CALCULATING THE EFFECT OF EMPLOYEE STOCK OPTIONS ON DILUTED EPS

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Abstract

This paper focuses on how to calculate diluted earnings per share (DEPS) when a firm has outstanding employee stock options (ESOs). Three possible methods are described and compared. The first is the current International Accounting Standard 33 – Earnings Per Share (IAS 33) approach which is based on the intrinsic value of the ESOs. The second method, advocated by Core et al. (2002), is very similar to that of IAS 33 but instead of the intrinsic value uses the fair value of the outstanding options. This paper derives an alternative method which adjusts the earnings for the year by the change in fair value of the outstanding ESOs, with no adjustment to the denominator in the DEPS calculation. The three methods are compared using a simple firm. The earnings adjustment method best describes the change in economic value of the current shareholders, the fair value is more useful in predicting future profits, and the intrinsic value method appear to provide no additional information to that already contained in the other two measures. The earnings adjustment method has a further advantage in that it provides an identical result at a DEPS level to that which would have been obtained if the ESOs were cash-settled and treated as liabilities in terms of IFRS 2. Thus using this method will improve comparability as cash-settled and equity-settled options have a very similar economic effect on current shareholders.

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Introduction

Employee stock option accounting has undergone significant changes in recent years. For the first time, most firms around the globe are required to account for the expense associated with employee stock options (ESOs). Whilst this has been a step in the right direction the standard setters seem to have overlooked a related but equally important issue; how should diluted earnings per share (DEPS) be calculated when the firm has outstanding share options. Much has been written on the appropriate accounting treatment of ESOs in the income statement and balance sheet. This paper will focus on the effects of outstanding ESOs on DEPS.

Generally Accepted Accounting Practice for Employee Stock Options

One of the more significant recent developments in generally accepted accounting practice (GAAP) has been the introduction of comprehensive rules for the accounting of share-based payments, and more specifically, employee stock options. International Financial Reporting Standard 2 – Share-based Payments (IFRS 2) (IASB 2003b) and its U.S. equivalent Statement of Financial Reporting Standard No. 123 (revised) (SFAS No. 123) (FASB 2004) have certainly improved accounting convention in this area. The original SFAS No. 123 was issued in 1995, but its introduction was accompanied by such controversy that application was made voluntary. Unusually for an accounting development, the accounting of employee stock options even attracted the attention of the legislators. Pressure to introduce an accounting statement on ESOs originated from a US senator in the early 1990's, and the Financial Accounting Standards Board (FASB) was forced to make the application of the original SFAS No. 123 voluntary because it was threatened by legislation from another US senator[1]. The large corporate governance scandals in the early 2000's again changed the mood of the business community, and the introduction of IFRS 2 and SFAS No. 123 (revised) in 2003 and 2004 respectively was generally welcomed.

IFRS 2 introduced accounting rules in an area that was largely unregulated before. Whilst IFRS 2 covers all types of share-based transactions, it is ESO's that attract most of the attention and will be the most affected by the new standard. ESOs were largely ignored in the accounting records of most companies across the globe, especially if those ESOs were issued with a strike or exercise price that was below or equal to the current share price. IFRS 2 now requires that all share-based payments be accounted for initially at fair value. The standard then distinguishes between cash-settled and equity-settled transactions. Those transactions that will be settled in cash are considered liabilities within the broader accounting conceptual framework, and transactions that are settled by the company issuing shares are considered equity. The distinction is important because equity items are never remeasured, whilst liabilities often are. Thus the standard requires that equity-settled transactions be accounted for at fair value on the initial grant date, and never thereafter adjusted. The obligation incurred in cash-settled transactions is reflected as a liability in the balance sheet, and remeasured at each reporting date to reflect changes in the value of the underlying shares. This requirement is somewhat unusual, as it results in different accounting treatments for transactions that are economically identical; whether the transaction is settled in cash or shares would generally be considered equivalent under general economic or finance theory.

When applied to employee stock options, the following treatment results. The initial grant date fair value of options that are equity-settled is recognised as an expense in the income statement over the vesting period of the options. The initial grant date fair value of cash-settled options is also recognised over the vesting period as an expense, but the cumulative expense is also adjusted to reflect changes in the value of the expected settlement amount due to change in the underlying share price. This means that the total expense recognised for equity-settled options will be the initial grant date value, whereas for cash-settled options it will be the final amount paid in settlement of the option obligation. For the remainder of this paper the term ESO will refer to equity-settled employee stock options and share appreciation rights (SARs) will refer to cash-settled employee stock options.

[1] For a detailed account of the process leading up to the introduction of the original SFAS No. 123 see Dechow et al. (1996).

One of the issues that has been highlighted by the objections to IFRS 2 is the relationship between ESOs and DEPS. The rules for calculating DEPS are contained in International Accounting Standard 33 – Earnings Per Share (IAS 33) (IASB 2003a). IAS 33 is again similar to its U.S. counterpart Statement of Financial Accounting Standards No. 128 – Earnings Per Share (SFAS No. 128) (FASB 1997). IAS 33 requires use of the treasury stock method. The treasury stock method calculates the dilutive effects of the outstanding options on the current ordinary shareholders by increasing the number of shares used in the earnings per share (EPS) calculation. The additional number of shares is determined by assuming immediate exercise of the options and that the firm uses the exercise proceeds to repurchase its own stock. The difference between the shares issued and the shares repurchased is then added to the denominator in the EPS calculation. In the case of ESOs, the value of the services still to be received from employees must be added to the exercise price before the treasury stock calculation is performed.

Many critics maintained that recognising an ESO expense and adjusting DEPS for the same ESOs would be double accounting (Bodie et al. 2003; Michaels and Waters 2004). There is actually a double effect on shareholders; this is well know and is simply explained by Bodie et al. (2003) and in the examples that follow later in this paper. It does, however, emphasise that the two issues need to be considered together. Minor changes were made to IAS 33 when IFRS 2 was issued, but in essence the treasury stock method was retained. In comparison to IFRS 2, the provisions of IAS 33 seem archaic and in need of revision. Why should we assume immediate exercise of the options, when finance theory indicates that it is rarely optimal to exercise options early? The treasury stock approach revolves around the difference between exercise price and the current share price, which is normally referred to as the intrinsic value. Why does the standard use intrinsic value of the ESOs rather than the fair value? Why is the value of services still to be received added to the exercise price when they describe completely different economic concepts? Why is the denominator in the earnings per share calculation adjusted rather than numerator, or both? By reference to finance and accounting theory, this paper will attempt to answer these questions, and criticise the current GAAP approach to accounting for the effects of ESOs on DEPS. The specific question raised in this paper is how best to calculate diluted earnings per share for a firm which has outstanding ESOs.

Prior research on DEPS

The current GAAP for measuring DEPS has been carried over largely unaltered from Accounting Principles Board (APB) Opinion 15 (AICPA 1969) which was issued in 1969. The introduction of this standard predated the development of option pricing models in the 1970's which quickly made the provisions of APB Opinion 15 seem archaic and redundant. These problems were soon identified by the researchers. Vigeland (1982) and Bierman (1986) point out that APB Opinion 15 ignores the probability of the option being exercised. Jerris (1992) uses the probability of the instrument being converted or exercised to calculate his EPS numbers, which he finds have a closer association with stock return residuals than the APB Opinion 15 figures. The treasury stock method also uses the exercise price rather than the present value of the exercise price, which understates the dilutive effects of the options. It also ignores the present value of the dividends foregone (Barlev 1984). All of these issues, probability of conversion, present value effects on the exercise price and dividends foregone are captured in the fair value of the options by the option pricing models. More recently, Caster et al. (2006) have criticised the SFAS No. 128 approach on a more basic level:

> "The current definition of diluted EPS describes a long, complex computational process, and it defines diluted EPS as being the result that one obtains at the end of the computation. Using the jargon of current accounting debates, this definition is completely rule-bound and essentially lacks any conceptual basis. It also seems oddly out of step with the other definitions that FASB has provided for the accounting profession."

Research into the information content of the various EPS figures has supported the view that the present requirements fail to capture the dilutive effects of potential future shares. Scott and Wier (2000) and Miller et al. (1987) find that DEPS has a weaker association with stock returns than basic EPS, suggesting measurement error in the calculation of DEPS. This is in contrast with the findings of Jennings et al. (1997) who find that DEPS explains more of the variation in stock prices than basic EPS. Rice (1978)

analysed stock price patterns around the time DEPS[2] figures were first disclosed, and finds that the information contained in DEPS was value-relevant. Huson et al. (2001) compare earnings response coefficients for firms with varying numbers of dilutive instruments outstanding, and find that coefficient is smaller for firms with large numbers of dilutive instruments. Their findings also suggest that current DEPS measures do not adequately reflect future dilution. Taken together, these studies suggest that the information contained in DEPS is useful, but is perhaps not correctly measured.

Core et al. (2002) directly address the issue of DEPS measurement. They derive their DEPS calculation by assuming a simple linear relationship between share price and earnings. Their DEPS calculation is similar to the treasury stock method, except that they use the fair value of the options to calculate the adjustment to the denominator. Their findings suggest that the SFAS No. 128 method significantly understates the dilutive effects of the options. This paper adds to the work of Core et al. (2002) by deriving an alternative way to adjust the earnings per share calculation for the dilutive effects of ESOs. It will be argued that this method has theoretical and practical advantages over the Core et al. method.

Debt vs. Equity

An important assumption made thus far is that equity-settled ESOs form part of the firm's equity, and are not liabilities. This is the approach used in IFRS 2, which follows from the conceptual framework definition of a liability. Liabilities are defined as:

> "… a present obligation of the entity arising from past events, the settlement of which is expected to result in an outflow from the entity of resources embodying economic benefits."

IFRS 2 does not classify equity-settled transactions as liabilities because it does not consider the transfer of shares to be an "outflow of resources embodying economic benefits"[3]. Many writers have objected to this approach (AAA_FASC 2004; Balsam 1994; Kirschenheiter et al. 2004; Landsman et al. 2006; Ohlson and Penman 2005). The crux of their arguments is that ESOs are economically equivalent to SARs. SARs are accounted for as liabilities because they are an obligation to transfer cash or other assets, and are therefore remeasured at each reporting period. The argument is that economically equivalent transactions should be accounted for in the same manner, and thus ESOs should be shown as a liability and remeasured. The American Accounting Association's (AAA) Financial Accounting Standards Committee (FASC) (AAA_FASC 2004) goes further to suggest that this problem indicates that the conceptual framework needs revision.

The fact that ESOs are economically similar to SARs while the accounting is quite different certainly does suggest problems with the current accounting rules, but it does not follow that ESOs should be accounted for in the same manner as SARs. In fact, while there are many similarities there is one important economic difference between the two. The obligation to deliver cash or other income generating assets of the business is very different to the obligation to deliver shares. Transferring cash or other assets reduces the entity's ability to generate future economic benefits, and at worse may comprise the existence of the entity if it results in liquidity or solvency problems. This is not the case with the obligation to deliver shares. Issuing more shares obviously dilutes the interests of current shareholders, but this is not always detrimental to current shareholders, and cannot result in the demise of the entire firm. This is one of reasons why accountants go to great lengths to reflect liabilities separately from equity on the balance sheet.

The only time it makes sense to show ESOs as a liability is if one takes a proprietary rather than entity view, which is of course the perspective adopted by those that argue for remeasurement of the ESOs. Which of the entity or proprietary perspective is more correct is a debate which will continue for many years, but the current conceptual framework is based on the entity concept. The framework defines equity as the difference between assets and liabilities, rather than the economic interests accruing to a particular type of proprietary holding. This is also consistent with the current

[2] Rice actually tested the impact of fully diluted EPS information, but fully diluted EPS is substantially the same as the current diluted EPS figure.
[3] See BC98 of IFRS 2.

general approach of financial reporting, which is to provide financial information on the performance of the entity, rather than focus on particular stakeholders. What is clear, however, is that the DEPS calculation *must* take a proprietary view, as it is clearly reporting the earnings attributable to ordinary shareholders. Thus while it is argued that an entity perspective is more appropriate for the balance sheet and income statement, it is still valid to expect parity between ESOs and SARs at a DEPS level.

Current rules for diluted earnings per share

The requirements regarding the dilutive effects of options are contained in IAS 33 p. 45, which states;

> "For the purpose of calculating diluted earnings per share, an entity shall assume the exercise of dilutive options and warrants of the entity. The assumed proceeds from these instruments shall be regarded as having been received from the issue of ordinary shares at the average market price of ordinary shares during the period. The difference between the number of ordinary shares issued and the number of ordinary shares that would have been issued at the average market price of ordinary shares during the period shall be treated as an issue of ordinary shares for no consideration."

In other words, DEPS = Earnings / (Number of ordinary shares + D), where

$$D = n_o - \frac{n_o X}{P} \qquad (1)$$

and
- D is the dilutive effect of the options which must be added to the denominator in calculating diluted EPS
- n_o is the number of options outstanding
- X is the exercise price of the options
- P is the average market price of the existing ordinary shares

equation (1) can be rewritten as

$$D = \frac{1}{P}\left(Pn_o - n_o X\right) \qquad (2)$$

this can be simplified to

$$D = \frac{n_o}{P}\left(P - X\right) \qquad (3)$$

D thus represents the total intrinsic value of the options expressed as a proportion of the current market price of the ordinary shares. The options are reduced to an equivalent number of ordinary shares, which is then added to the existing ordinary shares to calculate the DEPS. Options out of the money are ignored.

This approach is based on the treasury stock method, first advocated by APB Opinion No. 15. This method stipulated the dilutive effect of the options can best be described by calculating the effect on EPS of the following dummy transaction; assume the exercise of the options at year end and use the proceeds from the exercise to repurchase ordinary shares on the market. The net increase in the number of shares in issue must then be used to adjust the denominator in the DEPS calc.

Clearly the first step in this process is flawed, as the option holders are unlikely to exercise their options early, as this would result in them losing the time value of the options. Thus a more correct application of the treasury stock method would be to assume repurchase of the options at fair value (intrinsic value plus time value), and then assume that the company issues shares at market value to generate the cash needed to purchase the options. This approach is more realistic as the option holders will recover the full market value of their options. This will result in n_oF/P shares being issued, where F is the fair value per option,

and n_o and P are defined as above. This method will herein after be referred to as the treasury *option* method.

Formally the treasury option method can be expressed as

$$D = \frac{n_o F}{P} \qquad (4)$$

where D is again the dilutive effect of the options which must be added to the denominator when calculating DEPS.

When one compares the treasury option method with the current IAS 33 treatment given in equation 3, it can be seen that the intrinsic value of the options, P – X, has been replaced by F, the current fair value. This makes intuitive sense as the current fair value of the options is more likely to reflect the dilutive effects of the options than the intrinsic value. The treasury option method will also recognise the dilutive effects of options, even when they are out of the money. Of course when the treasury stock method was first advocated fair value information was not commonly used in financial reporting. Recent years have seen a growing use of fair value information, and it thus makes sense to introduce fair value information into the calculation of DEPS as well.

Interestingly, Core et al. (2002) derive a DEPS calculation which is exactly the same as the treasury option method described here. They derive their model by using a formal, theoretical approach which assumes that the total firm value is a function of economic earnings and that this value must be allocated between current shareholders and outstanding options.

Alternative approach to calculating DEPS

There is no clear reason why the treasury stock (or treasury option) method is the best method to use. In particular, why should only the denominator be adjusted for the DEPS calculation? Are there other valid approaches that adjust the numerator? This section will derive an alternative model for calculating DEPS which is based on Ohlson's residual income model (Ohlson 1995).

Ohlson provides a theoretical framework which can be used to link equity values, as understood by finance theory, to accounting information. Similarly to Ohlson, the following notation is used:

P_t	=	Total market value of equity at date t
d_t	=	Net dividends at date t
b_t	=	Book value of equity at date t
r	=	cost of capital
R	=	1 + r
E_t	=	The expectation operator conditional on date t information
x_t	=	Earnings for the period (t-1,t)
x^a	=	$x_t - rb_{t-1}$ (residual or abnormal income)

Ohlson describes the fair value of the company's outstanding stock as being equal to the accounting book value plus future expected abnormal earnings.

$$P_t = b_t + \sum_{\tau=1}^{\infty} R^{-\tau} E_t\left(x^a_{t+\tau}\right)$$

EPS can be considered a measurement of change in value of equity

$$\Delta P_t = x_t - d_t - E_{t-1}\left(x^a_t\right) + \sum_{\tau=1}^{\infty} R^{-\tau}\left[E_t\left(x^a_{t+\tau}\right) - E_{t-1}\left(x^a_{t+\tau}\right)\right]$$

For ease of exposition, but without restricting the generality of the results, from this point onwards the term

$$- E_{t-1}\left(x_t^a\right) + \sum_{\tau=1}^{\infty} R^{-\tau}\left[E_t\left(x_{t+\tau}^a\right) - E_{t-1}\left(x_{t+\tau}^a\right)\right]$$

is assumed to be zero.

$$\therefore \Delta P_t = x_t - d_t$$

To reduce this to per share information, each side must be divided by the number of shares in issue (n_s).

$$\frac{\Delta P_t}{n_s} = \frac{x_t - d_t}{n_s}$$

There are two problems which must be overcome before using this model. i) The clean surplus restriction, which underpins the Ohlson model, will not normally be met on a per share basis. ii) The model will also only work on a total value basis if the issue and buying of shares are value-irrelevant transactions and GAAP measures capital contributions at market value (Ohlson 2005).

The first problem can be overcome by defining

EPS ≡ ΔBVPS + DPS (Ohlson 2005)

where BVPS = Book value per share
DPS = Dividends per share

Whilst this relationship will not always hold under current GAAP, it facilitates the analysis that follows, as the objective is to determine the *correct* way to calculate EPS in the presence of ESOs.

The second problem can be overcome by restricting the analysis to ESOs and then assuming that the issue of ESOs are value-irrelevant transactions. This is a fair assumption in an efficient market. Current GAAP for ESOs requires that the issue of ESOs be recorded at grant date fair value. The clean surplus relationship on a per share level should thus hold in the context of ESOs.

If the company issues options on its own shares the Ohlson relationship becomes

$$S_t + O_t = b_t + \sum_{\tau=1}^{\infty} R^{-\tau} E_t\left(x_{t+\tau}^{aa}\right)$$ (Hess and Lüders 2001).

This formula differs from the Ohlson (1995) model in that i) the total value of the firm is described as the value of current shareholders (S_t) plus the value of outstanding ESOs (O_t), and ii) x^{aa} is the abnormal earnings after accounting for the issue of ESOs as an expense based on the fair value on grant date (which is what IFRS 2 does).

Following the same devolution as before we have

$$\frac{\Delta S_t + \Delta O_t}{n_s} = \frac{x_t - d_t}{n_s}$$

To calculate the DEPS, as it relates to the ordinary shares currently outstanding, we must transform the equation as follows:

$$\frac{\Delta S_t}{n_s} = \frac{x_t - d_t - \Delta O_t}{n_s}$$

Importantly, and in contrast to the IAS 33 method, this indicates that *earnings* must be adjusted by the change in the value of the ESOs. This approach is no more complicated than the treasury option method

and requires no additional estimates. In a sense, the change in the value of the ESOs represents a shift of value from the current shareholders to the future shareholders. This transfer in value is captured by reducing the earnings attributable to the current shareholders by the change in value of the ESOs.

Careful observers would have noticed that this will result in a DEPS figure that is similar to that which would be obtained if the options were cash-settled. The only difference is that the accounting for SARs would only reflect a part of the change in fair value of the options. Current GAAP for SARs only requires that a portion of the change in fair value be recognised in the current period. This portion is equal to the proportion of SARs expensed versus the total value of SARs to be expensed. The fact remains, however, that this approach results in a similar answer to what would be obtained with cash-settled options, which is useful as the two transactions are economically similar. The two treatments can be made identical by including the unrecognised change in SARs value in the earnings figure used for the DEPS calculation. This will better describe the transfer in value from the current shareholders to the SARs recipients.

The method of calculating DEPS described above, by which earnings is reduced by the change in the fair value of the outstanding options, rather than any adjustment to the denominator, will herein after be referred to as the *earnings adjustment* method. The analyses that follow will thus compare the three methods described thus far; the treasury stock method (the current IFRS 2 method), the treasury option method (or Core et al. method) and the earnings adjustment method.

Comparison with Core et al. and Landsman et al.

It would be useful at this stage to compare the method described above with those of Core et al. (2002) and Landsman et al. (2006) Core et al. derive their DEPS calculation by equating total firm value to the sum of current ordinary shares value and outstanding options value. They then immediately transpose their equation to express the per share value of ordinary shares as a function of total firm value, the number of ordinary shares outstanding, the number of options outstanding and the fair value of the options and the ordinary shares. Firm value is then assumed to be a multiple of accounting earnings, which then allows them to express per share diluted earnings as a function of accounting earnings in terms of the following formula:

$$DEPS = \frac{E}{\left[n_s + n_o\left(F / P\right)\right]}$$

where E is the accounting earnings
n_s is the number of shares outstanding
n_o is the number of options outstanding
F is the fair value of the outstanding options
P is the market price of the existing ordinary shares

This is similar to the approach used to derive the earnings adjustment method above, except that Core et al. reduce their equation to per share information at a much earlier stage in the derivation process, which forces them to assume a simple linear relationship between earnings and share price. The approach used here allows for a more complex, albeit still linear, relationship between earnings and share value as described by Ohlson (1995). The Core et al. calculation also focuses on allocating earnings between the various equity participants, which may be more useful in predicting future attributable earnings. The earnings adjustment method describes the shifts in value between the various equity participants, and should mirror changes in the share price. The Core et al. method has the advantage of being relatively simple and easy to understand. It is also a natural progression from the treasury stock method and changing IAS 33 to require this method would correspond with other shifts in accounting standards to require the use of fair value information.

Landsman et al. (2006), like some of the other authors who have argued that ESOs should be treated as liabilities, assume a proprietary view. They then demonstrate, also by using the Ohlson (1995) model, that the most correct way to account for ESOs is to recognise an asset and liability on grant date. The asset represents those future services that will be received from the employees, in much the same way that an

asset would be raised if the firm made a cash advance to employees in lieu of services which will be delivered over an extended period (sometimes called a restraint of trade payment). The liability represents the future claims the ESO holders have against the firm, which must reduce the firm value attributable to the ordinary shareholders. The ESO asset would probably be amortised over the vesting period of the ESOs, which will give an identical result to the IFRS 2 method *from an income statement perspective*. The ESO asset and ESO liability would also perfectly offset each other on grant date, which will also give the same net asset value as the IFRS 2 method. The two will differ post grant date, however, as the ESO liability under the Landsman et al. method must be adjusted for changes in the fair value of the outstanding ESOs. Again this will result in a similar effect to net asset value to that which would be obtained if the options were cash-settled rather than equity-settled[4]. Landsman et al. focus on the total value of the ordinary shares, rather than the per share value, but it is easy to extend their theoretical analysis to a per share level. Their approach to calculating DEPS would thus probably be the same as that suggested in this paper. The point of departure would be that they suggest that a proprietary perspective should be used in compiling accounting information, whereas this paper has argued for retention of the entity approach in preparing the income statement and balance sheet, but agrees that a proprietary view must be used for the DEPS calculation.

It is interesting to note that none of the analyses indicate that the DEPS needs to be adjusted for the unexpensed ESO grant date value. The current IAS 33 method of accounting for ESOs requires that the unrecognised ESO expense be added to the exercise price when calculating DEPS[5]. It is assumed that the standard setters believed that the employees pay more than the exercise price for their option, being the exercise price plus their future services. None of the theoretical analysis suggest that this is necessary (Core et al. 2002; Hess and Lüders 2001; Landsman et al. 2006; Ohlson and Penman 2005). The Landsman et al. (2006) approach provides the best explanation for this. Their method would require recognition of the total grant date value of the ESOs granted as an asset, which must then be amortised. This asset is then offset by the recognition of a liability. This is essentially what IFRS 2 does, except that it does not actually show the asset and liability on the balance sheet. Provided the economic value of the asset is equal to the value of the liability, which it should be in an efficient market, there is no dilution of current ordinary shareholders on grant date. The interests of ordinary shareholders may be diluted at a later stage if the value of the liability increases, which will occur if the value of the ESOs increases. The dilution is thus not caused by the initial grant date value of the options, but rather by subsequent changes in that value. Thus the total grant date value need not play any role in the calculation of DEPS. The examples that follow will also help to emphasise this point.

Examples

The differences between the different approaches to accounting for the dilutive effects of ESOs can best be understood by means of a series of simple examples.

The first example sets the scene and describes a simple firm with known future income. The firm then issues shares as compensation to employees to create additional income which is exactly equal to the economic value of the shares issued. It is useful to begin the examples with shares rather than options to help establish a base case scenario, and introduce the complications associated with options and uncertainty in the subsequent examples. This first example also helps to address an issue raised by many critics of IFRS 2, being that reflecting the issue of shares as a cost in the income statement and reducing the earnings per share by increasing the number of shares in the denominator results in "double-counting". As can be seen in the example there *is* a twin effect; to accurately reflect the economic position of the entity the value of the shares must be shown in the income statement, and the earnings per share must be reduced by increasing the number of shares used in the calculation[6].

[4] Again, the result will not be exactly the same as SARs accounting because under IFRS 2 only a portion of the change in the fair value of the outstanding SARs is accounted for.

[5] IAS 33 p. 47A

[6] This example is similar to that used by Bodie et al. (2003).

Example 1
Firm A begins in 2007 with ten shareholders, no liabilities and an asset of CU 100[7] cash. The cash earns a return of 10% p.a. Interest rates are constant throughout. Ignore taxes.

No. of shareholders	10
Cash asset	100
Return on cash deposit	10%

At the beginning of 2007, Firm A issues two shares to employees, in return for which they will provide services to the firm. The expense recognised in terms of IFRS 2 will be the fair value of the shares at the grant date, being CU 20. Assume that the transaction with the employees is value-irrelevant, thus in this case the firm will earn additional benefits of CU 22 in 2007. This is CU 20 to compensate for the value of the shares at grant date, plus CU 2 to compensate for the fact that had the shares been issued for cash of CU 20 at the beginning of 2007 CU 2 interest would have been earned on this cash. Stated differently, the benefits must equal the end of year value of the shares. Assume further that the benefits of CU 22 are realised in cash.

Thus the income statement of Firm A will reflect:

	CU
Interest received (100 x 10%)	10
Income from services	22
IFRS 2 expense	(20)
Net income	12
EPS (12/12)	1

Note that the original shareholders are no better or worse off than they would have been had the transaction with the employees not occurred. Their EPS is CU 1 and NAV per share at the end of 2007 CU 11[8] regardless. This result is achieved only because the cost of the services is reflected in the earnings *and* the dilutive effect of the new shares is incorporated into EPS.

Example 2
Amending example 1, Firm A now issues two options to employees (instead of shares) at the beginning of 2007 in return for which they will provide services to the firm. The options entitle the employees to purchase shares in the business at the end of 2007 for CU 10 per share. Assume again that the transaction with employees is value-irrelevant, thus the employees will generate benefits of CU 2. As Firm A is a very simple business, the payouts from the options are known with certainty at the beginning of 2007 (assuming constant interest rates). The value of the options on expiry with thus be CU 1 per option ([(110 + 20 + 2) / 12] – 10). Discounted back to the beginning of the year, the grant date value of the two options is CU 1,82 (2/1,1). As in the first example, it can be seen that the benefits derived from the employees must equal the end of year fair value of the options received.

[7] Consistent with International Financial Reporting Standards, the symbol CU is used to refer to "currency units".
[8] [(110 + 22) / 12] with the transaction with the employees and (110 / 10) without.

Thus the income statement of Firm A will reflect:

	CU
Interest received	10,00
Income from services	2,00
IFRS 2 expense	(1,82)
Net income	10,18

Calculating the DEPS by using the earnings adjustment method gives:

$$DEPS = \frac{10{,}18 - 0{,}18}{10}$$
$$= 1$$

The 0,18 is the change in value of the options over the year (2 – 1,82).

Because this example deals with a single period the DEPS figure for the other two methods is the same, i.e. CU 1[9].

Example 3

It is thus useful to extend the example to multiple periods to illustrate some of the differences between the methods. If we assume that the options vest and expire after two years, the equilibrium occurs where each option is initially worth CU 1,74[10]. The employees must provide benefits of CU 2,08[11] in the first year (1,74 + 1,74 x 2 x 10%) and CU 2,12 in the second year (1,74 + 1,74 x 2 x 1,1 x 10%). The IFRS 2 expense will be 1,74 each year.

	Y1	**Y2**
	CU	CU
Interest received	10,00	11,00
Income from services	2,08	2,12
IFRS 2 expense	(1,74)	(1,74)
Net income	10.35	11.38
EPS		
Earnings adjustment method	1,00	1,10
Treasury stock method	1,02	1,10
Treasury option method	1,00	1,10
Share price	11,00	12,10
Option value	1,91	2,10

The earnings adjustment method and the treasury option method both give the same EPS figures, whilst the treasury stock method understates the dilutive effects in the first year because it uses the intrinsic value rather than the fair value of the options.

Example 4

Example 4 uses the same information as Example 3, but introduces uncertainty. It is assumed that investors are risk neutral so that the expected rate of return does not change

[9] On maturity the fair value and the intrinsic value of the options will be the same, and the DEPS is 10,18 / [10 + (2 / 11)].

[10] $[(10 \times 1{,}1^2) - 10] / 1{,}1^2$

[11] Some errors are induced by rounding to two decimals.

from the previous examples. Circumstances change at the end of year 1 such that the earnings for year 2 are equally likely to be CU -18,62 or CU 41,38.

	Y1	**Y2(1)**	**Y2(2)**	**E(Y2)**
	CU	CU	CU	CU
Interest received	10,00	-19,00	41,00	11,00
Income from services	2,08	2,12	2,12	2,12
IFRS 2 expense	1,74	1,74	1,74	1,74
Net income	10,35	-18,62	41,38	11,38
Earnings adjustment method	0,964	-1,444	3,636	1,096
Treasury stock method	1,017	-1,862	3,893	1,101
Treasury option method	0,997	-1,862	3,893	1,096
Share price	10,96	9,52	14,60	12,06
Option value	2,09	-	4,60	2,30

Y2(1) and Y2(2) represent the two possible state realisations, and E(Y2) is the expected outcome for year 2. As is known from option theory, the value of the option at the end of year 1 will increase because of the introduction of uncertainty. The option can now be calculated as being worth CU 2,09 at the end of year 1 and CU 0 or CU 4,60 depending on which state is realised at the end of year 2. The results of year 1 are as before, except that the earnings per share have dropped to reflect the shift in value from the ordinary shareholders to the option holders. It can be seen that the earnings adjustment method exactly captures the increase in wealth of the ordinary shareholders, which neither of the other two methods do. Interestingly, however, the treasury option method gives the best predictor of year 2 earnings, because CU 0,997 x 1,1 is exactly the expected EPS in year 2. Thus it seems that the earnings adjustment method better reflects the change in economic wealth of the current ordinary shareholders, whilst the treasury option method is more useful in determining future earnings. The treasury stock continues to understate the dilutive effects of the options and does not appear to contain any useful information beyond that already reflected in the other two figures.

Example 5

Example 5 changes Example 4 slightly by introducing the uncertainty at the beginning of year 1 rather that at the end. This will change the initial grant date option value, and the benefits derived from the employees are adjusted so that the transaction continues to be value-irrelevant at the grant date.

	Y1	**Y2(1)**	**Y2(2)**	**E(Y2)**
	CU	CU	CU	CU
Interest received	10,00	-19,00	41,00	11,00
Income from services	2,30	2,34	2,34	2,34
IFRS2 expense	1,92	1,92	1,92	1,92
Net income	10,38	-18,58	41,42	11,42
Earnings adjustment method	1,000	-1,436	3,636	1,100
Treasury stock method	1,020	-1,858	3,895	1,104
Treasury option method	1,000	-1,858	3,895	1,100
Share price	11,00	9,56	14,64	12,10
Option value	2,11	-	4,64	2,32

As there is no shock to the system as in Example 4, both the earnings adjustment and the treasury option method provide the same information, and accurately convey the change

in economic wealth of the ordinary shareholders. The treasury stock method overstates the DEPS in year 1 and in the expected DEPS for year 2.

Conclusion

IAS 33 needs revision. The treasury stock method prescribed by IAS 33 went out of date in the 1970's, and the introduction of fair value accounting in many other areas of financial reporting mean that using fair value information in the calculation of DEPS should not pose any new practical problems. The new IAS 33 needs to begin with a clear objective. This objective must be to accurately convey the change in economic value of one ordinary share. This necessitates a proprietary view, but this need not influence the rest of the accounting information, and the income statement and balance sheet should continue to reflect the entity perspective.

This paper has described an earnings adjustment method for calculating diluted earnings per share. This method reduces the earnings used in the earnings per share calculation by the change in the value of the outstanding employee stock options. There is no adjustment made to the number of shares in issue, as is currently prescribed by IAS 33.

The theoretical analysis and examples that follow suggest that the earnings adjustment method described in this paper better reflects the changes in economic value attributable to ordinary shareholders. Future research should determine whether this can be confirmed empirically. The earnings adjustment method has the added advantage of giving a similar result to that of cash-settled options at a DEPS level, which should go some way to appeasing those critics that believe that equity-settled employee stock options should be treated as liabilities and remeasured at each reporting period.

References

American Accounting Association (AAA) Financial Accounting Standards Committee (FASC). 2004. Evaluation of the IASB's Proposed Accounting and Disclosure Requirements for Share-Based Payment. *Accounting Horizons* vol. 18 no. 1 (March 2004):65-76.

American Institute of Certified Public Accountants, Accounting Principles Board. 1969. *Earnings Per Share*. Opinion No. 15 AICPA.

Balsam, S. 1994. Extending the Method of Accounting for Stock Appreciation Rights to Employee Stock Options. *Accounting Horizons* vol. 8 no. 4 (December 1994):52-60.

Barlev, B. 1984. Theory, Pragmatism and Conservatism in Reflecting the Effects of Warrants on Diluted EPS. *Abacus* vol. 20 no. 1:1-15.

Bierman, H. 1986. Common Stock Equivalents, Earnings per Share, and Stock Valuation. *Journal of Accounting, Auditing and Finance* (Winter 1986):62-70.

Bodie, Z., R. S. Kaplan, and R. C. Merton. 2003. For the Last Time: Stock Options Are an Expense. *Harvard Business Review* (March 2003):63-71.

Caster, A. B., R. J. Elson, and L. G. Weld. 2006. Is Diluted EPS Becoming More Art than Fact? *CPA Journal* vol. 76 no. 9 (September 2006):26-29.

Core, J. E., W. R. Guay, and S. P. Kothari. 2002. The economic dilution of employee stock options: Diluted EPS for Valuation and Financial Reporting *The Accounting Review* vol. 77 no. 3 (July 2002):627-652.

Dechow, P. M., A. P. Hutton, and R. G. Sloan. 1996. Economic Consequences of Accounting for Stock-Based Compensation. *Journal of Accounting Research* vol. 34:1-20.

Financial Accounting Standards Board (FASB). 1997. *Earnings Per Share*. Statement of Financial Accounting Standards No. 128. Norwalk, CT: FASB.

Financial Accounting Standards Board (FASB). 2004. *Share-based Payment*. Statement of Financial Accounting Standards No. 123 (revised). Norwalk, CT: FASB.

Hess, D., and E. Lüders. 2006. *Accounting for Stock-Based Compensation: An Extended Clean Surplus Relation*. Discussion Paper 01-42, Center of Finance and Econometrics, University of Konstanz. 2001 [cited Dec 2006]. Available from ftp://ftp.zew.de/pub/zew-docs/dp/dp0142.pdf.

Huson, M. R., T. W. Scott, and H. A. Wier. 2001. Earnings Dilution and the Explanatory Power of Earnings for Returns. *The Accounting Review* vol. 76 no. 4 (October 2001):589-612.

International Accounting Standards Board (IASB). 2003a. *Earnings Per Share*. International Accounting Standard 33. London: IASB.

International Accounting Standards Board (IASB). 2003b. *Share-based Payment*. International Financial Reporting Standard 2. London: IASB.

Jennings, R., M. J. LeClere, and R. B. Thompson. 1997. Evidence of the Usefulness of Alternative Earnings per Share Measures. *Financial Analysts Journal* (November/December 1997):24-33.

Jerris, S. I. 1992. Option-Based EPS Measures: An Alternative to Primary and Fully-Diluted EPS. *Journal of Business Finance and Accounting* vol. 19 no. 3 (April 1992):345-362.

Kirschenheiter, M., R. Mathur, and J. K. Thomas. 2004. Accounting for Employee Stock Options. *Accounting Horizons* vol. 18 no. 2 (June 2004):135-156.

Landsman, W. R., K. V. Peasnell, P. F. Pope, and S. Yeh. 2006. Which approach to accounting for employee stock options best reflects market pricing? *Review of Accounting Studies* 11:203-245.

Michaels, A., and R. Waters. 2004. EDS Backtracks on Expensing Options. *Financial Times*, March 26, 2004, p. 29.

Millar, J. A., T. Nunthirapakorn, and S. Courtenay. 1987. A Note on the Information Content of Primary and Fully Diluted Earnings Per Share. *Financial Analysts Journal* (September-October 1987):77-79.

Ohlson, J. A. 1995. Earnings, Book Values, and Dividends in Equity Valuation. *Contemporary Accounting Research* vol. 11 no.2 (Spring):661-687.

———. 2005. On Accounting-Based Valuation Formulae. *Review of Accounting Studies* 10:323-347.

Ohlson, J. A., and S. H. Penman. 2005. Debt vs. Equity: Accounting for Claims Contingent on Firms' Common Stock Performance with Particular Attention to Employee Compensation Options. White Paper No. 1, Center for Excellence in Accounting and Security Analysis, Columbia University.

Rice, S. J. 1978. The Information Content of Fully Diluted Earnings per Share. *The Accounting Review* vol. 53 no. 2 (April):429-438.

Scott, T. W., and H. A. Wier. 2000. On Constructing an EPS Measure: An Assessment of the Properties of Dilution. *Contemporary Accounting Research* vol. 17 no. 2 (Summer 2000):303-326.

Vigeland, R. L. 1982. Dilution of Earnings per Share in an Option Pricing Framework. *The Accounting Review* vol. 57 no. 2 (April 1982):348-357.