CL 240A

May 15, 2003

Ms. Wendy Metcalfe
Financial Accounting Standards Board
401 Merritt 7, P.O. Box 5116
Norwalk Connecticut 06856-5116

Subject: **Minimum Value as a Proper Expense for Employee Options**

Dear Ms. Metcalfe

My IASB comment letter dated May 2, 2003 showed how the current expected life proposal for expensing employee options could motivate shorter vesting on options. Unfortunately this could also encourage excessive executive behavior such as in Enron and World Com. Over the telephone, you asked my opinion for a proper employee option expense. I will make four progressive proposals all of which would be a proper accounting approach to expense the compensation of employee options. Employee options can be analyzed as a value to employees, as a cost to shareholders, or as an accounting treatment of equivalent equities. This letter concentrates on the accounting treatment. However I also find that illiquidity and risk preferences find similar employee and shareholder discounts. Thus these accounting recommendations are also are approximately valid for employee value and shareholder cost. My first recommendation is a simple exercise date expense based on grant date stock price and the dilution caused by the option. The second is a mathematical derivation to bring the expected dilution back to the grant date. The third is our old friend the minimum value just because it is such a reasonable approximation to all of my more complex calculations. My final recommendation incorporates vesting into minimum value.

During the 1993 FASB option debate, Board Member Jim Leisenring asked a key question, “What part of an employee option payout should be a compensation expense, and what part is a capital gain which should be irrelevant to corporate accounting?” Since 1993, FASB has decided the expense of a vesting stock bonus. My understanding is that as the vesting conditions are removed from the stock bonus, the number of shares times the grant date stock price is expensed. Clearly this captures the dilution cost of the share bonus without expensing the employee’s capital gain during the vesting period. This same logic can be used to expense employee options.

Exercise Date Expense: Options cause dilution and that dilution should be an expense, just as stock bonuses dilute the number of shares and are an expensed as the cost of the shares. When options are exercised, the employee pays less than full price for the shares. Think of this as paying full price for some of the shares and getting the rest of the option shares for free. This free stock then needs to be expensed like a vesting stock bonus, with the grant date stock price. The remaining option shares are not an expense because they were purchased at full price by the exercise payment. Let this exercise date expense be C_T given by

$$C_T = S_0 \max(0, 1 - X/S_T) \quad (1.$$

where X is the exercise price, S_0 is the grant date stock price and S_T is the exercise date price. Notice that these free shares are the increase in shares that would obtain if the employee were to trade in stock to pay the exercise price. These free shares are also the same as the additional dilution caused by the option in the fully diluted shares calculation. Costing the free shares at exercise date with the grant date share price omits the employee's capital gain during vesting on the free shares. It also omits the cost of the shares bought at full price by the exercise payment. This exercise date expensing gets the same accounting as vesting stock bonuses, it is easy, and it is already part of the accountants diluted share calculation. This is my first recommendation.

Grant Date Expense: If IASB and FASB prefer a grant date expense, finance and probability theory can be used to calculate the grant date expectation of the free shares from the option. The Black Scholes option pricing formula can be derived with the lognormal risk neutral probability distribution as follows

$$BS = e^{-fT} \int_X^{\infty} dS_T P_{RN}(S_T|S_0)(S_T - X). \quad (2.$$

In 1993, I integrated the expected free shares with this same risk neural probability distribution to obtain what I called the Equivalent Stock Bonus solution as follows

$$ESB = S_0 \int_X^{\infty} dS_T P_{RN}(S_T|S_0)\left(1 - \frac{X}{S_T}\right) = BS\left(f - s^2\right). \quad (3.$$

The second equality shows that when you do this math, the resulting equation looks just like the Black Scholes formula except that the volatility s^2 is everywhere subtracted from the risk free rate f. Finance professionals rejected this solution. Cox Ross tells us that when an equity's cash payout is integrated with the risk neutral probability, then a delta hedge exists that locks in that value for the equity. Thus the BS value can be locked with delta hedging. Since "free shares" is not a cash payout, the ESB expense cannot result from delta hedging. The risk neutral probability distribution is a combination of an investor's probability expectation and his utility. Thus risk neutral probability is valid for pricing, but not a real probability that investors would expect. So what lognormal probability distribution should I have used?

Now I understand that I should have adjusted the lognormal distribution so that the stock would have the expected growth of CAPM theory. The risk neutral distribution has the expected growth of the risk free rate. CAPM says that investors will start buying a stock when its expected return a is related to the market return a_m by at least

$$a = f + b(a_m - f) = f + r\frac{s}{s_m}(a_m - f). \qquad (4.$$

This is a more optimistic expectation to put into the probability distribution. We'll call this ECM for ESB with CAPM. The second equation uses the correlation coefficient r because unlike b, it can be held constant as s is varied.

$$ECM = S_0 \int_X^{\infty} dS_T P_{CM}(S_T|S_0)\left(1-\frac{X}{S_T}\right) = BS\left(f - s^2 + r\frac{s}{s_m}(a_m - f)\right) \qquad (5.$$

The result of this integral is like the Black Scholes equation with the risk free rate reduced by the volatility and increased by the CAPM excess return.

The behavior of these equations is easier to see graphically. Figure 1 compares my ESB and ECM option expenses to the "fair value" of Black Scholes. The expense of the option as a fraction of the share price is graphed as a function of sigma, the standard deviation (square root of the volatility) of the underlying stock price. Here for a 5 year even money option with risk free rate of 3%, exercise price same as the stock price, the r correlation coefficient at 0.7, the expected market return 7%, and the market volatility of 28%. These values are chosen to be realistic. The graph clearly shows why the entrepreneurial community is so upset with calling Black Scholes a "fair value." When volatility gets large, the BS expense rapidly approaches the stock price. Yet all who work in high volatility startups know that options aren't nearly as valuable as liquid stock. It takes a lot

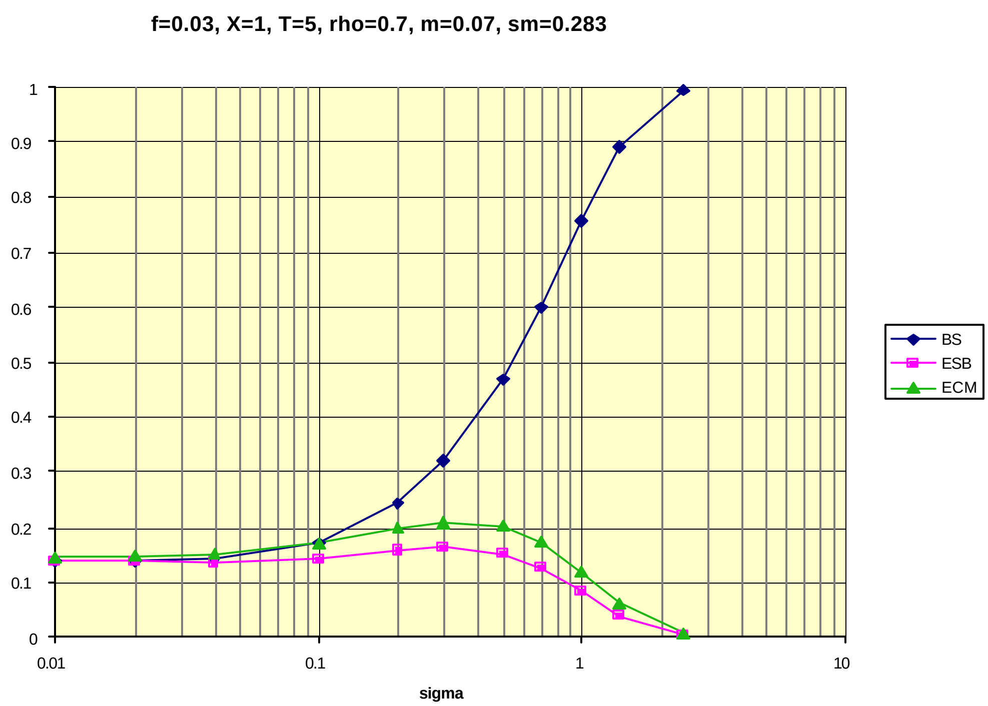

Figure 1 ESB and ECM proper option expenses compared to Black Scholes fair value for 5 year even money.

of work to grow and maintain the share price before the options generate significant value. Clearly expensing with Black Scholes would include the expected capital gains of the employee as a compensation expense. When the option is treated as the dilution stock expensed at the grant date price, the expense looks much more like minimum value. The Excel spreadsheet that generated this graph can be exercised for a variety of financial conditions. For nearly any reasonable values of the market return and volatility, ESB and ECM are close to each other, are close to minimum value for reasonable volatilities, and approach zero for the highest volatility.

Minimum Value: My third recommendation would be minimum value just because it is so simple, so nearly always agrees with my more complex mathematics, and would truly level the playing field between high and low volatility firms. In Figure 1, the minimum value is the left hand side as the volatility approaches zero.

$$MV = \max\left(0, S_0 - Xe^{-fT}\right) \qquad (6.$$

Minimum value is the cost of an interest free loan used to purchase the underlying stock. At exercise, the employee pays back the loan and receives the stock. Clearly the capital gains from the stock price changes are not expensed. Yet the time value of the option is also ignored.

So far I've derived the accounting expense from the concept of grant date price times number of free shares. Yet these models are also about right for the value as seen by employees and the cost as seen by large shareholders. The non-liquidity gives employees much more risk yet the same payout as tradable options. Therefore a risk discount to employee value is needed. Discounts like $exp(-s^2T/2)$ reduce Black Scholes to values similar to ESB or ECM. Large shareholders prefer employee bonuses be paid by options because of risk aversion. In bad times, options expire doing no harm. In good times the options are valuable, but the large gains by the big shareholders make them quite willing to share a fraction of dilution with the employees. Expected utility theory gives costs to large shareholders that look and behave like ESB and ECM. So options are an overly risky bonus for employees and a win-win bonus from shareholders, both of which derive values and costs similar to the minimum value.

Fair Value or Proper Expense? Imagine Dilbert being given a stock option, and he says, "Thanks boss, but in my case could you make the option be on some other company's stock?" Awarding options on another company's stock is laughable because it defeats the employee alignment and the win-win purposes of employee options. Black Scholes derives from delta hedging. Suppose options were awarded on another company's stock. They should be hedged, and the delta hedging would lock in the Black Scholes cost. The accounting rules would capture the capital gains of the other firm's stock, interest expenses to acquire the stock, and final payout, giving Black Scholes as the proper accounting expense regardless of the other company's performance. Now try to do the same delta hedge on a firm's own stock. The hedge gains or loses are not income or expense. Such gains on your own stock pass directly through to shareholders equity with no effect on revenue or cost. There is no interest expense for holding the delta hedge stock; these shares already exist in the treasury. Accounting rules for the firm's own equity will undo the effects of the delta hedge, and the only remaining expense would be the final payout of intrinsic value at employee exercise. This would count capital gains on the shares as compensation. Thus delta hedging option models such as Black Scholes can be a fair and proper expense for options on another company's stock, but they are not a proper expense for employee options on your own firm's stock.

Vesting: We opened with the point that the current expected life treatment could cause more harm than good by improperly motivating shorter vesting. How should exercise date or minimum value expense treat vesting? My first recommendation of exercise date expense already encourages longer vesting. Longer vesting forces exercises to be later, and the later expenses would be preferred by firms as they would make current accounting look better. A minimum value expense at grant date would be indifferent to vesting. However, it is possible to revise the minimum value formula so that it could apply at the vesting date. This vesting date option expense would make option expensing even more like the expensing vesting stock bonuses. Actually vesting stock bonuses are expensed during vesting rather than at vesting. The following discussion and equation are easier to understand for expensing at vesting, but can be adapted to expensing during vesting.

Suppose an option of term T becomes vested at time V which is less than or equal to T. Then a minimum value at vesting (MV_V) could be revised to assure that we have a minimum value number of expected shares times the grant date stock price.

$$MV_V = S_0 \max\left(0, 1 - \frac{Xe^{-f(T-V)}}{S_V}\right) \quad (7.$$

As the stock value grows between 0 and V, this MV_V equation assures that the additional free shares are counted and priced at the grant date stock price rather than the vesting date stock price. If the vesting length is zero, minimum value is expensed at the grant date. If the vesting date equals the term (as a European employee option), then the expense is the free shares at term times the grant date share price. For intermediate vesting times, this revised minimum value generates a minimum value number of free shares at vesting times the grant share price. In this manner, capital gains are always excluded from the expense, and longer vesting always gets a later expense. Equation 7 could be adapted to expense options during the vesting period rather than at vesting.

Conclusion: My final recommendation is for the revised minimum value over the vesting time. This is most consistent with the current expensing of vesting stock bonuses. There is no expense until vesting when the employee has the ability to obtain value, capital gains are excluded by pricing the dilution shares by the grant date cost, and longer vesting is encouraged by allowing a later expense.

The mathematics of this letter has been minimized so as to illustrate the principles rather than to derive equations or prove results. I would be pleased to provide more detailed derivations of my results at your request. I have claimed that calculations of value to employees and cost to large shareholders can also be shown to be like minimum value. I would be pleased to provide such work to you, although this work has not been accepted for peer-reviewed publication. My final recommendation of a revised vesting date minimum value (MV_V) is predicated on the goal of keeping option expensing simple and in line with the expensing of vesting stock bonuses. The large difference between minimum value and Black Scholes comes from the accounting principle of keeping capital gains out of the compensation expense. FASB or IASB may have other goals that can be derived from this approach. I would be pleased to work with you to evolve the best possible option expense that would be proper, fair, and continue to find options to be an important bonus strategy.

Sincerely,

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