

VALUATION ISSUES™

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Valuation of Nonmarketable Stock Options

by Louis J. DiSilvestro, CFA, ASA

We are occasionally called upon to value options to purchase common stock when there is no established market price for the option. The options referred to herein are those issued by a company on whose stock the option represents a call, which is the right to buy the stock, usually either as a part of incentive compensation for executives or in conjunction with capital raising efforts. These options lack a trading market causing them to be illiquid assets. The most common situations requiring the valuation of nonmarketable stock options have included the following: (1) repurchase of an option by the issuing corporation; (2) transfer of the ownership of the option to a third party; (3) litigation in which the value of the option is in dispute; and (4) determination of executive compensation for income tax purposes. This article presents a discussion of key factors influencing stock option values and an overview of the Black-Scholes Option Pricing Model which is currently the most widely used theoretical model for the valuation of stock options.

The term “option,” as used in this article, represents a contract which gives the holder the right, but not the obligation, to buy a specified number of shares of stock at a fixed price within a

predetermined period of time. The fixed stock price at which the option is exercisable is called the exercise price or the strike price. The options addressed in this article have the following characteristics: (1) they are options to purchase stock of either a publicly traded or closely-held company, but in either case there is no public trading market for the option itself; (2) they typically have more than a year remaining until expiration; and (3) at the time of exercise, the company will issue either treasury stock or authorized but previously unissued shares, resulting in cash coming into the company and additional shares outstanding.

The value of a stock option consists of two components: the intrinsic value and the time value.

We note that publicly traded instruments that have the above-noted characteristics are called “warrants.” Instruments known as “options” in the public stock market differ from those addressed here, in that they are issued by third parties as opposed to the company itself (such that at exercise they are satisfied by already outstanding shares), and they are issued for periods of months rather than years. While the instruments that we are talking about in this article are called “warrants” rather than “options” in the public stock market, we use the term “options” here because

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these instruments arise most frequently in the familiar context of incentive stock options, and because contracts granting such instruments in connection with financing packages typically use the term “option” rather than “warrant.”

The value of a stock option consists of two components: the intrinsic value and the time value. The intrinsic value of a stock option is simply the difference between the stock’s value and the exercise price (i.e., the price at which the option holder can purchase the stock). The intrinsic value of a stock option may be either positive or zero, but it can never be negative since the option holder is not obligated to exercise its option to purchase the stock. In its simplest form, the time value of a stock option is the present value of the expected difference between the value of the stock at the option’s date of expiration and the option’s exercise price. This component represents the value added by the time over which the stock price can potentially exceed the exercise price. All stock option valuation models incorporate these two components.

Key factors which have an influence on stock option values include: (1) the

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time to the option's expiration; (2) the volatility of the value of the underlying stock; (3) whether or not the company pays dividends on its stock; (4) the prevailing level of interest rates; (5) the dilutive effect of the option's exercise; and (6) the liquidity of the underlying stock and the option itself. These factors are present, to varying degrees, in most of the widely used option valuation models.

The longer the time to expiration, the greater the stock's opportunity to appreciate in value, thus enhancing the option's value. Therefore, there is a positive correlation between the time to expiration and the value of a stock option. In general, the wider the fluctuations in the value of the underlying stock over time, the greater the option's time value. As such, a positive correlation also exists between the value of an option and the volatility of the value of the underlying stock.

In regard to factor 3, the payment of dividends on the underlying stock detracts from an option's value, because the option holder does not receive the dividends and the company pays out retained earnings that otherwise might be available for reinvestment and would contribute to the growth in value of the underlying stock. In regard to factor 4, empirical studies have shown that higher interest rate levels in the economy tend to produce higher option values.

Factor 5 deals with the potential dilution from the exercise of options. The more options outstanding in relation to the existing number of shares

of underlying stock outstanding, the greater the common stock dilution if all the options are exercised. Potential dilution, therefore, has a negative impact on the value of an option. Finally, the liquidity of the underlying stock and the option itself affects the pricing of stock options. Due to the preference of liquidity on the part of investors, the more readily marketable the underlying stock, the greater the option's value. In the case of closely-held

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companies whose shares are normally illiquid, the lack of liquidity results in reduced stock option values. In addition to the foregoing, if the option to be valued lacks ready marketability, the option value indicated by the application of the selected valuation model should be discounted to reflect this factor. It is important to recognize, however, that the discount for lack of marketability for an option is less than that for common stock due to the leverage afforded by stock options.

All of the widely used option valuation models incorporate the price of the underlying stock as an input variable. For publicly traded companies, the price of the stock is simply obtained from the public trading markets. Because closely-held companies do not experience the benefit of a public trading system, a well documented appraisal of these companies' shares is required in determining the value of stock options issued on these shares. Most options issued on the shares of closely-held stock provide the option holder with the right to purchase a minority ownership interest. As such, an appraisal establishing the value of closely-held shares for use in the valuation of stock options must include an analysis of appropriate fractional interest discounts. Such discounts include a minority interest discount and a discount for lack of marketability.

The most widely used option valuation model in the appraisal community is the

Black-Scholes Option Pricing Model. This model, which was developed by Fisher Black and Myron Scholes in 1973, is used in the valuation of both marketable (i.e., options which are traded on a public exchange) and nonmarketable options. The Black-Scholes Option Pricing Model is based on the assumption that it is possible to set up a perfectly hedged position consisting of owning the shares of stock and selling a call option on the stock. Any movement in the price of the underlying stock will be offset by an opposite movement in the option's value, resulting in no risk to the investor. This perfect hedge is riskless and, therefore, should yield the riskless rate of return. If it does not yield the riskless rate, the option is mispriced, the hedge is not perfect, and the option should be revalued until the hedge yields the riskless rate. It is inferred by this model that when the option is correctly priced, the perfect hedge results.

Although the usefulness of the Black-Scholes Option Pricing Model is reduced by the many assumptions necessary for its derivation, the explanation of which is beyond the scope of this article, as noted, it is the most widely used option pricing model within the appraisal community. The model is based on five inputs which include the following items: (1) the time to expiration; (2) the current stock price; (3) the exercise or strike price; (4) the risk-free interest rate; and (5) the volatility of the stock price in the future. Its application to the valuation of options issued on the shares of closely-held companies requires a valuation of the underlying stock and the estimation of a volatility factor. Due to the lack of historical pricing, an exact volatility factor cannot be calculated on the shares of closely-held companies. As an alternative, comparable publicly traded companies must be identified and the historical pricing of their shares are used as a proxy to estimate the volatility factor of the closely-held company's shares.

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In conclusion, the valuation of non-marketable stock options requires a thorough and comprehensive analysis of the factors identified above, which include: the time to the option's expiration; the volatility of the value of the underlying stock; whether or not the company pays dividends on its stock; the prevailing level of interest rates; the dilutive effect of the option's exercise; and, the liquidity of the underlying stock and the option itself. The last factor, along with the pricing of the underlying stock, is critically important to the valuation of options issued on the shares of closely-held companies. The Black-Scholes Option Pricing Model, when used in conjunction with reasonable input variables, provides a credible estimate of the value of stock options.

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Strangi Case Decided (KTS testified as valuation expert for IRS)

Estate of Albert Strangi (petitioner)
Commissioner of Internal Revenue (respondent)
115 T.C. No. 35

A decision on the Strangi case was filed on November 30, 2000. In the decision the court accepted our (KTS) discounts (giving no weight to the taxpayer's expert testimony) and stated that our report was "well documented and persuasive." However, the court also stated that our selected discounts (resulting in an overall discount of 31% for a 99% limited partner interest) "...may still be overgenerous to petitioner...."

We will discuss this case in greater detail in our next issue.

Ina F. Knight (petitioner) Commissioner of Internal Revenue (respondent) 115 T.C. No. 36

By John A. Thomson, ASA, MAI

On December 28, 1994, petitioner established a trust of which petitioner's husband was trustee (the management trust), a family limited partnership (the partnership) of which the management trust was the general partner, and trusts for the benefit of each of petitioner's two adult children (children's trusts). The petitioner transferred three parcels of real property used by petitioner and her children and some financial assets to the partnership. Each petitioner (husband & wife) transferred a 22.3 percent interest (gift) in the partnership to each of their children's trusts. The Net Asset Value (NAV) as of December 28, 1994 (the date of value) was stipulated to at \$2,081,323.

The IRS raised the issue (among others) as to whether or not section 2704 (b) of the Internal Revenue Code (IRC) applied to the partnership. The court concluded it did not. However, the IRS valuation expert only valued the partnership interest under 2704 (b) which implies a Fair Value standard and did not value the assets under the Fair Market Value standard which would apply if the court was to conclude 2704 (b) did not apply. Therefore, respondent (IRS) expert's (Francis Burns) report (direct testimony) and testimony (cross examination) was not considered in deciding the fair market value of the gifts. At this point, one might wonder why the IRS did not require a Fair Market Value report in addition to the 2704 (b) Fair Value report. Of greater significance (at least from a valuation perspective) the taxpayer's expert, Robert K. Conklin's report and testimony were disregarded in their entirety. The following quotes from

the court on the taxpayer's expert are informative and guiding.

1. "Conklin gave no convincing reason why the partnership's mix of assets would be unattractive to a buyer. We apply no portfolio discount to the assets of the partnership."

2. "We have rejected expert opinion based on conclusions which are unexplained or contrary to the evidence."

3. "An expert fails to assist the trier of fact if he or she assumes the position of advocate."

4. "Conklin's erroneous factual assumptions cast doubt on his objectivity."

5. "We conclude that Conklin was acting as an advocate and that his testimony was not objective."

"An expert fails to assist the trier of fact if he or she assumes the position of advocate."

This is a blistering critique of an appraiser. As independent appraisers, we are supposed to be independent and

objective; unfortunately, we see too many well qualified appraisers succumbing to the pressure of their client's wishes and crossing the line from being independent and objective to becoming an advocate.

The court in this case held for a 15.0 percent discount¹ from Net Asset Value to account for any minority and marketability aspects of a 22.3 percent limited partnership interest which primarily held real estate.

¹Based on its own wisdom as neither expert was of any help to the court on the issue of Fair Market Value.

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- 11/30/00 Presentation—Estate Planning Council of Northeastern Pennsylvania—"Valuation Concepts from the Davis Case and Valuation of Family Limited Partnerships"
- 2/14/01 Presentation—Greater New Jersey Estate Planning Council—"Valuation Concepts from the Davis Case and Valuation of Family Limited Partnerships"
- 2/15/01 Presentation—Lehigh Valley Estate Planning Council—"Valuation Concepts from the Davis Case and Valuation of Family Limited Partnerships"
- 3/9/01 Presentation—CLE, Springfield, IL—"Business Valuations in Mergers and Acquisitions"
- 3/13/01 Presentation—Eastern Illinois Estate Planning Council, Champaign, IL—"Valuation Concepts from the Davis Case and Valuation of Family Limited Partnerships"
- 3/14/01 Business Valuation Roundtable, St. Louis, MO—"Valuation Concepts from the Strangi Case"
- 3/16/01 Presentation—CLE, Chicago, IL—"Business Valuations in Mergers and Acquisitions"

- * Valuation of common stock of fabless semiconductor company for gifting to a university.
- * Valuation of large midwest flooring contractor for ESOP purposes.
- * Valuation of truck repair facility for gifting purposes.
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- * Valuation of the preferred and common stock of a leading, development stage wireless multi-media company for charitable purposes.
- * Valuation of the stock of a leading manufacturer and marketer of golf products for gift tax purposes.
- * Valuation of a semiconductor distribution division of a leading worldwide electronics product manufacturer.



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**"Many an optimist has become rich
by buying out a pessimist."**

- Robert G. Allen