

Not All Options Are Created Equal

At first glance, valuing options may seem like a simple task: plug the numbers into a standard option pricing model, such as the Black-Scholes formula, and a price is mechanically calculated. But not all options are alike and failing to use the most suitable approach for valuing a particular option can result in a value that may not be the most accurate.

There are two types of options: calls and puts. A call option allows the holder to buy an asset on or before a certain date for a certain price. The holder of a put option has the right to sell an asset on or before a certain date for a certain price. The payoff is the difference between the price of the stock when the option is exercised and the exercise price. These simple contracts are referred to as "plain vanilla" options. Options with more complicated payoffs, which may depend on the price path of the underlying security, are called "exotic options." For our purposes, we will be discussing methodology with respect to plain vanilla options. It is important to make sure the options being valued are plain vanilla options since exotic options come in many forms and require different valuation solutions.

MEASURING VOLATILITY

The value of an option depends on the following factors: the fair market value of the underlying security, the volatility of that security's price, the time to maturity, the risk-free rate covering the time to maturity, and the exercise price. Of these factors, volatility is the most difficult to measure because it is not static. In a straightforward application of the Black-Scholes model, for example, volatility is calculated by looking at either a) the historical performance of the stock (in the case of public companies with good liquidity in their stock) or b) the historical performance of stocks in the company's peer group (in the case of companies with poor liquidity in their stock). An often used rule of thumb is to look back for the same length of time as the life of the option being valued.

Fundamentally, volatility is used as a gauge of future stock behavior. However, two factors combine to encourage deeper scrutiny of the calculated volatility. The first factor is that the volatility of a security is strongly affected by the behavior of the overall market and by its industry peer group. The second factor is the age and maturity of the company or industry. During certain periods, the volatility of a company or industry may be much higher than at other times.

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A more accurate measure of volatility is "implied volatility" which is calculated by looking at comparable options trading in the market, selecting an appropriate model for valuing those options, and then solving for volatility using that model. By performing this type of analysis, we can see how the market is estimating **future** volatility in the peer group. For example, Valuation Research was asked to value options for an Internet company at the height of the dot-com craze, shortly before its initial public offering. Historical volatilities of the peer group were extremely high. After examining the implied volatility of the peer group, we determined that the volatility expected by the marketplace was a fraction of the amount calculated directly, resulting in a much lower value.

EXERCISE THE RIGHT APPROACH

Along with volatility, the time to maturity is an important driver of the value of an option. The date at which an option can be exercised depends on whether the option is American (can be exercised at any time during its life) or European (can only be exercised at the end of its life). These two different "styles" of options require different valuation approaches. American options should be valued using a binomial model, while plain vanilla European options should be valued using the Black-Scholes model. Complications arise, however, when the option can only be exercised during part of its lifetime. Many employee options fall into this category because they specify a vesting period. In addition, these options may specify a moving exercise price or set the forward exercise price to be at-the-money once the vesting period is over. Options with these minor variations would be considered exotics and cannot be valued using either the Black-Scholes model or a simple binomial model.

As you can see, valuing options requires more than a "cookie cutter" approach. What may seem like a plain vanilla option may actually be an exotic option. It is important to be able to distinguish between the two types of options and to implement the correct valuation approach. Periodically, we are asked to help clients structure option terms to achieve a specific goal. Companies should be mindful of the language they use when writing options into shareholder agreements or they may end up with problems later. In some instances, we have been asked to value options which were not structured separately as options but were embedded in the overall language of the agreement. For more information regarding valuing options, contact your Valuation Research representative or Summer Parrish at 609/243-7009. **VR**