An Evaluation Of Fair Value Accounting For Employee Stock Options

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ABSTRACT

This paper employs static and simulation analysis to consider the measurement properties of the currently active accounting standards for reporting compensation expense related to Employee Stock Options. We find that under a wide range of plausible scenarios the reported expense significantly understates the cash cost incurred by the entity at exercise. The paper includes a discussion of implications for practice and standards setters.

Keywords: ESO; Fair Value Accounting; Simulation Analysis

INTRODUCTION AND MOTIVATION

Both the Financial Accounting Standards Board (FASB) and International Accounting Standards Board (IASB) have promulgated a fair value approach to the accounting for Employee Stock Options (ESO). The FASB adopted the present (revised) standard, in part, to address concerns that the APB 25 method did not faithfully represent the economic effects on the issuer; namely, the receipt and consumption of employee services in exchange for equity instruments (FASB, 2004). It deemed recognition of grant date fair value to be a significant improvement over the past practice of recognizing cost under the intrinsic value method, which frequently resulted in zero cost appearing on the income statement. Both the FASB and IASB approaches require grant date fair value measurement with no revision for subsequent changes in value – an "equity" approach rather than a "liability" approach.

This paper examines the differences between the liability approach rejected in the standards (which would have recognized "the gain made by the option holder on exercise of the option" (IASB, 2004, at BC98, and recognition of fair value changes in interim periods) and the equity approach required by these standards. More specifically, this paper will compare the exercise cost of an ESO grant – measured as a cash outflow for the purchase of treasury shares or the opportunity cost of issuing new dilutive shares – to the expense recognized under the current FASB and IASB standards, which are similar to each other in their use of a one-time model-derived estimate of cost (IASB, 2004, at ¶ 11; FASB, 2004 at ¶ 10). In addition, we introduce the expected value approach, a modification of the equity approach which comes closer to measuring the cost of services consumed without recognizing gains and losses on the ESO.

LIABILITY, EQUITY AND EXPECTED VALUE APPROACHES TO THE ACCOUNTING FOR ESO

There are differences of opinion concerning whether or not the grant date valuation required under the FASB's approach should be updated for value changes occurring between grant date and exercise date and, if so, how these updates should be recognized. Regardless of how this additional information is treated – reported, disclosed or suppressed, it is difficult to contest the proposition that exercise date intrinsic value provides essential context for understanding the cash cost impact of ESO. The results in this paper indicate that, across many plausible scenarios, the FASB approach often results in a compensation expense value that is dramatically less than its cash cost. While adherents of the FASB approach argue that expense recognition is a proverbial "step in the right direction" over the treatment proscribed by APB 25, the actual impact may be more misleading than the earlier APB 25 approach which at least had the merit of transparently reporting nothing for the cost. ESO "expensing," by promising and then failing to provide a true fair value for the cost of the options, may provide the same type of illusory comfort as a cracked railing alongside a precipice.

The measurement of goods and services received in an arm's-length transaction is commonly based on the most reliable information available about the value of the goods or claims given in exchange (ASC 845 10 30 1). Complications arise when the transfers occur at different points in time, as the value of the settlement generally needs to be adjusted for time value. Consider a prepayment arrangement under which both parties agree that the individual will be paid the present value of several years of services, discounted at an agreed upon rate. (For simplicity, we assume that it is certain that there is no uncertainty regarding the services to be provided.) Due to the present value effects, the earlier the payment is made (relative to the time at which services are provided), the smaller it need be. Although the payment will be smaller, this does not affect the value of the services when they are rendered. Starting with the payment, if we want to appropriately value the services, we need to adjust the present value to the date at which the services are rendered. The same considerations are relevant to ESO - the grant date precedes the date at which services are rendered and, consequently, an adjustment of the grant date value should be made for expected changes in the value of the stock options between grant and service dates. In the case of a note, this interest adjustment is straightforward. This is not as true for stock options. However, there is an expected change in the value over time. It is important to distinguish between gains and losses due to changes in expectations (*e.g*. those resulting from changed economic circumstances or outlook for the particular firm) versus expected changes due to the passage of time (*i.e*. changes resulting from an expected return on investment manifested as an increase in share price). In the former case, gains and losses would reflect new information that becomes available after the grant date and in the latter case, there are expected changes in the value of the option over time, based solely on information available at the grant date.

COMPARATIVE ANALYSIS

This section begins with a simple numeric example that compares the expense under SFAS 123R to the exercise date intrinsic value of that option. The next section introduces an expected value approach.

For the simple numeric example, the results depend wholly on several key assumptions. While we have used assumptions well within the bounds of plausibility, we test the sensitivity of the observed results to a spectrum of alternate assumptions. To facilitate the analysis, we calculate a summary measure of the key result of each outcome by taking the quotient of total economic cost and the total expense recognized under the FASB's approach. This Economic Cost Multiple (ECM, the ratio of cash cost to accrual expense) reflects the difference between the FASB's approach and the ultimate cash impact on existing shareholders. A value of 1.0 would represent no difference. As the value climbs above (falls below) 1.0, the FASB approach reports a total expense that is less than (more than) the cash cost of ESO. The analysis in the following section examines the sensitivity of ECM to stochastic changes in the value of inputs. This analysis results in distribution of ECM values that can result from a single set of key assumptions.

Table 1: Comparison of FASB/IASB Approach and Exercise Date Intrinsic Value Under Conditions of Certainty

Total Cost	$31.01
SFAS 123R	10.26
Difference	20.75
ECM	302%

Table 1 compares the exercise date cost of a single stock option to its grant date fair value estimated via the Black Scholes Model (BSM), which is one of the methods found acceptable by the FASB. The example assumes the case of a stock trading at $25.00 on the grant date (time 0) and BSM inputs that include a 4.0% risk free rate, 20% volatility, 0% dividend rate, a ten-year life and $25.00 strike price. The value of the option is $10.26. Under both FASB and IASB approaches, there are no adjustments for subsequent changes in the fair value of the option or the stock.

To place the accounting value given to compensation expense in context, the example assumes that the stock price increases at an average rate of 8.4%. (Ibbotson studies indicate that "the average compounded annual return of the Standard & Poor's 500 index from 1926 to 2004 is 10.4 percent." We obtain the 8.4% average growth in share value by reducing the 10.4% rate of return by two hundred basis points for dividends (see, *e.g.* Deener, 2005). At the expiration date of the option ten years after the grant date, the stock would be worth $56.01 and, assuming exercise of the option at that time, the cost to the issuer (whether measured in cash outlay for treasury shares acquired at market price and reissued at below market prices, or in the opportunity cost of dilution at less than fair value) would be $30.01 – more than three times the amount recognized under the FASB's approach. For the example in Table 1, the ECM is 3.02, the quotient of total economic cost ($30.01), and the total expense recognized under SFAS 123R ($10.26).

The ECM value of 3.02 obtained in Table 1 is specific to the assumed rate of growth for the stock and a volatility factor for the stock option model. Table 2 shows the sensitivity of ECM to various combinations of assumed values. The cells show the value of ECM as the growth rate (rate of return) varies from 6.0% to 12.0% and the volatility ranges from 12.0% to 36.0%. All other pricing inputs for this table are the same as those in the earlier example. In only a few combinations of return and variability does the ECM fall below 2.0; for the most part, the cash flow effect varies from twice to almost six times the amount recognized under the FASB/IASB approach.

Table 2: Static Analysis Across Spectrum of Inputs

	Variability							
Rate of Return	4.318	0.120	0.160	0.200	0.240	0.280	0.320	0.360
	0.060	2.242	2.085	1.928	1.784	1.658	1.549	1.454
	0.070	2.742	2.549	2.357	2.182	2.028	1.894	1.778
	0.080	3.286	3.055	2.825	2.615	2.430	2.270	2.130
	0.084	3.516	3.269	**3.023**	2.798	2.601	2.429	2.280
	0.100	4.518	4.201	3.885	3.596	3.342	3.121	2.930
	0.120	5.970	5.551	5.133	4.752	4.416	4.124	3.871

The results shown in Table 2 demonstrate the effect of a range of plausible average values for the assumed inputs, but actual returns may vary considerably from expected returns. The next example introduces random variability by simulating changes in stock price and a random component that is based on the same annual volatility as was assumed for the previous examples.

Table 3: Simulation Analysis

Bin	***Frequency***	**% T**
-	789	0.158
1.0	837	0.167
2.0	756	0.151
3.0	649	0.130
4.0	495	0.099
5.0	379	0.076
6.0	271	0.054
7.0	192	0.038
8.0	163	0.033
9.0	117	0.023
10.0	86	0.017
More	266	0.053
	5000	1.000

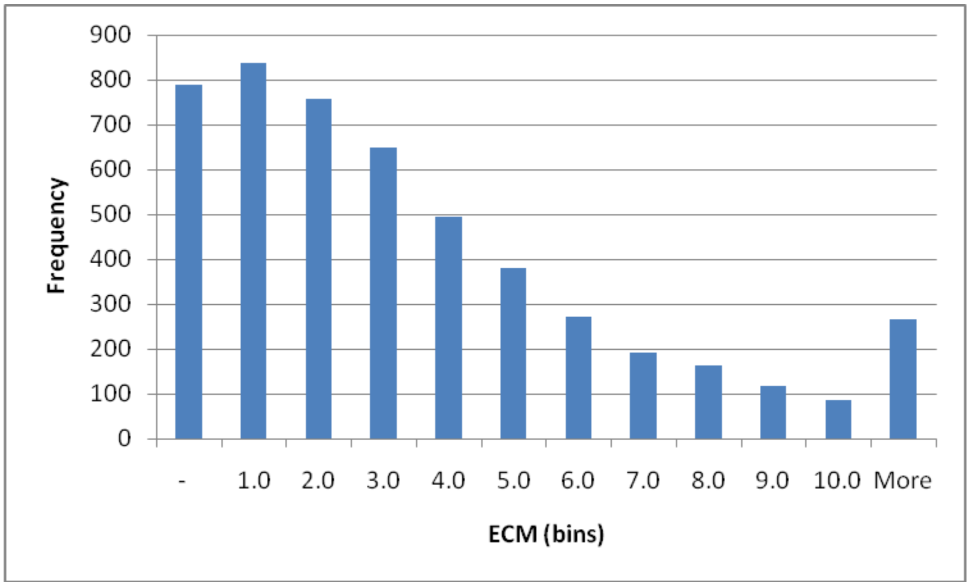

Figure 1: Simulation Analysis

Table 3 and Figure 1 detail the results of simulating the stock price over a ten-year time period and then computing ECM for each of 5,000 trials. All the other terms in this example (time, risk free rate, stock price at grant date and the strike price) remain the same as in the examples provided in Tables 1 and 2. Monte Carlo simulation using Geometric Brownian Motion to model changes in stock prices is a widely-used means of creating price series for financial forecasting; details and readily implemented models are available on the web and through numerous published sources (Sengupta, 2004).

The histogram in Figure 1 shows the distribution of 5,000 simulated trials, with resulting ECM values ranging from zero to well above 10. A zero value represents options that expired out of the money, which in Table 3 occurred in 789 cases (leftmost bar; approximately 16% of the sample). Any positive value *n* would represent actual costs that were *n* times the amount recognized under the FASB's approach. The range contains significant probabilities of dramatic differences between actual ESO costs and the amount that would be recognized in the financial statements. Assume, for instance, that 30% represents a reasonable materiality standard for ESO expense; i.e., that actual ESO costs should fall within 70% and 130% of the reported number. In repeated trials, the number of ECM results that fell in this "reasonable" range generally ran from 9% - 10% of the total. If a more conventional threshold for materiality were used, say 5.0%, then approximately 1% - 2% of the ECM values fell in a "reasonable" range. In the manner of a stopped clock that is right twice a day, the APB 25 approach, which recognizes zero expense for the ESO, would more often have reported a correct number than the FASB approach. The rightmost bar in Figure 1 represents the probability of getting a value for ECM greater than 10. It could also be thought of as a long series of very small probabilities that taper off as ECM rises above 10.

EXPECTED VALUE APPROACH

Table 4 shows the expected value of the stock option introduced in Table 1 derived from a 2,000 iteration simulation of share prices, using the same assumptions and procedures discussed above for Table 3. If, for instance, the service period was assumed to occur equally over the first five years, measuring the value of the services over this period using an expected value approach would result in a total expense of $14.94 per option (summing one-fifth of years 1-5 option value). Similarly, if the service period were to occur over the entire ten years, then the option-related expense would be $20.91. Thus, even ignoring gains and losses subsequent to grant date, the FASB/IASB approach significantly understates the value of the services and the cost of the options.

Table 4 ESO Valuation Data for Expected Value Approach

Year	AVG
Grant date	10.26
1	11.56
2	13.21
3	14.57
4	16.70
5	18.65
6	20.89
7	23.75
8	26.40
9	29.79
10	33.56

CONCLUSION

The results in this paper suggest that disparities between accounting expenses and actual exercise date economic effects reflect a significant wealth transfer that is not presently recognized nor disclosed. Even within the context of the equity approach, one can argue that the expenses, as currently measured, significantly understate the value of the services rendered. While there is a considerable quantity of academic research that compares the "accuracy" of one model approach to the "accuracy" of another, for a variety of reasons, including, quite importantly, the difficulty of obtaining relevant data, there is very little work that examines the relationship between grant date model value and exercise date intrinsic value (see, e.g. comments on limited data availability in Carpenter, 1998).

The FASB and IASB standards have created improvement only in the sense that they forced companies to recognize an expense for ESO compensation and established that grant date intrinsic value (zero in many cases) was neither an appropriate nor useful measurement attribute. However, characterization of equity-approach expensing as a "fair value" approach is so misleading that the standards may do more harm than good. That harm would surely include the propagation of fictional values that bear perhaps no more than a random association with the true economic costs of ESO, but the more troubling issue may well be that by addressing the need for reform while not actually creating reform, the boards stifled real improvement in this area.

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