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Valuation of Intellectual Property: Placing a Dollar Value on Technology (or, Are Real-Options Real?)

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VALUATION OF INTELLECTUAL PROPERTY: PLACING A DOLLAR VALUE ON TECHNOLOGY (OR, ARE REAL-OPTIONS REAL?)

Gordon V. Smith

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*Gordon V. Smith**

I. INTRODUCTION

Valuation professionals have for a long time been appraising business enterprises and their underlying assets. The "dot-com" New Economy has dramatically changed how businesses can do business and has introduced us to some new forms of intellectual property rights. Have these changes altered our valuation methodologies?

Prior to the 1960s, when valuation professionals were faced with a situation in which the value of a business enterprise appeared to exceed the value of its underlying assets, the difference was ascribed to "goodwill" or "blue sky." No real effort was made to identify the constituents of this catch-all category, it was simply the difference between the value of the business and the value of its clearly identifiable assets.

During the 1960s, however, the United States experienced the first of a series of "merger mania" periods. These were the days when the so-called conglomerates were being assembled. Acquirers quickly realized that there could be significant tax benefits in allocating a portion of an ambitious purchase price to identifiable intangible assets. The Internal Revenue Code at that time permitted amortization of such intangibles if the taxpayer could successfully support the notion that these assets had value, were identifiable, and had finite remaining economic lives. Because the resulting amortization reduced the post-acquisition tax burden for the buyer, this strategy attracted much attention. Valuation professionals were called upon to identify, value, and estimate the remaining economic life of these intangible assets that were formerly lumped together as goodwill.

II. VALUING INTANGIBLE ASSETS AND INTELLECTUAL PROPERTY

A. The Business Enterprise

Technologies for the valuation of intangible assets were developed from these experiences in the 1960s. It is now clearly recognized that a business enterprise is comprised of three elements: monetary assets, tangible assets, and intangible assets. *Monetary assets* comprise inventories, cash investments, work in process, and accounts receivable less current liabilities. Some refer to these assets as "net

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working capital." *Tangible assets* consist of land, buildings, machinery and equipment, mineral reserves, and other such assets that are commonly designated on a company's balance sheet as "property, plant, and equipment." Finally, *intangible assets* include computer software, intellectual property (such as patents, trademarks, proprietary technology, and copyrights), an assembled workforce, customer relationships, favorable contracts and other elements of a going concern.

These three primary asset categories comprise a portfolio of assets that make up the business enterprise. Each of these categories, as well as the individual assets which comprise them, have different risk and economic life characteristics.

When estimating value for intangible assets and intellectual property, an analyst must always be cognizant of the value of the business enterprise in which those assets are employed. Intangible assets and intellectual property typically attain their highest value as part of a business enterprise because they require complementary monetary tangible and intangible assets for their successful exploitation.

There is an essential relationship between the value of a business enterprise and the value of its underlying assets. If the earnings of a business enterprise are less than that necessary to provide an adequate return on an investment in its underlying assets, and if that condition is expected to persist in the future, the value of the enterprise is best realized in the disposal of those assets in some form of liquidation value. This is the lowest level of potential business enterprise value. If the earnings of the business rise, so does the value of the underlying assets to a maximum of their replacement cost. The earnings of a healthy business should be sufficient to provide a reasonable investment return, not only on its monetary and tangible assets, but also on its intangible assets and intangible property.

B. Valuation Methods

There are three ways to value a business or its underlying assets. First, the *cost approach* measures value by the amount that would be required to replace or reproduce the assets in question. Second, the *market approach* looks to arm's length transactions involving comparable property. Finally, the *income approach* measures value by calculating the present value of the future economic benefits that are expected to flow from the business or specific assets within it. The ingredients of the income approach are the amount of income to be received in the future, the duration of that income stream, and the risk associated with its realization. The income approach is the predominant methodology for valuing intangible assets and intellectual property and thus will be the focus of the following discussion.

The keystone of the income approach is the discounted cash flow methodology. Stated briefly, this methodology calculates the present value (at a discount rate reflective of risk) of the *net* cash flow (revenues less cash expenses) that the enterprise or asset is expected to provide. For businesses or assets that have a commercial "track record," the information necessary to construct this model is not terribly difficult to obtain, and the present value result is usually a positive amount.

For a new technology or fledgling enterprise, however, the inputs become much more difficult to forecast. Also, the start-up, or commercialization, expenses

in the early years may be so great that even handsome profits in the future may not yield a positive present value using a discount rate which reflects the real possibility of failure.

C. The Dot-Com Dilemma

In the dot-com enterprises of the New Economy, one observes enterprises accumulating start-up losses measured in the hundreds of millions of dollars with no real assurances as to when the negative earnings will become positive. At the same time, the marketplace values these enterprises as if they were already enjoying handsome earnings, evidenced by the market price of their common stock. The basic "earnings = value" equation seems to have been suspended. Is the market "irrationally exuberant"? Or are investors expecting such truly spectacular earnings in the future that even the almost unheard-of levels of start-up expenses will be outweighed? Such spectacular future earnings may depend on the enterprise becoming market dominant (a "winner take all" scenario). In this case, investors are making a bet on which of several competing enterprises will achieve that dominance. Many investors feel that there are great financial rewards out there somewhere in the future and, even if they do not know how it will all sort out, they need to be participants now—an "I don't want to be left behind" theory.

Whatever the reason, the market appears to be willing to disconnect the relationship between the value of a business or asset that might be indicated in a basic discounted cash flow model (the positive present value of future earnings) and the price that investors are willing to pay. There also may be a disconnect between business enterprise value and underlying asset value as discussed above.

D. The Real-Option Solution

One theory that has been advanced is that the New Economy stock prices result from the application of a 'real option' concept.¹ In financial terms, an option is a derivative security. The techniques for valuing options have been known for a number of years. Since the seminal work by Black and Scholes² in the early 1970s, several permutations of option pricing theory have been advanced. The real option methodology is one of these and, in valuation terms, is a mathematically sophisticated model for estimating the ingredients for the traditional income approach. It still is based upon a calculation of the present value of future benefits of ownership and is, in essence, a discounted cash flow measure, albeit more complex. It is a model growing from decision-tree theory that permits one to forecast various milestones in the future development of a business enterprise or intangible asset, and forecast the probability of success, failure, or a change of direction at these various points. The usefulness of this model is that it permits one to consider the possibility of aborting a project if one of the milestones is not successfully passed, or of changing the direction of the enterprise or the exploitation mode of an intellectual property. It also permits one to consider the possibility of an extremely successful outcome that might have been only remotely related to the originally planned objective.

1. MARTHA AMRAM, & NALIN KULATILAKA, *REAL OPTIONS* (1998).

2. See F. Black, & M. Scholes, *The Valuation of Option Contracts and a Test of Market Efficiency*, 27 J. FIN. 399 (1972).

As an example, if one embarks on a project to construct a large-scale electric generating facility, there are really only two practical outcomes. The project might be aborted at some point (perhaps due to government regulation, a drastic increase in fuel cost, or a drastic drop in electric power prices) and the other is to complete the construction and enjoy some degree of success in the electric power marketplace. The milestones in such a decision tree, then, are all a matter of "go" or "no go." There are few, if any, alternative uses for a partially completed electric generating facility. A basic discounted cash flow model is quite appropriate for the appraisal of such a project, even in its planning stage.

On the other hand, is a company such as Yahoo!, a quintessential e-commerce enterprise? Yahoo!, which started as an internet portal, is now described as a "global internet communications, commerce, and media company that offers a comprehensive branded network of services to more than 120 million users each month worldwide."³ In the Yahoo! enterprise, one finds an extreme example of enterprise and asset versatility. That is, given its brand name, and relationships with regular internet users who utilize the Yahoo! website as their primary point of access to the internet, the entire enterprise is in a position to move in a multitude of directions, and it has done so. Earlier this year, the market value of the invested capital of Yahoo! was approximately \$90 billion. Over 99 percent of that amount represented the value of its underlying intangible assets and intellectual property. In 1999, Yahoo! experienced a net income of a mere \$61 million, following four years of losses. The lack of present income and the uncertainty of future earnings do not seem to bother investors in the least. The real option model for developing the income approach inputs may be the preferred valuation method. In fact, it may be the only method that could reflect the 'spectacular success scenario' necessary to explain the market price.

E. Returning to the Basics

Between the electric generation facility and an e-commerce enterprise is a whole spectrum of business enterprise and intellectual property profiles. For the valuation of most of these, the basic discounted cash flow model is practical and appropriate. There are situations, however, in which the decision-tree or real options techniques are useful for estimating the income approach inputs. Those situations are characterized as having an enterprise or assets that are highly versatile, can be redeployed rapidly and at minimal cost, have easily definable milestones for development, and where there is potential for both spectacular success and abject failure.

The dot-com business world also can present another valuation anomaly. As stated above, the value of a business enterprise must be commensurate with the values of its underlying assets. In the case of Yahoo!, 99 percent of \$90 billion was the value of intangible assets and intellectual property. What are those assets? One would probably name the Yahoo! trademarks, its customer (viewer) base, relationships with advertisers and content suppliers, its assembled workforce, software, and the like. It also was stated above that the upper limit of value for the underlying assets of a business (irrespective of earnings) is their replacement cost.⁴

3. Yahoo!, Inc., 10-K Filing with the Securities and Exchange Commission (Dec. 31, 1999).

4. The well-accepted valuation Principle of Substitution states that no one would pay more for property than the cost of replacing it.

Since its inception, Yahoo! has spent approximately \$750 million building its business and creating whatever intangible assets and intellectual property it has. Even restating those costs to present day levels leaves an enormous gap of unaccounted-for value. Must this be called "goodwill" resorting to the old catch-all term, or should this be more properly referred to as "option rights"? That is, the ownership of these highly versatile assets provides an unusually wide range of exploitation possibilities. The owner therefore has the right to a wide range of business options.

Techniques for estimating the ingredients for the traditional income approach to valuation will continue to be refined. In the meantime, this paper supplies some food for thought as valuation issues in the New Economy are grappled with.