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以剩餘所得評價模型探討員工認股權證之會計處理

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摘要

本研究利用剩餘所得評價模型，比較四種員工認股權證會計處理反映經濟實質的能力。四種會計方法係指目前美國實行的 *APB 25*，*SFAS 123*，*FASB 1993 Exposure Draft* 法，以及 *IASB ED-2* 之延伸法。*ED-2* 延伸法係將員工認股權證給予義務視為負債，並將授予日後之給付義務公平價值變動金額納入所得計算及資產負債表中。本研究將運用股利折現模式 (*dividend discount model*)，分析員工認股權證對普通股價值稀釋效果、並推導出現有普通股及員工認股權證價值；再利用剩餘所得模型，推行出不同會計方法下，員工認股權證隱含的股權價值。本研究根據四種會計處理產生之隱含價值 (*implied value*)，比較四種員工認股權證會計處理反映經濟實質的能力。分析認為唯有 *ED-2* 延伸法之會計資訊，方能允當反映員工認股權證發行對於現有普通股權益價值之稀釋效果。

為驗證前述模型分析之有效性及合理性，本研究使用 S&P 500 公司之股價及會計資料，以實證方式測試前述模型分析結果。本研究測試發現，1.除 *ED-2* 延伸法外，於普通股權益評價方程式，加入依公平價值衡量之認股權證為自變數並限制其迴歸係數為-1 的作法，將可提高該方程式之解釋能力；2. *SFAS 123* 會計處理產生之資訊於普通股權益評價方程式的解釋能力，低於其他三種會計處理產生之資訊的解釋能力。

關鍵字：員工認股權證、剩餘所得衡量模型、稀釋效果

Employee Stock option Accounting in Residual Income Valuation framework

Abstract

We use the residual income valuation framework to compare the equity valuation implications of four approaches to employee stock options (ESOs) accounting proposed by regulators: *APB 25* “recognize nothing”, *SFAS 123 (revised)* “recognize ESO expense”, *FASB Exposure Draft* “recognize and expense ESO asset” and “recognize ESO asset and ESO liability”. Our theoretical analysis shows that only grant date recognition of an asset and a liability, and subsequent marking-to-market of the liability, results in accounting numbers that accurately capture the dilution effects of ESOs on current shareholder value when used in the residual income valuation model. The other accounting methods lead to over-estimates of current equity value. Out-of-sample and in-sample empirical tests are used to assess value relevance of the four accounting methods. The out-of-sample tests compare contemporaneous equity market value predictions based on each of the four methods. The in-sample tests compare the model explanatory power from estimating equations relating to each of the four accounting methods. The out-of-sample tests indicate the method with grant date asset and liability recognition has the lowest prediction errors, followed by the *Exposure Draft* method, the *SFAS 123 (revised)* method, and the *APB 25* method. Findings from the in-sample tests are largely consistent with our theoretical expectations and provide support for the grant date recognition of an ESO asset and liability.

Key words: employee stock options, residual income valuation framework, dilution effects

Motivation and Purposes

The policy debate over how firms should account for employee stock options (ESOs) has been long and acrimonious. It focuses on whether it is appropriate to recognize ESO-related expense and mark-to-market gains and losses in the income statement, and ESO-related equity or liabilities and assets in the balance sheet. Recent empirical research provides some insights relevant to these questions. For example, Kirschenheiter et al. (2003, 2004) and Core et al. (2002) report evidence on the importance of accounting for dilution effects in equity valuation; Hanlon et al. (2003) shows that stock options are associated with future earnings growth; Bell et al. (2002), for a sample of profitable software companies, shows that the market appears to value their equity as if option grants create an intangible asset; and Aboody et al. (2004) shows the market prices ESO expense as an expense after including controls for earnings growth.

We contribute to this literature in two main ways. First, we build on theoretical work by Christensen and Feltham (2003) to identify the properties of valuation estimates obtained using financial statement numbers from four ESO accounting methods central to the policy debate as inputs to the residual income valuation model. This analysis demonstrates the importance of recognizing both income statement and balance sheet effects of ESOs from a “super clean surplus” perspective if the objective of financial statements is to provide information relevant to valuing existing equity shares. The accounting method most consistent with the super clean surplus perspective is that which includes an ESO asset and liability on the balance sheet and mark-to-market gains and losses on the liability in income. Second, for a sample of US firms, we examine the empirical relation between stock prices and estimated financial statement numbers under the four accounting methods. The empirical analysis suggests the accounting method that is most consistent with the stock market valuation of companies is again that which includes the ESO asset and liability on the balance sheet and mark-to-market gains and losses on the liability in income. Overall, our results suggest that currently mandated financial reporting standards provide incomplete information for existing shareholders.

We start with a model that captures certain key features of ESO transactions and is simple enough to show how financial statement numbers from four different ESO accounting methods might be used in an accounting-based valuation model. The accounting methods we consider are (i) the intrinsic value approach, which we call the *APB 25* approach; (ii) the recognition of ESO expense, which we call the *SFAS 123 (revised)* approach; (iii) the recognition of an asset and its subsequent amortization as ESO expense, which we call the *Exposure Draft* approach, and (iv) the recognition of an ESO asset, its subsequent amortization as ESO expense and the recognition and marking-to-market of an ESO liability, which we call the *Asset and Liability* approach. Our analysis draws on Feltham (1995), which uses the residual income valuation model (RIV) to demonstrate the importance of clarity over the claimants to be viewed as equity holders when there are outstanding contingent equity claims.¹ The main objective of our analysis is to emphasize the wealth effects of the four approaches to accounting for ESOs that are left implicit in Feltham (1995) and Christensen and Feltham (2003).

¹ For a published version of the results, see Christensen and Feltham (2003, ch. 9).

Consistent with Feltham (1995) and Christensen and Feltham (2003), our analysis indicates that of the four methods we consider, only the *Asset and Liability* approach results in recognized book equity and net income amounts that, when used as inputs to RIV, correctly identifies the economic dilution effects of ESOs on *current* shareholder equity value. This is because it is the only method that applies what Christensen and Feltham refer to as “super clean surplus accounting,” whereby income reflects all gains and losses attributable to *existing* shareholders. Our analysis also shows that use of book equity and net income numbers from the *APB 25* and *Exposure Draft* methods result in overestimates of the value of current shareholder equity. Specifically, these two approaches yield book equity and net income numbers that, when used as inputs to RIV, result in a valuation estimate equal to the sum of current equity value and ESO value. Both methods satisfy “clean surplus” in that all gains and losses arising from transactions not involving equity claimants pass through income. However, Christensen and Feltham label them as “mixed surplus” accounting methods because their accounting amounts are related to the value of the claims of both existing and potential *future* equity holders.

Our analysis yields an important new insight. We find that the *SFAS 123 (revised)* approach results in book equity and net income numbers that, when used in RIV, would also lead to overstatement of current equity value. However, the degree of overstatement is lower than in the cases of the *APB 25* and *Exposure Draft* approaches. Estimated value based on *SFAS 123 (revised)* numbers captures the value of current equity plus a fraction of ESO value. This is a troubling result because the *SFAS 123 (revised)* approach is *the* approach mandated by the two leading accounting standard setting bodies in the world, in the face of fierce opposition from much of the business community. Yet it fails to provide book equity and net income numbers that, when used as inputs to valuation, lead to easily interpretable valuation estimate. Its RIV valuation estimate is neither the value of total equity claims nor the value of current equity claims.

The second main contribution of the paper is to examine empirically how well the four accounting approaches reflect actual market pricing. We use publicly available data to estimate the values of book equity and residual income (and relevant components) that would be reported under each of the four accounting methods.² Although the theoretical analysis assumes perfect foresight with respect to the future residual income stream, our empirical analysis adopts the extreme conservative assumption that the *only* information available is current equity book value and current residual income (or components thereof) for a given accounting method. We then estimate regressions of observed equity values on equity book value and current residual income (and components) for each accounting method. The accounting method that best reflects the market’s implied view of the economic substance of ESOs will yield the accounting numbers that best explain market value of equity.

To determine which accounting method best explains market value of equity, we employ both out-of-sample and in-sample tests, based on S&P 500 firms with available data from 1997-2001. The out-of-sample tests compare contemporaneous equity market

² The data needed for the *ASB 25* and *SFAS 123 (revised)* approaches are readily available from *SFAS 123* mandated disclosures, whereas the additional items needed to implement the *Exposure Draft* and particularly the *Asset and Liability* approaches have to be approximated by the external analyst, with attendant greater risks of measurement errors.

value predictions based on each of the four methods. The in-sample tests involve comparisons of model explanatory power from two versions of estimating equations relating to each of the four accounting methods. The first set of models includes residual income and equity book value applicable to a given method, and the second set also includes option fair value as an explanatory variable with its coefficient restricted to equal minus one. A comparison of these two nested models is equivalent to testing whether the appropriate value construct explained by the accounting items is the total value of all equity claims, rather than the value of existing equity claims alone. We also compare the relative explanatory power of models based on the different accounting methods.

We conduct our out-of-sample tests by estimating jack-knife regressions including accounting amounts applicable to each of the four accounting methods. The jack-knifing procedure generates firm-specific equity market value predictions using regression coefficients estimated with data for all sample firms except the firm under consideration. We compare equity value predictions across the four accounting methods in terms of mean-square and mean-absolute error metrics. Based on the theoretical modeling, we expect the lowest prediction errors for the *Asset and Liability* method, highest prediction errors for the *APB 25* and *Exposure Draft* methods, and prediction errors between the two extremes for the *SFAS 123 (revised)* method. A different empirically grounded expectation, based on findings in Barth, Beaver, Hand, and Landsman (2006), is that out-of-sample equity market value predictions will improve with sequential levels of earnings disaggregation. We exploit this alternative by developing and testing a model that combines all of the ESO-based residual income and equity book value components from the four accounting methods. Our empirical prediction is that the *Asset and Liability* method will have the lowest prediction errors, followed by the *Exposure Draft* method, the *SFAS 123 (revised)* method, and the *APB 25* method. The empirical evidence is mostly consistent with these latter empirical predictions.

We conduct our in-sample tests using the theoretical residual income valuation model findings that for the *APB 25* and *Exposure Draft* methods, equity market valuation equations based solely on equity book value and residual income applicable to each method will be incorrectly specified unless an estimate of the option fair value is added to equity market value, whereas such adjustment is unnecessary for the *Asset and Liability* method. We implement this adjustment by including our estimate of option fair value as a regressor, with its coefficient restricted to equal minus one. Our theory provides no clear prediction for the *SFAS 123 (revised)* method. We test these predictions by estimating four pairs of equations (one pair for each method), and compare the relative explanatory power of each set of regressors. Findings from these tests are largely consistent with our theoretical predictions. Also, consistent with our predictions and the out-of-sample test findings, the *Exposure Draft* and *Asset and Liability* valuation models are better specified than those based on the *SFAS 123 (revised)* method.

Theoretical Analysis

Model setup

The manager's net ESO compensation at exercise date T will be zero if the options lapse unexercised. On the other hand, if the options are exercised, the economic value of

the manager's ESO compensation will equal the amount by which the current total market value of the n^m shares received exceeds the amount X paid to acquire them. We can write m 's option exercise decision at time T as

$$\max(MV_T^m - X, 0) = MV_T^m - \min(MV_T^m, X), \quad (1)$$

where the (currently uncertain) total market value of the n^m shares that might be issued to m at that date is

$$MV_T^m = \sum_{t=T+1}^{\infty} \frac{E_T[d_t^m]}{(1+r)^{t-T}}, \quad (2)$$

where $E_T[\cdot]$ is the expectations operator evaluated using risk-neutral probabilities based on information available at date T and r is the (assumed constant) risk-free rate of interest. The value of the ESO at grant date, OPV_0 , can be expressed in terms of the discounted expected value of (1):

$$\begin{aligned} OPV_0 &= \frac{E_0[MV_T^m - \min(MV_T^m, X)]}{(1+r)^T} \\ &= \frac{\int_X^{\infty} MV_T^m dF(MV_T^m) - X \int_X^{\infty} dF(MV_T^m)}{(1+r)^T}, \end{aligned} \quad (3)$$

where $F(MV_T^m)$ is the cumulative risk-neutral probability density function associated with MV_T^m . By the law of iterated expectations, we can use (2) to rewrite (3) as

$$OPV_0 = \sum_{t=T+1}^{\infty} \frac{E_0[d_t^m]}{(1+r)^t} - \frac{E_0[X]}{(1+r)^T}, \quad (4)$$

where $E_0[X] = X \int_X^{\infty} dF(MV_T^m)$ is the exercise price multiplied by the probability of the option being exercised. As long as there is some probability that the option will be exercised, it follows from (1) that the ESO will have a strictly positive value, i.e., $OPV_0 > 0$.

The date 0 value of the existing shareholders' claim can be expressed as:

$$MV_0^e = \sum_{t=1}^{\infty} \frac{E_0[d_t^e]}{(1+r)^t} = \sum_{t=1}^{\infty} \frac{E_0[d_t]}{(1+r)^t} - \frac{E_0[MV_T^m]}{(1+r)^T}. \quad (5)$$

A measure of equity value that "mixes" or "combines" the claims of existing and future shareholders, MV_0^c , can also be derived.

$$MV_0^c = \sum_{t=1}^{\infty} \frac{E_0[d_t]}{(1+r)^t} - \frac{E_0[X]}{(1+r)^T}. \quad (6)$$

$$MV_0^c = \sum_{t=1}^{\infty} \frac{E_0[d_t^e]}{(1+r)^t} + \left\{ \sum_{t=T+1}^{\infty} \frac{E_0[d_t^m]}{(1+r)^t} - \frac{E_0[X]}{(1+r)^T} \right\} \quad (7)$$

$$= MV_0^e + OPV_0.$$

Residual income valuation

The next step is to examine what happens when accounting numbers in the place of dividends are used to value equity. The residual income valuation (RIV) model is a natural vehicle for this purpose because it expresses economic in terms of a book value anchor and a premium based on the discounted present value of the excess of future earnings over the normal return on book value (Preinreich, 1938; Edwards and Bell, 1961; Peasnell, 1982; Ohlson, 1995). This provides a method of capturing all the wealth effects of ESOs, both in how they are captured in equity book value and how the impact the measurement of earnings.³ If the clean surplus accounting relation holds then the dividend discount model can be expressed in terms of current equity book value and future residual incomes, as follows:

$$MV_0^i = BV_0^i + \sum_{t=1}^{\infty} \frac{E_0[RI_t^i]}{(1+r)^t} \quad (8)$$

where BV_0^i and RI_t^i are the book value of equity at time 0 and the residual income for period t , respectively, using ESO accounting method i . Residual income is a random variable, defined as $RI_t^i = NI_t^i - rBV_{t-1}^i$. NI_t^i is net income for period t using accounting method i . If accounting violates the clean surplus relation, future residual income flows would have to be adjusted by expected dirty surplus flows in order to ensure articulation between equation (8) and the relevant dividend discount model.

We examine the consequences of applying the RIV model (8) to equity book value and get residual income flows obtained under the four accounting alternatives.

Method 1

$$MV_0^1 = \sum_{t=1}^{\infty} \frac{E_0[d_t]}{(1+r)^t} - \frac{E_0[X]}{(1+r)^T} \quad (9)$$

³ A natural alternative approach would be to use the abnormal earnings growth (AEG) model developed by Ohlson and Juettner-Nauroth (2005) as it does not assume that clean surplus accounting is employed and can easily handle changes in the numbers of shares in issue. It can readily be shown that when net income is measured under *any* of the four ESO accounting approaches considered in this paper the AEG model will produce a value estimate equal to $MV_0^e + OPV_0$, if dividends are defined on a total net dividends basis. Furthermore, if dividends are defined on a per share basis then the AEG value will always equal MV_0^e , regardless of the basis on which the accounting is done. As we shall see, this is not always the case with the RIV model. While this makes the AEG model a potentially extremely useful model for many practical investment purposes, it means it is not a suitable engine for obtaining insights into how equity market value reflects ESO transactions. For the present study, an advantage of the RIV model is that it makes use of both balance sheet and income statement items, whereas the balance sheet is superfluous in the AEG model.

We therefore know that $MV_0^1 = MV_0^c = MV_0^e + OPV_0$. Since OPV_0 must be positive prior to expiration date, applying the RIV model to accounting numbers prepared under method 1 over-estimates the value of *current* equity. The reason is that method 1 ignores stock options in recognized net income and equity book value.

Method 2

$$\begin{aligned} MV_0^2 &= MV_0^1 - \sum_{t=1}^T \frac{OPV_0}{T(1+r)^t} \\ &= MV_0^e + \left[1 - \frac{1 - (1+r)^{-T}}{rT} \right] OPV_0. \end{aligned} \quad (10)$$

ESO accounting method 2 recognizes option equity over time, as a by-product of recognizing option expense. Generally, the resulting valuation provides an estimate of neither the MV_0^e nor $MV_0^e + OPV_0$.

This “neither fish nor fowl” result is troubling, given that method 2 is the approach that both the FASB and the IASB have chosen to require companies to follow in the future. Method 2 can be viewed as a variant of model 3, where an ESO asset is recognized at grant date and then immediately written off to equity, after which the asset is amortized as ESO expense against income. The effect of this is that dirty surplus accounting is taking place.

Method 3

$$\begin{aligned} MV_0^3 &= \left\{ MV_0^e + \left[1 - \frac{1 - (1+r)^{-T}}{rT} \right] OPV_0 \right\} + OPV_0 - \left[1 - \frac{1 - (1+r)^{-T}}{rT} \right] OPV_0 \\ &= MV_0^1 \end{aligned} \quad (11)$$

since $MV_0^3 = MV_0^e + OPV_0$. Method 3 results in an over-estimate of the value of *existing* equity but correctly values the total of the claims of *e* and *m*. As with method 1, method 3 is a form of mixed surplus accounting because it reflects dividends flowing to existing *and* potential future equity holders.

Method 4

$$\begin{aligned} MV_0^4 &= BV_0^1 + \sum_{t=1}^{\infty} \frac{E_0[RI_t^1]}{(1+r)^t} - OPV_0 \\ &= \sum_{t=1}^{\infty} \frac{E_0[d_t]}{(1+r)^t} - OPV_0. \end{aligned} \quad (12)$$

Insight into this result can be obtained by recalling that all the ESO expenses and gains and losses on the ESO liability are accounted for on a “super-clean surplus” basis. In which case, it follows that method 4 will yield an estimate of value that is a function of d_t and MV_T^m . The Equation implies that $MV_0^4 = MV_0^e$.

Empirical Design

The key empirical issue for our study is whether different approaches to accounting for ESOs results in the recognition of ESO-related amounts that have different dynamic properties, and hence different valuation characteristics that we can measure.

We estimate all four equations below using unscaled data (Barth and Kallapur, 1996) and using year fixed-effects.

$$MVE_{it} = \alpha_0 + \{\alpha_1 RI_{it}^1 + \alpha_2 OPTIONEXPENSE_{it} + \alpha_3 DOPTIONLIAB_{it} \\ + \alpha_4 [r \times NETSESO_{i,t-1}] + \alpha_5 [r \times OPTIONLIAB_{i,t-1}]\} \\ + \{\alpha_6 BV_{it}^1 + \alpha_7 NETESO_{it} + \alpha_8 OPTIONLIAB_{it}\} + \varepsilon_{it}.$$

$$MVE_{it} = \alpha_0 + \alpha_1 RI_{it}^1 + \alpha_6 BV_{it}^1 + \varepsilon_{it}$$

$$MVE_{it} = \alpha_0 + \alpha_1 RI_{it}^1 + \alpha_2 OPTIONEXPENSE_{it} + \alpha_6 BV_{it}^1 + \varepsilon_{it}$$

$$MVE_{it} = \alpha_0 + \{\alpha_1 RI_{it}^1 + \alpha_2 OPTIONEXPENSE_{it} + \alpha_4 [r \times NETSESO_{i,t-1}]\} \\ + \{\alpha_6 BV_{it}^1 + \alpha_7 NETESO_{it}\} + \varepsilon_{it}.$$

Sample and Data

The sample comprises 1,354 and 1,204 firm-year observations drawn from the S&P Industrial Index, where the former (latter) sample is based on residual income computed using the constant 12% (ValueLine firm-specific) equity cost of capital. The sample period includes fiscal years 1997-2001, with 1996 being the first year for which *SFAS 123* data are available. Because construction of the change in option liability variable requires lagged data, the sample period starts in 1997 instead of 1996. The potential sample for use in cross-sectional regressions is 2,500 observations (5 years x 500 firms). We require firms to have earnings, equity market value, (non-negative) equity book value, and ESO data necessary to estimate equity book value and residual income under all four ESO accounting methods.⁴ To mitigate the effects of outliers, for each variable appearing in the estimating equations, by year, we treat as missing any observations that are in the extreme top and bottom one percentile (Kothari and Zimmerman, 1995; Collins, Maydew and Weiss, 1997; Fama and French, 1998; Barth, Beaver, Hand, and Landsman, 1999, 2004). After imposing this requirement but before imposing the ESO data availability requirement on a per share basis, the potential sample size ranges from a low of 446 firm-year observations in 1997 to a high of 467 in 2000. Earnings, equity book value and equity market value data are drawn from the *Compustat* database, and ESO data are from a database provided to us by Jack Ciesielski of R.G. Associates, Inc.

⁴ Following Bell, Landsman, Miller, and Yeh (2002), we require positive beginning owner's equity to ensure that the firm's cost of capital in calculating abnormal earnings ($rBVE_{t-1}$) is positive. Also for the case of the firm-specific equity cost of capital sample, we also require non-missing data for beta.

Summary and Concluding Remarks

We use the residual income valuation framework to compare the extent to which four approaches to accounting for ESOs, reflecting variations of current and proposed accounting standards, best capture the economic effects of ESOs on current equity market value. We explicitly model the dilution effects on shareholder value of ESOs using a dividend discount model and then use the residual income framework to derive the implied equity value amounts associated with each ESO accounting method. Findings from the theoretical modeling indicate that the only method that results in recognized accounting amounts that accurately reflect the economic dilution effects of ESOs on current shareholder equity value is that which recognizes an asset and liability at grant date, and subsequently recognizes gains and losses on the liability in income. That is, only the *Asset and Liability* method employs super clean surplus accounting, whereby income reflects all gains and losses attributable to *existing* shareholders. The other accounting methods all result in balance sheet and net income amounts that overstate the value of current shareholder equity, whereby the *APB 25* and *Exposure Draft* result in balance sheet and net income amounts that reflect the sum of the value of current shareholder equity value and the value of the stock options granted to employees, and the *SFAS 123* accounting method results in balance sheet and net income amounts that reflect the sum of the value of current shareholder equity value and a fraction of the value of the stock options granted to employees.

We use out-of-sample and in-sample tests to assess the value relevance of the four accounting methods. The out-of-sample tests compare contemporaneous equity market value predictions based on each of the four methods. The in-sample tests compare the model explanatory power from two versions of estimating equations relating to each of the four accounting methods. Findings from the out-of-sample tests indicate the *Asset and Liability* method has the lowest prediction errors, followed by the *Exposure Draft* method, the *SFAS 123* method, and the *APB 25* method. Findings from the in-sample tests are largely consistent with our theoretical predictions. The *Exposure Draft* and the *Asset and Liability* models appears to be generally better specified than that based on the *SFAS 123 (revised)* method.

The empirical evidence presented in the study suggests that the *APB 25* “do nothing” method is inferior to the methods of accounting for ESOs that include some form of ESO recognition, at least when judged in terms of how they are reflected in market pricing. Our evidence also suggests that ESO accounting that does not involve recognition of an asset at grant date—as is the case for *IFRS 2* and for the *SFAS 123 (revised)* method—is likely to be less value relevant. In addition, our evidence is largely consistent with the superiority of additional grant date recognition of an ESO liability and subsequent marking-to-market of that liability. We caution that these policy conclusions are subject to the several important caveats, notably that our theory and empirical tests are based on the valuation context and that all the firms in our sample use the *APB 25* method. It is impossible to predict the effects on market pricing of ESO accounting amounts once a new standard is adopted because managerial actions could be affected by the imposition of a new ESO accounting method by standard setters.

References

- Aboody, D. (1996). "Market Valuation of Employee Stock Options." *Journal of Accounting and Economics* 22, 357-391.
- Aboody, D., M.E. Barth and R. Kasznik (2004). "SFAS No. 123 Stock-Based Employee Compensation and Equity Market Values." *The Accounting Review* 79, 251-275.
- Accounting Principles Board (1972). *Opinion No. 25: Accounting for Stock Issued to Employees*. American Institute of Certified Public Accountants, New York.
- Barth, M.E., W.H. Beaver, J.M. Hand, and W.R. Landsman (1999). "Accruals, Cash Flows, and Equity Values." *Review of Accounting Studies* 4, 205-229.
- Barth, M.E., W.H. Beaver, J.M. Hand, and W.R. Landsman (2006). "Accruals, Accounting-Based Valuation Models, and the Prediction of Equity Values." *Journal of Accounting, Auditing, and Finance*, forthcoming.
- Barth, M.E., and S. Kallapur (1996). "Effects of Cross-Sectional Scale Differences on Regression Results in Empirical Accounting Research." *Contemporary Accounting Research* 13, 527-567.
- Bell, T.B., W.R. Landsman, B.L. Miller, and S. Yeh, (2002). "The Valuation Implications of Employee Stock Option Accounting for Profitable Computer Software Firms." *The Accounting Review* 77, 971-996.
- Black, F., and M. Scholes, (1973). "The Pricing of Options and Corporate Liabilities." *Journal of Political Economy* 81 (3), 637-654.
- Christensen, P.O., and Feltham, G.A. (2003). *Economics of Accounting. Volume 1 – Information in Markets*. Kluwer Academic Publishers, Hingham, MA.
- Collins, D.W., Maydew, E.L., and I.S. Weiss. (1997). "Changes in the Value-Relevance of Earnings & Equity Book Values Over the Past Forty Years." *Journal of Accounting and Economics* 24, 39-67.
- Core, J., and W. Guay, and S. P. Kothari (2002). "The Economic Dilution of Employee Stock Options: Diluted EPS for Valuation and Financial Reporting." *The Accounting Review* 77, 627-652.
- Credit Suisse First Boston (2004a). "Expensing Stock Options: The Impact on S&P 500 Earnings." *Accounting & Tax*, March.
- Credit Suisse First Boston (2004b). "Cost of Employee Stock Options" *Accounting & Tax*, June.
- Dechow, P.M., A.P. Hutton, and R.G. Sloan (1999). "An Empirical Assessment of the Residual Income Valuation Model." *Journal of Accounting and Economics* 26, 1-34.
- Edwards, E.O., and P.W. Bell (1961). *The Theory and Measurement of Business Income*. University of California Press, Berkeley and Los Angeles.
- Fama, E.F., and K.R. French. (1998). "Taxes, Financing Decisions, and Firm Value." *Journal of Finance* 53, June.

- Feltham, G. (1995). "Valuation, Clean Surplus Accounting, and Anticipated Equity Transactions." Working paper, University of British Columbia.
- Financial Accounting Standards Board (1993). *Exposure Draft: Accounting for Stock-Based Compensation*. FASB, Norwalk, CT.
- Financial Accounting Standards Board (1995). *Statement of Financial Accounting Standards No. 123: Accounting for Stock-Based Compensation*. FASB, Norwalk, CT.
- Financial Accounting Standards Board (2004a). *Exposure Draft: Share Based Payment*. FASB, Norwalk, CT.
- Financial Accounting Standards Board (2004b). *Statement of Financial Accounting Standards No. 123 (revised 2004): Share Based Payment*. FASB, Norwalk, CT.
- Hand, J.R.M., and W. Landsman (2004). "The Pricing of Dividends and Equity Valuation." *Journal of Business Finance and Accounting*, forthcoming.
- Hanlon, M., S. Rajgopal, and T. Shevlin (2003). "Are Executive Stock Options Associated with Future Earnings?" *Journal of Accounting and Economics* 36, 3-43.
- Hogg, R. V., and E. A. Tanis (2001). *Probability and Statistical Inference*. Prentice Hall.
- IbbotsonAssociates (2005). *Risk Premia Over Time Report*.
- International Accounting Standards Board (2004). International Financial Reporting Standard, *Share-Based Payment*. IASB, London.
- Kirschenheiter, M., R. Mathur, and J.K. Thomas (2003). "Entity Accounting and Dilution: The case of Stock Options." Working paper, Columbia Business School.
- Kirschenheiter, M., R. Mathur, and J.K. Thomas (2004). "Accounting for Employee Stock Options." *Accounting Horizons* 18, 135-156.
- Kothari, S.P., and J. Zimmerman. (1995). "Price and Return Models." *Journal of Accounting and Economics* 20, 155-192.
- Lee, C., J. Myers, and B. Swaminathan. (1999). "What is the Intrinsic Value of the Dow?" *Journal of Finance* 54, 1693-1741.
- Li, F., and M.H.F. Wong. (2004). "Employee Stock Options, Equity Valuation, and the Valuation of Option Grants Using a Warrant-Pricing Model." Working paper, University of Chicago.
- Liu, J., D. Nissim, and J. Thomas (1999). "Equity Valuation Using Multiples." *Journal of Accounting Research* 40, 135-172.
- Miller, M.H., and F. Modigliani (1961). "Dividend policy, Growth and the Valuation of Shares." *Journal of Business* 4, 411-433.
- Noreen, E.W. (1989). *Computer Intensive Methods for Testing Hypotheses: An Introduction*. Wiley: New York, NY.
- Ohlson, J.A. (1995). "Earnings, Equity Book Values, and Dividends in Equity Valuation." *Contemporary Accounting Research*, 66-687.
- Ohlson, J.A. (1999). "On Transitory Earnings." *Review of Accounting Studies* 4, 145-162.

- Ohlson, J.A., and B. Juettner-Nauroth (2005). "Expected EPS and EPS Growth as Determinants of Value." *Review of Accounting Studies*, 10.
- 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.
- Peasnell, K.V. (1982). "Some formal Connections Between Economic Values and yields and Accounting Numbers." *Journal of Business Finance and Accounting* 9, 361-381.
- Penman, S.H. (2003). *Financial Statement Analysis and Security Valuation*. McGraw-Hill.
- Preinreich, G.A.D. (1938). "Annual survey of Economic Theory: The Theory of Depreciation." *Econometrica* 6, 219-241.
- Stiglitz, J.E. (2003). *The Roaring Nineties: Seeds of Destruction*. Allen Lane.
- Vuong, Q.H. (1989). "Likelihood Ratio Tests for Model Selection and Non-nested Hypotheses." *Econometrica* 57, 307-333.