



SOCIETY OF ACTUARIES

Article from:

Risks and Rewards Newsletter

July 2004 – Issue No. 45

Expensing Employee Stock Options

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FASB 123 requires the disclosure of Black-Scholes based valuation of stock options given to employees. FASB is considering requiring income to be based on a Black-Scholes calculation or binary tree method. Black-Scholes assumptions imply independence between the grantor and receiver of an option and the underlying security. In the case of employee stock options, the incorporation of Black-Scholes must be modified to reflect that the stock underlying the option is equity in the grantor. While the binary tree methods discussed are effective in recognizing the impact of various exercise restrictions and contingencies unique to employee stock options, they do not address the impact of the relationship between the underlying and grantor discussed in this article.

The February 2004 issue of the *Venture Capital Journal* contains an article entitled "FASB's New Method to Value Options is Flawed" by Kim Marie Boylan. While this article focuses on other issues related to expensing employee stock options, it does question whether "FASB should take a step back and look at the fundamental question of *whether* employee stock options are in fact a corporate expense or, rather, a cost to the other shareholders in the form of potential dilution." This is similar to the question addressed by this article.

Consider an illustrative example. Company XYZ is a small company with a volatile stock price and limited net worth. XYZ pays no dividends. It offers generous stock options to its highly skilled employees. Let us assume a strike price equal to the current stock price of 100. XYZ grants one million options in addition to one million shares previously outstanding. The options are struck at the money and are 10-year Europeans. XYZ can issue additional stock at any time. XYZ has net equity of 50 million. At 50 percent volatility and 5 percent risk-free interest, the value of one call is 67.32, according to Black-Scholes. On this basis, the value of the call option exceeds the company's net worth. In actuality, Company XYZ is a viable corporation. The employee options in this

case redefine how the company's future earnings may be split among equity stakeholders, but do not impair the total amount of those future earnings. If XYZ performs well over the next 10 years, then most likely its net equity and stock price will grow. The options will become valuable, but so will the company's fortunes and therefore ability to support the options. On the other hand, if the company does poorly, the options are likely to expire with little or no value.

In issuing employee stock options, company XYZ is essentially creating a contingent liability whereby a claim is placed against equity if XYZ does well, but there is no assessment if XYZ performs poorly or mediocre enough that the stock price at the end of 10 years does not exceed 100. There is a significant difference between XYZ issuing employee stock options and a third party issuing options on XYZ stock. The critical element is the inherent link between success and option value and the ability of XYZ to issue more stock.

For example, assume XYZ's net equity increases to 100 million and the stock price increases to 150 at the end of 10 years. Then XYZ issues one million shares of stock in exchange for 100 million in cash to honor the options. This leaves net equity of 200 million, two million shares and market capitalization of 300 million.

Now assume XYZ's net equity and share price remain flat. The options expire worthless. Net equity is 50 million, we have one million shares and market capitalization of 100 million.

So we see options on XYZ stock issued by XYZ represent a share of the upside potential of XYZ, but not a claim on the economic viability of XYZ. Rather than arbitrarily assigning a cost to employee options, ignoring the relationship between the underlying and the issuer of the derivative, let us consider an approach which recognizes that employee stock options affect future divisions of the pie but do not completely consume the shareholder's equity.

A simple approach is available to address these issues. Define the following variables:

T = time to maturity of employee stock option
 MV(t) = the market value of company at time t
 S(t) = stock price at time t
 C(T) = value of a call option on the stock as of time zero when option expires at time T
 Shares = number of shares outstanding
 Options = number of options granted
 r = risk-free rate of return
 E = stock holder equity ignoring any claim of option holders to such equity

From risk-neutral assumptions, we can say that the expected value of MV(T) just prior to option expiry is equal to:

$$E[MV(T)] = \text{Shares} * S(0) * \exp(rT) + \text{Options} * C(T) * \exp(rT)$$

Also,

$$MV(0) = E[MV(T)] * \exp(-rT)$$

A portion of MV(0) is associated with stock, but a portion is associated with options. Clearly the portion associated with stock is Shares*S(0) with the remainder being associated with the options. Simple algebra shows this to be equal to Options*C(T).

This approach gives us a convenient means to reflect the impact of options on the company. At the end of each accounting period, a portion of the company's equity should be allocated to the optionholders. Algebraically, this equals:

$$E * \text{Options} * C(T) / (\text{Options} * C(T) + \text{Shares} * S(0))$$

This amount would then be set up as a liability. The change in the liability would flow through earnings in each accounting period. If E is negative, then the liability is zero since the presence of options cannot increase the net worth of a company.

In the previous example, the option liability for XYZ is equal to:

$$50,000,000 * 1,000,000 * 67.32 / (1,000,000 * 67.32 + 1,000,000 * 100) = 20,117,140$$

On the one hand, the liability is sensitive to a variety of factors, including stock level and earnings. It can change dramatically from period to period. On the other hand, it will automatically adjust to changing factors. It will always bear a logical relationship to the value of the employee options.

If the stock price rises, then the value of the option, C(T), will increase more than proportionally, meaning that the option liability will be larger in proportion to remaining stockholder equity. Note this is more likely to occur when total equity has increased due to correlation between company success, equity and stock price. If the stock price falls, then all these relationships operate in reverse.

The analysis becomes more tedious due to multiple option grants, exercising rights prior to maturity, restrictions on exercise and the existence of stockholder dividends, but the principles remaining the same.

Hull¹ discusses a company issuing warrants (options on its own stock). While it recognizes these should not be valued as options issued by a third party, their approach assumes market capitalization equals book equity, which is rarely the case. ❖

¹Hull, John C., *Options, Futures, and Other Derivatives*, 5th edition. Upper Saddle River, New Jersey. Prentice Hall, 2002.



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