

# Alert

December 2005

## Choosing the Right Option-Pricing Model

*"The burning question from clients is consistently, 'Which model will provide the lowest value?'"*

As the deadline for SFAS 123(R) implementation looms, companies are deciding which option-pricing model to use to value their particular form of share-based payment. Our clients frequently ask us to provide a comparison of the value of their employee stock options under the following option-pricing models: Black-Scholes, binomial, and Monte Carlo. They later review the spreadsheet of the various values with their management and boards before deciding which model to present to their auditors.

The burning question from clients is consistently, "Which model will provide the lowest value?" Our answer is always, "It depends." In this issue of the *Valuation Researcher Alert*, we will attempt to answer this question by providing the conclusions we have reached in the course of our analyses. We will also provide an update on the FASB's recent decisions concerning the grant date of share-based payment awards.

### BLACK-SCHOLES

Under SFAS 123(R), FASB requires use of an option-pricing model to derive fair value. The option-pricing model must consider the following factors: exercise price, expected life of an option, the current stock price, expected dividends, expected volatility, and the risk-free interest rate. The Board maintains that either a closed-form (Black-Scholes), or a lattice (binomial) model should be used to value share-based payment.

Black-Scholes, the most widely-accepted model, was intended to be used to value publicly traded options. Black-Scholes fails to accurately value employee stock options because the model does not account for the options' lack of marketability. To account for this lack of marketability, the FASB has supported the use of an expected term for the option based on historical exercise behavior in the employee population, rather than the application of an appropriate discount for illiquidity based on the specifics of the option plan.

We have found that Black-Scholes may provide the lowest valuation (of the three models) if 1) employees tend to exercise options near the vesting dates (and there is exercise data available to support this) and/or, 2) the company's price path has had a strong, positive slope (options are deep in-the-money).

### BINOMIAL

A binomial, or lattice model considers discretely an employee's propensity to exercise their options at different price points, and post-vesting employment termination behavior. This type of model can incorporate a term structure of volatility, and can also accommodate differences in exercise behavior across the employee population. A binomial model can be difficult to implement if sufficient historical data on an employee's exercise behavior is not available.

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In performing analyses for clients, we have found that the binomial model may provide the lowest valuation for companies which experience one or more of the following: 1) employees tend to hold their options or the vesting period is long, 2) the company's price path has had a low, positive slope (options are barely in-the-money), and 3) the turnover ratio for the grantee population is high.

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### MONTE CARLO

Although not widely known, the Monte Carlo model is allowed for and mentioned liberally in SFAS 123(R). Monte Carlo, often used for derivatives, is able to capture observed changes in suboptimal behavior over the expected life of the option. According to option theory, holding an option until the end of its contractual term provides the highest, or optimal, benefit. When employees exercise their options before the end of the term, that behavior is considered suboptimal.

Not unsurprisingly, the Monte Carlo model provides lower valuations than the Black Scholes when a company's circumstances are similar to those described above in the Binomial section. It may provide even lower valuations than the binomial model if there is a large amount of employee exercise data available. And in the case of options with market conditions, it may well be the only model that can reasonably estimate the option value.

### GRANT DATE

An issue that has created quite a stir in the business community is determination of the grant date of a share-based payment award. The grant date is the date used to measure the fair value of a share-based award. In August, the FASB expressed an informal view that the grant date is the date the terms of the award are communicated to the recipient. In a reversal of its previous thinking on the matter, the FASB issued a staff position (FSP) on October 18, stating that the grant date can be established prior to communication of the terms if 1) the award is a unilateral grant, i.e. the recipient does not have the ability to negotiate key terms and conditions of the award with the employer, and 2) the key terms and conditions of the award are expected to be communicated to an individual recipient within a relatively short time period from the grant date. For more information, contact your Valuation Research representative or Summer Parrish at (609) 243-7009. **VR**

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