indication of the value of that technology is possible from other approaches.

The market approach develops indications of value by considering the amounts at which similar property with identical utility and in similar condition have exchanged in arms-length transactions. This approach is very useful for property that is standard in nature and for which market data is available. Standard property such as drill presses, label machines, and trucks can be easily valued using the market approach.

The income potential and associated risks are indirectly reflected in the market transactions because the buyer is assumed to have considered the income potential and risks during the process of negotiating how much to pay. The willing buyer would only pay an amount that will allow profitable use of the asset after assessing its potential and risks.

Limitations with application of this approach to intellectual property valuations are due to: 1) similar intellectual property of equal utility may not exist; 2) similar property may exist but has never been exchanged for consideration; 3) information regarding transactions that have occurred for a fair price may not be available.

Income Approach

An income approach develops an indication of value by calculating the present value of the future income that is directly associated with the subject property. This requires an assessment of the future outlook for the economy as well as the specific business that is to be valued.

Determination of the present value requires a discount rate which reflects the business, financial, interest rate, and inflationary risks associated with a specific investment. The appropriate discount can be determined from a market analysis of the rates of return demanded in the equity marketplace for varying types of businesses in varying industries.

Typically, the capital asset pricing model and the dividend growth model are used to determine appropriate discount rates. A review of the investment returns available from alternative investments such as certificates of deposit, treasury securities, and corporate bonds provides a framework for the discount rate development. The discount rate reflects the risks of achieving the anticipated profits.

VALUATION OF INTELLECTUAL PROPERTY

The process begins with determination of the value of the total enterprise. This is typically based upon the earning power of the business to which all of the integrated assets contribute. Individual asset values are then isolated, including fixed assets and identifiable intangible assets. As the parts are woven into the enterprise framework, presented in Figure 1, the magnitude of value that may be attributed to intellectual property

comes into focus.

Sometimes the existence of intellectual property is not readily apparent. Above average profits may be part of the business but a highly recognized trade name or patented product may not exist. Often, an investigation is needed to identify the various components of intellectual property that contribute to the company's success.

The balance sheet of every company presents a summary of the assets of the company as well as the liabilities that were accepted as part of assembling the assets. The value of many corporate assets are reflected in the balance sheet, at least from a historical perspective. Typically, we find the original amount that was paid for the assets less depreciation. With this, and other information about the age and condition, price indexes can provide a fairly accurate indication of the value of the physical assets at any point in time.

Application of the previously discussed cost and market approaches can also help to value the fixed assets of a company. Value indications for current assets, such as accounts receivable and inventories, are much easier to determine because many of these components are expressed in current dollar amounts.

Intangible Assets

Unfortunately, the balance sheet for many corporations doesn't provide even a clue regarding the value of intangible assets such as patents, tradenames, and other forms of intellectual property. We know that indeed these assets exist and in many cases are the heart and soul of an organization. The value and identity of these assets just aren't reflected in the financial reports.

One approach that is used to value intellectual property is a residual approach. The first step is to establish the overall value of the business enterprise. This is a complex subject all to itself, but is typically accomplished by a discounted cash-flow analysis and a market analysis of comparable publicly traded companies. Then by establishing the value of all other assets that comprise the business, the amount remaining can be an indication of the value of the intellectual property. Referring to Figure 1, once the values are established for all of the components, the equation can be solved to indicate a value for the unknown component of intellectual property.

This procedure becomes an intricate weave where several operating divisions with separate and distinct types of intellectual property form the overall business enterprises. Nonetheless, the same procedure can be followed for subcategories of the overall enterprise.

Throughout the entire process the many macro- and micro-economic factors that affect value must be considered. Key areas of concern that affect the value of a business and the underlying assets include:

1. The general level of economic activity.
2. The rate of inflation.
3. The level of interest rates.
4. Competition by others; domestic and foreign.
5. Profit potential.
6. The required amount of investment in equipment.
7. Requirements for skilled labor and their availability.
8. Dependency upon scarce raw materials.
9. The level of marketing expenditure requirements.

10. Methods of distribution.
11. Size of the market and ease of penetration.
12. Product life cycles and current product ages.
13. Technology life cycles and current ages.
14. The level of research expenditures required.
15. Fiscal policies; tax rates and budget deficits.
16. Monetary policies; discount rates and bank reserves.

**ROYALTY RATE DETERMINATION:
QUANTITATIVE ANALYSIS**

A determination of the value of all of the business enterprise assets, including intellectual property, provides a base from which application of a rate of return analysis will yield a fair royalty.

Analysis of the rates of return that investors demand in the equity marketplace would initially be conducted when the value of the entire enterprise was being established. The subcategorization of the overall return to various asset components of the business can lead to a fair rate of return for intellectual property.

Suppose that the appropriate rate of return for the overall business is established at 15%. We then know that the weighted average return from each asset category must sum to that rate.

Working capital is the most liquid asset of a corporation. Receivables turn over in usually 60 days and inventories in 90 days. Cash is immediately available. In addition, many companies can sell off current assets at relatively low discounts if necessary. The liquidity of working capital indicates that a low amount of investment risk in relation to the other business assets exists and that a relatively lower rate of return should be associated with the working capital investment. An appropriate rate is often pegged to that which is available from short term securities such as treasury bills and CDs.

An similar analysis is conducted for the other assets by considering the characteristics of each category. The rate-of-return requirement reflects risk as measured by liquidity, asset versatility with respect to strategic redeployment, and of course the underlying risks of the economy and industry in which the assets are used. The weighted average of the rates for each asset category must balance with the overall rate for the entire enterprise.

Allocation of the income derived from the total enterprise can now be completed based upon the rate of return that is required on the value of each asset category. The amount attributed to the technology is then expressed as a percentage of sales as a royalty. Presented below is a simple example that shows the result of the entire process. Here is a company with \$10,000 in revenues and income of \$1,440.

Total Enterprise Revenues	\$10,000
Total Enterprise Income	\$ 1,440

Using the values that were determined for each asset category and the required rate of return for each category, the income of the total enterprise is attributed to each asset. Remember, that the weighted average rate of return for the entire enterprise is approximately equal to the rate that was established for the overall business. Thus, each dollar of income is attributed to one asset category or another depending upon the risk associated with the asset category. The \$500 of working capital

that is used in the business is very liquid and could earn a return of 8% if employed elsewhere.

Fixed assets of \$5,000 could also be employed elsewhere, but typically are less liquid requiring a higher rate of return; 12% in this case. The only other asset found in this example company is technology. The value of the technology was found to be \$4,000. The rate of return required for it was determined to be 20%. Presented below is allocation of the income that is earned from the business to the assets that comprise the business:

Assets Employed	Rate of Return	Allocated Income
Working Capital		
\$500 @	8%	40
Fixed Assets		
\$5,000 @	13%	600
Technology		
\$4,000 @	20%	800
Total Allocated Income		1,440

Expressing the \$800 that we associate with the technology as a percentage of sales indicates that a royalty of 8% is appropriate for the technology in question. Put another way, a royalty rate of 8% of sales is necessary to earn a fair rate of return on the technology. Suppose the rule-of-thumb used in the industry would have indicated a fair royalty of 5%. Then the licensing of this technology would most likely have been completed at an under-priced level.

We recognize that a given license agreement may provide for a complex financial arrangement between licensor and licensee. The licensor may have to commit additional capital for development or assume certain liabilities. The licensee might be obligated to purchase raw materials from the licensor or make lump-sum payments at certain "milestones," in addition to paying a running royalty. The economic substance of these transactions is, however, the net cash flow attributed to the transaction. The present value of this potential net cash flow is the basis by which to measure the fair rate of return.

CASE STUDIES

One of our clients was a multinational company that manufactured a special product using injection molding techniques. The product was molded in one step including a non-plastic component. Although the process is unpatented, the competition could not economically duplicate the technique. The superior product commanded a price premium and yielded profits that were above the industry average. The physical asset base of our client was no larger than its competition but above-average profits resulted. A license to an overseas subsidiary was granted at a royalty that was twice the royalty level usually associated with products and processes in the industry. The foreign taxing authority challenged that the high royalty was not a fair arms-length amount and served only to remove income from the tax base of the subsidiary.

A rate-of-return analysis was conducted. A fair rate of return was associated with the value of all the physical assets of the company as well as working capital and other intangible investments such as computer software. The remaining profits were due to the premium

price that the superior product commanded. That amount was ascribed to the proprietary manufacturing techniques and indicated that a royalty could be justified above the amount that the parent company was actually charging the overseas subsidiary. The conclusion indicated that the royalty being charged was indeed fair.

The same techniques has provided royalty support in other studies as well. Proceeding from an overall business value, and then valuing the other identifiable intangible and tangible assets, the value of the subject intellectual property is isolated. In one case this was very important proprietary manufacturing technology. In another it was the trademark of a merchandising company. The earnings attributable to these assets provided an indication of a fair return and an appropriate royalty rate that could be associated with them.

ROYALTY RATE DETERINATION: QUALITATIVE ANALYSIS

So far, we have addressed the quantitative factors that can establish a fair royalty rate. Some of the qualities of intellectual property and form of license are listed below which contribute to the amount of royalty that can be reasonably expected:

— *Exclusivity.* When the technology will be available for use by only one licensee the amount of royalty is supported.

— *Competition.* When the number of competitors and alternate technologies are limited, a high royalty is supported.

— *Market.* When the market is large and high in quality, more support exists for a high royalty. Quality of a market can be measured as the amount of price elasticity.

— *Life.* When the remaining useful life of the technology is long, then an investment horizon is adequate to allow a return of and a return on capital outlays. High royalties can be expected.

— *Assignable.* When a license can be assigned to another the licensor gives up elements of control and should obtain additional compensation in the form of a higher royalty.

— *Profits.* When high profits result from exploitation of a technology a high royalty shouldn't be far behind.

— *Versatility.* When the property has a variety of profitable applications, failure in one industry is not as severe and the royalty should be higher to reflect this reduction of risk.

Depending on specific circumstances, other factors in addition to those cited above may play an important role in royalty rate determination. Many of these factors are indirectly reflected in the quantitative analysis as part of the risk-and-return analysis that developed the discount rate.

While the factors cited above are intuitively known to determine the level of a royalty the exact amount of sensitivity to each factor has never been studied. Obviously, this is a very simplified list of what can be a matrix of a myriad of factors. Robert Goldscheider, Tom Arnold, and others in the field have written and lectured extensively about the many factors to be considered in pricing technology. The courts (i.e. *Georgia-Pacific Corp. v. Plywood-Champion Papers, Inc.* 318 F. Supp. 1116 (1970)) have provided insight on the qualitative factors as well. In the end, however, the practitioner is left with the task of economic quantification.

The Royalty Research Group is in the process of amassing a computerized database of royalties. While it will not reveal the identity of any licensor, licensee, or specific product or process that is licensed, it will provide "generic" data and allow statistical analysis to measure the correlation of specific license characteristics with royalty rates. It is our intention that this data, as well as the results of the analysis, will be made available to the database contributors. Our hope is that this effort may shed some light on the extremely complex process of intellectual property pricing.

Conclusion

Intellectual property is fast becoming the most important asset possessed by most corporations and application of investment theory to the pricing decision of intellectual property is an important step toward optimal management of these assets. The valuation and rate of return concepts introduced within this paper are the same fundamentals that are followed for any other type of capital investment, whether it be an industrial project or a financial security.

Royalty rates have typically been determined by using "rules-of-thumb" and negotiations that are based upon "what the traffic will bear."

We suggest that there are quantitative methods available to licensors and licensees that can assist in the determination of proper royalties by using investment theory.