

November 2005

FAS123r Stock Option Accounting White Paper

Accounting Treatment for Stock Options: Option Valuation and Model Selection

Author: **Lynda Radke, CPA**
ProCognis, Inc.
info@procognis.com

Abstract

This discussion summarizes the newly revised FAS123r treatment for expensing of stock options. The coverage includes the two most common option valuation models: Binomial Lattice and Black-Scholes-Merton. The paper concludes with an analysis of the models along with a discussion of their practical application.

1. Stock Option Treatment Background

FAS123 'Share Based Payments' was revised in December of 2004. The new standard, known as "FAS123r" requires the expensing of employee stock options over the implied service term: the period over which the grantee earns the option grant.

Historically, employee stock options fell under the guidance of APB Opinion No. 25, "Accounting for Stock Issued to Employees". [1] APB No. 25 used the intrinsic value approach, which only required an expense be recorded if the grant had *intrinsic value*: a strike price lower than the current market price of the stock on the date of grant. Many shareholder activists sought to have all options expensed. Businesses actively lobbied against such a provision due to the perception that the expense treatment would be potentially onerous.

In the end, a compromise was reached and the FASB issued the original FAS No. 123, "Accounting for Stock Based Compensation". While it encouraged expensing, it did not specifically require it. It did require that all companies determine the fair market value of their stock options at grant date. However, it allowed the Company to choose between expensing the value of the options under FAS123 or disclosing what that amount would have been and continue to record options under the intrinsic value method.

Not surprisingly, most companies chose to continue using the intrinsic value method. Under this method they had to calculate the fair value, but the amount was only used in the footnotes. As the fair-value method was used for disclosure only, few companies invested significant resources in building complex valuation models.

In fact, most companies chose to use a modified version of the Black-Scholes-Merton ("BSM") model. This model was easy to implement using formulas widely available on the Internet, in trade publications or through auditing firms. The downside was that because of its simplicity it often produced valuations that lacked precision. [2]

However, the issue of expensing stock options was not resolved. Shareholder activists continued to advocate for the full expensing of the calculated fair-value of stock options. And many analysts complained that the choice between expensing and disclosing created inconsistencies between companies selecting differing treatment which hampered their analysis.

During the high growth late 90s, companies felt free to issue large stock grants as an effective way to attract and retain the best and brightest. While there were always some rumblings of discontent, rising stock prices subdued the dissent.

However, once the stock bubble burst the discontent boiled over with the high profile implosions of Enron, WorldCom and countless others. Suddenly, large option grants came under intense scrutiny. In a few well publicized cases, company executives had exercised and profited from their options shortly before their once mighty companies tumbled into financial ruin. Proponents of expensing stock options came out swinging and the battered business community was in no position to oppose them.

The result was FAS No. 123r, "Share-Based Payments", a re-issuance of the existing accounting standard. The re-issuance removed the choice to continue using the intrinsic method. The end result is that companies that issue stock options will now have to record an expense for what they had previously only had to disclose. They are also required to record expense for any outstanding unvested options.

2. FAS123r Requirements

FAS123r requires that costs resulting from all share-based payment transactions be recognized in the financial statements. It also established *fair-value* as the measurement objective. The FASB has been gradually establishing the fair-value accounting approach over the last decade, supplanting historical cost treatment.

As a result, companies will be required to use a fair-value based measurement method to account for employee stock options. The FASB stopped short of requiring a specific model (they considered requiring the use of a binomial or lattice technique, see below) and even left the door open for the development of new models. [3]

Fair-Value vs. Historical Cost Accounting

FAS123r is another step towards fair-value accounting and away from the historical cost method. A number of recent pronouncements have demonstrated FASB's preference for the fair-value methodology.

To meet the criteria, the model must at minimum take into consideration the following criteria: *Volatility*, *Expected Term* and *Risk-Free Rate of Return*. Companies certainly can continue to use the BSM. However, now that expensing is required, they should carefully consider the appropriateness of both the model and their inputs to that model.

In addition, FAS123r no longer permits companies to account for forfeitures as they occur. Companies will be required to estimate their forfeiture rate and record expense net of estimated forfeitures.

FAS123r Terminology

Volatility: the amount of up or down price movement of the stock that underlies the option or warrant.

Contractual term: the period of time that the grant could potentially remain in effect due to the contractual terms of the option grant.

Expected Term: the term that an employee share option or similar instrument is expected to be outstanding. This term is generally shorter than the contractual term of the grant. Used as an input to Black-Scholes but computed through the Binomial model.

Risk-Free Rate of Return: the annual interest rate a "risk-free" investment could potentially earn during the expected term of the option grant. This rate is used to present-value the option grant valuation for future potential exercise.

Sub-Optimal Stock Price: the price that the underlying shares of the option grant must exceed before the Binomial or Trinomial lattice models will consider the stock to be exercised. This stock price is generally a multiple of the strike price.

3. Who does FAS123r Impact?

FAS123r will have its biggest impact on those companies that have and will continue to have stock options as a significant part of their compensation strategy. Those companies, who had previously chosen the intrinsic value method, will be the most impacted.

In some cases, because the information was used for disclosure only, simple models were employed to meet the disclosure requirements without carefully considering the long-term implications of this choice. These companies are now faced with expensing these pre-existing options using their original (potentially overstated) valuations.

Companies with stock option plans should be researching valuation models and be developing a strategy for expensing their existing options and evaluating future grant policies. The expensing requirements will have a ripple effect throughout these companies' income statements.

At a minimum, these companies should have support as to how they determined their assumptions in the selected model. Historical results can be an excellent starting place for developing assumptions. However, they should not be used without professional judgment. It must always be considered that you are trying to predict what the stock pricing and option valuation will behave in the future. Certain past anomalies, such as increased volatility immediately after an IPO or activity related to a large acquisition, may not be an indicator of the future performance.

4. When will we have to start expensing options?

The original effective date of FAS123r was the first accounting period after June 15, 2005 for publicly traded companies. Small business issuers and non-public companies were required to comply by the first accounting period after December 15, 2005. In early 2005, the SEC announced that they were allowing their registrants to defer implementation until the beginning of the first fiscal year after June 15, 2005. For calendar year end registrants it means that they must begin expensing stock options under the new rule on Jan 1, 2006. [4]

5. Do I have to expense existing options?

To the extent that they are not yet vested, yes. Under the existing guidance, fair value is calculated at grant and amortized over the implied service period (which in the vast majority of cases is deemed to be the vesting period). [5]

To the extent you have existing options that are not fully amortized you will need to begin recording the amortization of the fair value. This is the same amount you would have been disclosing previously. The only difference is that you will now record the amount in your financial statements.

6. How is it different from the current requirements?

The primary difference between the original FAS123 and the revised FAS123r treatment is that companies will no longer have the choice of recording stock option expense using the intrinsic value method. This method resulted in no expense being recorded for companies that granted options at or above the current market price. The key changes implemented by the revised FAS are detailed in Table 1. [6]

Accounting Treatment	FAS123 (Original Treatment)	FAS123r (New Revision)
Measurement of share based payments (Option valuation methodology)	Choice of grant date fair-value or grant date intrinsic value.	Grant date fair-value required.
Forfeitures	May be accounted for as they occur.	Must be estimated at grant date.
Modification of Terms	Additional compensation cost is calculated based on the fair-value immediately before and after the modification using the shorter of the initial expected life or the expected life of the modified award.	Additional compensation cost is calculated based on the difference in fair-value immediately before and after the modification.
Financial Statement Impact	Choice between expensing fair-value or disclosing pro forma fair-value information.	Fair-value of grant expensed over the implied service term (generally the vesting period).

Table 1. Comparison of accounting treatment between the original FAS123 and the revised FAS123r.

7. Black-Scholes Vs. Binomial Lattice Models

The two most common models are the Modified Black-Scholes-Merton (BSM) and the Binomial Lattice (BL).

➤ Black-Scholes-Merton Model

The BSM model is the more basic of the two models. The BSM model is calculated using a simple well established formula. It models a single outcome (a single valuation), where a stock appreciates (according to the defined volatility) each year for the option's life (expected term) and is then exercised. This produces a profit upon exercise that is then present-valued (using the risk-free rate of return) to determine the value of the option in today's dollars. [7]

➤ Binomial Lattice Model

A binomial lattice model uses more complex logic, but takes into consideration that in each period a stock can either go up or down (volatility) and produces a range of potential future stock prices (and thus multiple valuations). The resulting data forms a tree (see Figure 1). Each potential outcome represents an ending node in that tree with the grant as the root of the tree.

The binomial lattice model has two outcomes from each interior node in the tree that represents either the up-volatility or the down-volatility scenario. Trinomial models also exist with a third option for no stock price change. Trinomial models follow the same methodology as the BL with more potential outcomes.

In general, the higher the number of nodes, the more precise the model will be. Unlike BSM which assumes the grantee will hold their options to the end of the expected term, a binomial model allows for early exercises. Instead of determining an expected life (as you would need to do for the BSM model) the binomial model uses an assumption called the *sub-optimal exercise factor* that is a multiple of the strike price. A grantee is assumed to exercise the vested portion of the option grant if the prevailing stock price is the same or greater than the *sub-optimal price* (sub-optimal exercise factor x strike price).

The interior nodes of the tree created for each possible outcome percolate stock price changes until the option reaches or exceeds the *sub-optimal stock price* (and the vested shares are assumed to be exercised at that price). If all shares are exercised, that branch of the tree ends and the cash value for the shares exercised is computed (including any earlier exercises).

This cash value is present-valued at the point of exercise to reflect time value of money using the risk-free rate of return. Other branches will continue for any unvested or unexercised shares.

Black-Scholes vs. Binomial Lattice Models

The BSM formula assumes that the option exercise occurs at the end of the option's expected term (this parameter defines exercise behavior in the BSM model). BSM also assumes constant volatility and dividend yield. In other words, BSM models rely on *static* assumptions.

BL models can be designed to allow *dynamic* assumptions of expected volatility and dividend yield and expected option exercise behavior. BL models more fully reflect substantive characteristics of a particular option grant. In contrast to BSM, BL models *compute* the expected term from the underlying stock price volatility instead of relying on user input. [7]

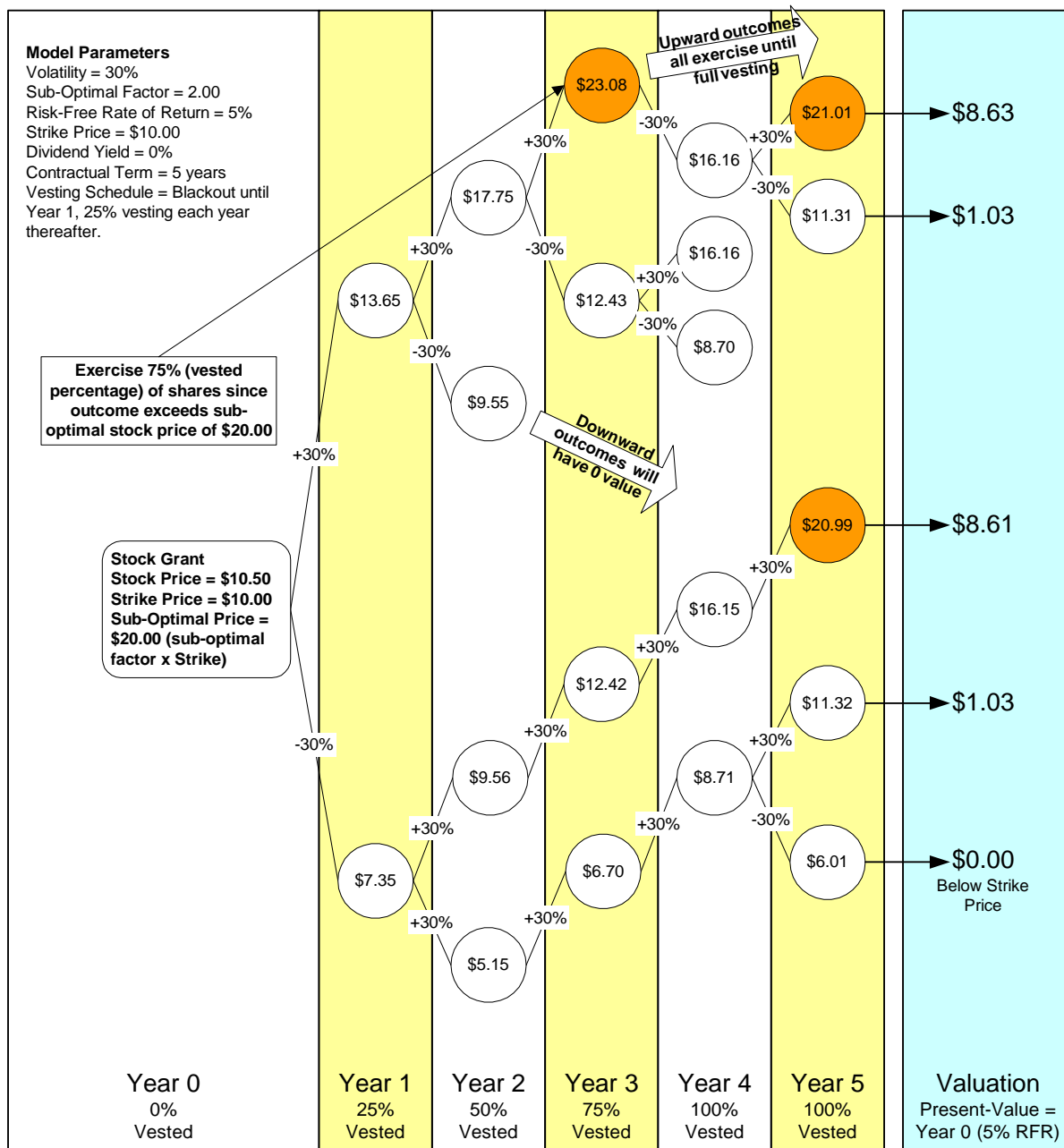


Figure 1. Simplified graphical representation of a Binomial Lattice model tree structure (small sample of nodes, transitions and valuations shown for clarity). Each node represents a particular underlying stock price at a particular point in time and the grantee is assumed to either exercise all vested shares at that node if the stock price is greater than or equal to the sub-optimal price. Each transition represents a stock volatility possibility either up or down by the given volatility percentage for that period (may be fixed for all periods or set for each period individually). Each period is a calendar year from grant inception in the above graph but other time periods could also be used.

The nodes that result in stock prices below the sub-optimal price are assumed to be not yet exercised. If these options do not reach the sub-optimal price during the contractual term, they are assumed to be exercised at the end of the term if the stock price is greater than the strike price (in the money) or are assumed to be terminated if at or below the strike price (not in the money).

The model then present-values each of the potential outcomes, that result in an exercise using the risk-free rate of return to create an ending value. The model then values the outcomes that did not result in an exercise as an ending value of 0. All ending values are averaged to produce a single number representing the calculated option valuation. The expected life is also computed by tracking the implied term of the assumed exercise outcomes from the tree.

Because of the complexity and the number of potential outcomes, a software implementation will be necessary to correctly compute the valuation. Only solutions that support a variable (and potentially large number) of nodes will be viable.

8. What model should I use?

The ideal model will depend on each company's circumstances. The Binomial Lattice model requires sophisticated technique to output a correct result and requires more effort to implement. The trade-off is that the results may be significantly more accurate. If that precision results in a more accurate stock option expense, using the binomial model is worth the effort. The key is to find the right trade off between effort and results.

Companies who would be inclined to choose BSM model tend to have:

- Limited Option Activity
- A Stable Stock that Increases in a Predictable Pattern
- Stock Option Expense which is Immaterial or Insignificant
- Low Option Holder Turnover
- Little History of Early Exercises

Companies who would be inclined to choose a binomial lattice model tend to have:

- Significant Option Activity
- A high level of Volatility
- A Stock Price that has Periods of Declining value as well as periods of Increasing Value
- Stock Option Expense which is Significant
- High Option Holder Turnover
- Significant History of Early Exercises

FAS123r allows for a change of model if the change is expected to produce a more accurate valuation. The model used must be disclosed in the financial statements and a new model can only be used prospectively (for all grants issued after the new model has been adopted). [8]

We provide software to support both models, as each has a place in stock option valuation. We believe that management is in the best position to determine which model is the most appropriate for the company's circumstances.

9. Conclusion

FAS 123r will have far reaching impacts on the way Companies view employee compensation. In preparation for implementing FAS123r companies with existing option plans should first consider if the model they are currently using remains appropriate for their circumstances. Once a model has been selected, the assumptions should be revisited to make sure they are appropriate and well documented. Finally, if companies have been accounting for forfeitures as they occur, they will need to establish a method for estimating forfeitures and updating the estimates on a periodic basis.

About the Author

Lynda Radke has a degree in Business Economics with an emphasis in Accounting from the University of California Santa Barbara. She began her career with Deloitte & Touche and entered the private sector and quickly rose as the CFO of a publicly traded Bank holding company. There she managed stock option valuation and reporting, among other responsibilities. Currently she is the co-founder of ProCognis, Inc., a software and professional services company that specializes in financial reporting and other SEC matters. ProCognis Inc. is the developer of numerous software tools used in valuing and recording stock option expense in compliance with FAS 123r.

[1] APB Opinion No. 25, "Accounting for Stock Issued to Employees"

[2] FAS No 123r "Share-Based Payment" Appendix A – Implementation Guidance, Paragraph A15.

[3] FAS No. 123r "Share-Based Payment" Appendix B – Basis for Conclusions, Paragraph B67.

[4] SEC Press Release 2005-57: Commission Amends Compliance Dates for FASB Statement No. 123R on Employee Stock Options

[5] FAS No. 123r, "Share-Based Payment", Paragraph 74 Modified Prospective Application.

[6] Compiled from a review of FAS No. 123, "Accounting for Stock-Based Compensation" and FAS No. 123r, "Share-Based Payment"

[7] FAS No 123r "Share-Based Payment" Appendix A – Implementation Guidance, Paragraph A15.

[8] FAS No 123r "Share-Based Payment" Appendix A – Implementation Guidance, Paragraph A17.

Disclaimer

While the proceeding information reflects our best interpretation of the prevailing law and industry best practices, implementation of this or any other financial function must involve careful consultation with your SEC counsel and audit firm. Furthermore, the above discussion cannot encompass all details for each company or organization and professional judgment will dictate the proper course of action in your particular case.