Market Valuation of Disclosed Employee Stock Option Expenses - Evidence from Taiwan

1. Introduction

Numerous studies document evidence supporting that investors view the disclosed employee stock option (ESO) expense as an expense of the firm and as sufficiently reliable to be reflected in their valuation assessments[1] (e.g., Chamberlain and Hsieh 1999; Li 2002; Aboody et al. 2004; Balsam et al. 2006). By contrast, Rees and Stott (2001) and Bell et al. (2002) find that investors apparently view the disclosed option expense as an intangible asset of the firm. Further, Bell et al. (2002) and Garvey and Milbourn (2002) find that the unrecognized ESO compensation is negatively related to subsequent abnormal stock returns and suggest that investors may overvalue firms with high levels of ESOs (Bell et al. 2002; Bloomfield 2002; Hirshleifer and Teoh 2003).

Possible mispricing of the disclosed ESO expense raises serious concerns as to whether firms should recognize rather than merely disclose the option compensation expense in the footnotes (Bloomfield 2002). Proponents argue that markets do not fully incorporate into their valuation assessment the disclosed ESO expense in the footnotes. Alternatively, opponents contend that the recognition of ESO expense could cause an adverse effect on the share prices of firms. However, under the Efficient Market Hypothesis (EMH) (Fama 1970), whether expensing the ESOs should not matter, as long as the details of the ESO-related compensation are disclosed in the footnotes.[2] As the use of stock options has begun to expand internationally (Hall 2000), such concerns of whether market prices already

[1] The disclosed ESO expense means the stock-based compensation expense that is disclosed, but not recognized in net income, under the U. S. Statement of Financial Accounting Standards (SFAS) No. 123.

[2] Under the EMH, the recognition of ESO expense could affect stock prices only through influencing the terms of contracts between the reporting firms and other parties (Watts and Zimmerman 1986).

incorporate the value-relevance information underlying the disclosed ESO expense has spread from the U.S. to other emerging markets.

In 2007 August, the Accounting Research and Development Foundation (ARDF) of Taiwan issued Statement No. 39, *Accounting for Stock-Based Compensation*, which requires firms to use the *fair value method* to account for options granted on or after January 1, 2008. The new recognition rule apparently influences greatly the management's options granting behavior, as evident by an unusual huge grant of 4.5 billion in 2007, compared with an average option grant of one billion shares from 2004 to 2006 for the high-tech firms of Taiwan. The ensuing consequence of such huge grants is reflected in the size of disclosed ESO expense in 2008 and 2009. The average disclosed ESO expenses for the period from 2008 to 2009, NT$ 21 million, is more than three times that from 2004 to 2007. The huge option grants in 2007 obviously deviate much from what would be expected. More importantly, firms disclose in the footnotes large amounts of option expense but recognize only a negligible amount of expense in the income statement in 2008 and 2009 due to the good timing of option grants.

Such option-granting behavior is consistent with managers' attempt to manage the perceptions of functionally fixated investors. In other words, managers behave as if investors are imperfect processors of publicly available information; and therefore, even informationally equivalent disclosures could have different effects on investor perceptions of the firm's profitability.[3] The main purpose of the study is to investigate whether investors incorporate the seemingly manipulated ESO expense disclosed in 2008 and 2009 into their valuation assessment.

[3] Several studies have provided evidence indicating that investors put more weight on information that is recognized than that merely disclosed in the footnote. See Hirshleifer and Teoh (2003) for detailed discussion.

To address our research question, we adopt a variant of the residual income model (Ohlson 1995; Li 2002) to test the pricing effect of the disclosed ESO expense. To form a testable hypothesis, we assume that the benefits related to option incentive effects are reflected in book value of equity and residual incomes.[4] Moreover, we assume that the disclosed ESO expense variable can capture the cost associated with stock-based compensation. To the extent that these assumptions can reasonably hold, we expect to observe a negative association between disclosed ESO expense and share prices. Notably, our tests do not aim to determine whether the dilution effect outweighs the incentive effect of ESO compensation. Rather, the test is to assess the value relevance of the disclosed ESO expense.

We use a sample composed of 701 high-tech firms in Taiwan over a sample period from 2004 to 2009. As expected, we find a negative relation between disclosed ESO expense and share price, suggesting that investors on average view the unrecognized ESO expense as an expense of the firm, after controlling for equity book value, residual incomes, recognized ESO expense, and option value outstanding at year-end. In addition, we find that recognized ESO expense is not significantly associated with share price, consistent with our conjecture that the amount of recognized ESO expense during the sample period is simply too small to attract investors' attention.

Further, cross-sectional analyses show that before 2007, the disclosed ESO expense is positively associated with firm value. The results are similar to those documented by Rees and Stott (2001) and Bell et al. (2002) and suggest that investors seemingly consider ESO-related expense an intangible asset to the firm during 2004-

[4] Aboody et al. (2004, p. 268) provide evidence supporting the idea that a nontrivial portion of the benefits related to disclosed ESO expense is reflected in net income and equity book value within a few years subsequent to the option grant.

2006. Interestingly, this positive relation changes slightly over time, as indicated by the declining trend in the t-statistics. Until 2007, the disclosed ESO expense becomes insignificant and the sign changes to be negative. Further, we find disclosed expenses are significantly and negatively associated with firm values thereafter.

The results from year-by-year regressions are consistent with the position that the negative pricing effect of ESO expense in both 2008 and 2009 is mainly attributable to the effect of No. 39. In 2003, the standard setting body in Taiwan issued a series of new accounting rules for stock-based compensation. These influential accounting rules may direct investor intention on how firm's operating results and financial position could be affected by these newly announced accounting rules. In addition, these rules also cause intensive discussion over the accounting for stock-based compensation among commentators, standard setters, and accounting practitioners. If such publicized discussions and debates can really attract investors' attention and thus make investors gradually incorporate the ESO-related expense into their valuation assessments subsequent to the issuance of these new disclosure rules in 2003, this would naturally explain the observed declining fashion in positive pricing effect of *ESOexp_disc* over time. However, there are also several possible interpretations for the results.

First, the mean disclosed ESO expense for the period 2008-2009 is more than triple the amount for the period 2004-2007; therefore, we conjecture that the observed negative pricing effect of disclosed ESO expense during 2008-2009 could be caused by the "size effect". That is, if large amounts of disclosed ESO expense could attract investor attention to a greater extent, this could lead to a more pronounced negative impact on firm value. Consistent with the size effect view, we do find large size disclosed ESO-related expense is negatively associated with firm value in both

2008 and 2009. However, contrary to our expectation, small amounts of ESO expense is also negatively related to firm value in 2008. Taken together, the results indicate that disclosed ESO expense negatively affects firm value after No. 39 becomes effective, irrespective of the size of disclosed ESO expense.

Second, an alternative interpretation is the positive effect is caused by firm's profitability. Namely, to the extent that investors believe loss firms are less likely to translate ESO compensation expense into future earnings, they will price disclosed ESO expense negatively for such firms. Thus, if disclosed ESO expense for loss (profitable) firms during 2008-2009 are significantly and negatively (positively) priced by the market, this will provide evidence supporting that the negative market valuation effect of disclosed ESO expense is actually driven by firm's profitability rather than No. 39. We find that disclosed ESO expense for loss firms is significantly and negatively related to firm value in 2009, congruent with the profitability hypothesis. On the other hand, however, we also find that ESO expense is significantly and negatively associated with firm value for both 2008 and 2009, which is incongruous with the profitability argument. In summary, the negative pricing effect of ESO-related expense during the 2008-2009 is unlikely driven by the profitability. Rather, the result is more in line with the "No. 39 effect" interpretation.

Lastly, in addition to the No. 39 effect explanation, we provide a complementary explanation, the "fade-out effect". That is, the result is also consistent with the notion that as time frame lengthens between option grant date and the valuation test date, more benefits associated with incentive effects of ESOs granted in prior years will be recognized in equity book value and residual incomes. This leads to a more pronounced negative valuation effect of disclosed ESO expense over time.

Moreover, we find that investors price positively the unrecognized ESO expense for firms in information services industry. One possible interpretation of the result is that there are relatively fewer firms in the sector; therefore, they are less likely to attract mass media, analysts and investors to follow, resulting in a misinterpretation as to the economic implications of ESOs (Aboody 1996).

As a robustness check, we also use two-stage least square technique to address the simultaneity issue in the per share regression analysis setting. Consistent with the findings in the total dollar amounts analysis, we find disclosed ESO expense is significantly and negatively associated with share price. More importantly, we find the coefficient on the recognized ESO expense is insignificantly negative, suggesting that the insignificant result in the total dollars analysis is not driven by the simultaneity issue.

To our best knowledge, in Taiwan, this paper is the first to examine the market valuation of disclosed ESO expense before and after No. 39. More importantly, we find that even though managers behave as if they are trying to circumvent the adverse effect of ESO expense under No. 39, apparently investors could see through the economic implications underlying the ESO-related compensation expense disclosed in the footnotes.

The remainder of this paper proceeds as follows. Section 2 provides the institutional background. Section 3 presents the related studies and hypotheses. Section 4 details the data obtained. Section 5 shows empirical results. Section 6 describes additional analyses. Lastly, Section 7 summarizes and concludes the study.

2. Institutional background

In 2001, the Financial Supervisory Commission (hereafter FSC, formerly known as the Securities and Futures Commission) of Taiwan amended the Securities

and Exchange Act and since then allowed public firms to grant stock options to their top executives and employees. Starting from 2003, more and more *high-tech* firms of Taiwan use stock option plans to incentivize their talented employees, leading to an increasing trend in the number of options outstanding.[5,6]

In 2003, the ARDF of Taiwan issued Interpretations No. 70, 71, 72 and 205, requiring firms to use the *fair value* method or the *intrinsic value* method to account for their ESOs[7]. Beginning 2004, if choosing to use the fair value method, firms should first measure the fair value of options on the grant date and then recognize in the income statement an amortized option expense over the vesting period. Alternatively, if firms choose to use the intrinsic value method, they need to disclose the ESO-related expense information in the footnotes to the financial statements as if firms had employed the fair value method to price their ESOs[8]. In fact, almost all firms in the high-tech sector of Taiwan choose to use the intrinsic value method; and thus, typically recognize nothing in their income statements. In 2007 August, the ARDF of Taiwan issued Statement No. 39, *Accounting for Stock-Based Compensation*, which requires firms to use the fair value method to account for options granted on or after January 1, 2008. Under No. 39, firms do not have to apply

[5] High-tech firms are defined as those classified under industry classification codes (IC) from 24 to 31 in the Taiwan Stock Exchange (TSE). Unless otherwise specified, all statistics in this paper are based on the sample firms in the high-tech industry. See Section 4.1 for detailed information regarding TSE industry classification system.

[6] The number of ESO-issuing firms increases from 208 in 2003 to 385 in 2007, representing an 85% increase over the period. Moreover, the number of options outstanding at fiscal year-end increases from 3.8 billion shares in 2003 to 7.3 billion shares in 2007, an increase of more than 90%. Further, untabulated statistics indicates that the percentage of number of options outstanding to that of common shares outstanding at year-end increases from 1.64% in 2003 to 2.38% in 2007. Moreover, the estimated fair value of ESOs outstanding at year-end is about NT$ 70 billion in 2004 and has increased more than twofold, i.e., NT$ 165 billion until 2007.

[7] The accounting for stock-based compensation specified in the Interpretations No. 70, 71, 72 and 205 are in spirit consistent with the U. S. Financial Accounting Standard Board (FASB) SFAS No. 123, *Accounting for Stock-based Compensation*, and Accounting Principle Board (APB) Opinion No. 25, *Accounting for Stock Issued to Employees*.

[8] In addition to the *pro forma* information, firms are also required to disclose in the footnotes the input assumptions of the option pricing model they use to estimate the option value.

retrospective application for options granted prior to 2008; however, they still need to disclose the option-related *pro forma* information in the footnote for options granted prior to 2008; and meanwhile, recognize ESO-related compensation expense for options granted in 2008.

It is very likely that the new recognition rule of accounting for ESOs encourages firms to issue more options before No. 39 becomes effective, if the management believes that the recognition of ESO expense could adversely affect the perception of firm's profitability. Figure I shows an interesting pattern regarding the number of options granted for years from 2004 to 2009. It presents an unusual pike in 2007 and this high volume of option grants is much larger than would be expected by chance. Compared with an average number of one billion shares granted from 2004 to 2006, 4.5 billion shares were granted in 2007 alone, 4.5 times that granted from 2004 to 2006.[9] The consequence of such grants in 2007 is reflected in the size of disclosed ESO expenses in 2008 and 2009, as shown in Figure II. The average disclosed ESO expense in 2008 and 2009, NT$ 21 million, more than triple that from 2004 to 2007. In contrast, Figure III shows only a negligible ESO expense recognized in the income statement during the same period. This scenario provides researchers a natural setting

[9] In addition, the huge grant in 2007 could be attributed to the expensing policy of employee stock bonuses (ESB). Under No. 39, firms are required to expense their ESB starting January 1, 2008 as well. Prior to January 1, 2008, the number of shares distributed to top executives and employees is obtained by dividing the amount of the stock bonus by the par value or NT$10. However, according to the new accounting rule, the number of shares to be paid is computed using the market price per share, which in general has been substantially greater than the par. Accordingly, the number of ESBs distributed to employees will drop significantly in 2008. "For example, the number of shares to be paid to a typical employee of Taiwan Semiconductor Manufacturing Company Limited (TSMC) in 2008 is expected to, on average, drop by 80%, according to the KPMG Certified Public Accountants Taiwan" (The *China Times*, August 15, 2007). In addition, estimated by the 104 Job Bank, the largest job search website in Taiwan, the average annual pay for a typical employee in high-tech industry will drop by approximately NT$220,000. (The *China Times*, December 3, 2007). Because the real income obtained by employees is very likely to decrease due to the new accounting standard, to retain their high-talented employees, firms have to compensate their employees by other means. The favorable accounting for options could motivate firms to issue more options rather than to increase cash compensation.

to investigate whether the market incorporates into its valuation assessment the disclosed ESO expenses regardless of their reporting regime.

3. Related studies and hypothesis development

Prior studies provide evidence that the disclosed ESO expense is negatively related to share prices (e.g., Chamberlain and Hsieh 1999; Li 2002; Aboody et al. 2004) and conclude that investors view disclosed ESO expense as an expense of the firm that is measured with sufficient reliability to be reflected in their valuation assessments (Aboody et al. 2004). Likewise, Balsam et al. (2005) find that investors view the ESO expense as a cost to the firm, irrespective of their reporting regimes. The evidence is consistent with the notion under the EMH that since the structure of compensation contracts can be inferred from information disclosed in footnotes, the reporting regimes do not matter.

On the other hand, Bell et al. (2002) find that the market appears to value the ESO expense not as an expense but as an intangible asset of the firm. Moreover, they also find the ESO expense negatively associated with future abnormal returns. Similarly, Garvey and Milbourn (2002) find that the size of unrecognized option compensation is a negative predictor of subsequent abnormal stock returns during 1996-2000. These findings cast a serious doubt as to whether investors correctly value firms with high levels of ESOs (Hirshleifer and Teoh 2003).

To render a possible interpretation on why the investors tend to overvalue the firms with higher ESOs, Hirshleifer and Teoh (2003) suggest the psychological fact that individuals focus on salient components of their environment at the expense of information items that are less salient or require additional cognitive processing. They consider earnings as highly salient, while footnote disclosures are less salient in their form of presentation, and require greater cognitive processing to generate a modified

summary measure of performance (Hirshleifer and Teoh, p.365). On the same issue, Bloomfield (2002) suggests that managers make many decisions motivated, at least partly, by a desire to make it harder for investors to uncover information because the managers do not want to affect their firms' stock prices.

The alternative notions, in contrast to the EMH, presented by Hirshleifer and Teoh (2003) and Bloomfield (2002) could naturally explain why firms tend to expend resources in lobbying to affect regulatory choices among alternative informationally equivalent reporting regimes.[10] The opposition by firms to expensing ESO seems to reflect a belief that investors tend to overlook information that is not presented saliently (Hirshleifer and Teoh 2003) or investors could systematically underreact to information contained in footnotes, since they are more costly to extract (Bloomfield 2002).

The main purpose of the study is to investigate whether investors incorporate the disclosed ESO expenses in the footnotes into their valuation assessment despite of their less salient reporting regimes. The new recognition rule of stock-based compensation in Taiwan provides a natural setting for researchers to investigate the very issue.

To formulate a testable hypothesis, we need additional assumptions. First, we assume that the benefits associated with option incentive effects are reflected in equity book value and residual incomes. Second, the cost related to ESO compensation is reliably measured and is reflected in the disclosed ESO expense variable. To the extent that these assumptions can reasonably hold, we expect the disclosed ESO

[10] For example, Dechow et al. (1996) provide evidence that firms which protested the 1993 proposal of Financial Accounting Standard Board (FASB) to expense the ESOs, used options more heavily in their incentive plans, paid higher compensation, and used options more intensively for their top executives. They conclude that the protests were probably driven by the motivation that managers tried to hide the magnitude of the stock-based compensation.

expense to be negatively associated with share prices.[11] Alternatively, an insignificant or a positive association between disclosed ESO expenses and share prices will support the position of Hirshleifer and Teoh (2003) and Bloomfield (2002).

To address our research question, we incorporate the future employee options into the residual income (RI) model (Ohlson 1995; Li 2002) using a method similar to the *asset/liability method* proposed by Landsman et al. (2006). Since the method complies with the clean surplus relation, it produces accounting numbers that best capture the dilution effects of ESOs on the current shareholder value (Landsman et al. 2006).[12] Following Li (2002), we use the value of options granted for the current year as a proxy for expected future option value and express the theoretical model as follows.[13]

$$V^S_0 = BVE_0 + \sum_{t=1}^{\infty} \frac{E_0[NI_t - r * BVE_{t-1}]}{(1+r)^t} - \sum_{t=1}^{\infty} \frac{E_0[ESO_t]}{(1+r)^t} - V^O_0 \qquad (1)$$

where V^S_0 is current market value of common shareholder equity. BVE_0 is the current book value of equity. NI_t is net income for the time t. r is the risk-free interest rate. ESO_t is the value of option granted for the time t. V^O_0 is the value of options

[11] The empirical approach used in this study is to test the value relevance of disclosed employee stock option (ESO) expense. According to Barth et al. (2001), an accounting number is deemed value relevant only if the amount reflects information relevant to investors in valuing the firm and is measured reliably enough to be reflected in share prices. Therefore, a significantly negative relation between the disclosed ESO expense and share prices can be found (and therefore deemed value relevant) only if that amount reflects information relevant to investors in valuing the firm and is measured reliably enough to be reflected in share prices. In other words, we base our interpretations of the test results on this assumption underlying the value relevance tests. Notably, the validity of this assumption is not contingent upon which country the data are drawn from. In addition, as can be seen later in the paper, we do not specify an additional variable in the model to capture the benefit effect associated with option-base compensation. As such, the incentive effects, if any, will presumably be captured by book value of equity and residual incomes. This modeling practice can also be found in the ESO-related studies (e.g., Aboody et al. 1996; Aboody et al. 2004; Li 2002). Again, this assumption is not dependent on the data sources. Accordingly, we do not have particular reason to doubt the validity of the two assumptions in Taiwan context.

[12] The fair value method under SFAS 123 and the intrinsic value method under APB 25 both violate the clean surplus relation (Aboody 2006), and thus require further adjustments to recover the equity value to current shareholders (Landsman et al. 2006).

[13] For detail derivation, see Li (2002) or Landsman et al. (2006).

currently outstanding. $E[\cdot]$ is the expectation operator. Equation (1) shows that the current market value of common equity can be expressed as a function of book value of equity, future residual income, and the expected future option value as well as the value of options currently outstanding. With reference to Li (2002) and Landsman et al. (2006), the empirical model we use to test the market valuation of ESO compensation is as follows,

$$\begin{aligned} Equity\_mv_{i,t} = {} & \alpha_0 + \alpha_1 Equity\_bv_{i,t} + \alpha_2 RI\_t{+}1_{i,t} + \alpha_3 RI\_t{+}2_{i,t} \\ & + \alpha_4 ESOexp\_disc_{i,t} \\ & + \alpha_5 FVopt\_outstdng_{i,t} \\ & + \sum(Y=2005 \text{ to } 2008)\, \theta_Y YR_{Yi,t} \\ & + \sum(I=25 \text{ to } 31)\, \phi_I IND_{Ii,t} \\ & + \varepsilon_{i,t} \end{aligned} \qquad (2)$$

where *Equity_mv* is market value of common stock outstanding at fiscal year-end. *Equity_bv* is book value of common equity as of fiscal year-end. *RI_t+1* is the residual income measured as net income for the period *t+1*, minus *Equity_bv* (lagged one year, i.e., at time *t*) times 2%, the risk-free interest rate, measured as the average interest rate of 10-year treasury bond over the sample period. *RI_t+2* is *RI_t+1* times 1 plus the earning growth rate, measured as the annual growth rate of operating income.[14] *ESOexp_disc* is the disclosed ESO expense, measured as reported net income minus *pro forma* net income. Because firms are not required to provide *pro forma* earnings information if they grant no options to their employees, we therefore assume the disclosed ESO expense to be zero if such information is missing; *i* and *t* stands for firms and years, respectively.

FVopt_outstdng is the Black-Schole (BS) value of ESOs outstanding at the fiscal year-end. We set share price equal to the sample mean price in each year, and thereby, to some extent, we can remove the mechanical relation between ESO value

[14] Another earning growth rate proxy, annual growth rate of net income, is also used for robustness test purpose.

and stock price. In addition, we use the weighted average exercise price as the striking price. The risk-free interest rate is measured as the weighted average yield on treasury bonds with a term equal to the disclosed weighted average remaining option life. Next, we use the average dividend yield over the last two years as a proxy for expected dividend yield. Stock return volatility is measured as the annualized standard deviation of monthly stock return calculated over the past 60 months. If the historical stock return is shorter than 60 months, the available data are used instead. We use the weighted average remaining option life as the proxy for expected option life.[15] Finally, we plug in the BS formula the aforementioned input assumptions to estimate the fair value per option outstanding at fiscal year-end. Then, the total fair value of options outstanding is obtained by multiplying the per option value by the number of options outstanding at fiscal year-end.

For firms with options outstanding at the year-end but fail to provide complete information on input assumptions pertaining to their outstanding options, we use the following approximation procedure to estimate individual firm's per option value outstanding at year-end.

First, for each year, we calculate the sample average per option value outstanding at year-end for firms in each of the eight industry sectors. Then, the firm's estimated option value outstanding at year-end is obtained by multiplying the industry-year average per option value by the number of options outstanding at year-

[15] The 35th paragraph of the Statement requires firms to disclose "…the weighted-average remaining contractual life (WARCL) for options outstanding at the date of the latest statement of financial position presented". Thus, this rule allows us to collect this information directly from the footnote disclosure to firm's annual report. In general, the number of options outstanding at year-end is composed of several grants with different contractual life remaining in years. To calculate the WARCL, firms first determine the remaining contractual term for each group of stock option grants and then apply a weighted average based on the number of options. Specifically, the weight for a particular group of option grants is determined by the ratio of the number of that group of options to the total number of options outstanding at year-end. Namely, WARCL is the sum of the remaining contractual life in years multiplied by their corresponding weights, for all groups of options.

end. This estimation procedure is necessary since we would otherwise lose about 50% of the observations, thus undermining significantly the power of our tests. In addition, the approximation procedure is reasonable, since the missing data are estimated according to the peer firm's per option value within the same fiscal year.[16] Furthermore, firms typically do not disclose the year-end number of options outstanding if the option number at year-end is zero. Thus we assume that no options are outstanding at year-end if such information is missing. Lastly, *YR* is a dummy, which equals one if *YR* equals year and zero otherwise; *IND* is a dummy, which equals one if *IND* equals the TSE industry classification code and zero otherwise.

Our analysis focuses on the total dollar amount instead of per share amount, in doing so we can bypass unnecessary complications such as the endogeneity issue arising from the positive relation between the ESO values and stock prices on the per share basis. In Section 6.3, we also conduct additional analyses using variables on per share basis after controlling for the endogeneity issue.

We also add the recognized ESO expense variable, *ESOexp_recog*, to test if investors take the recognized ESO expense information into their valuation assessment. The regression model is listed as follows.

$$\begin{aligned} Equity\_mv_{i,t} = {} & \alpha_0 + \alpha_1\, Equity\_bv_{i,t} + \alpha_2\, RI\_t{+}1_{i,t} + \alpha_3\, RI\_t{+}2_{i,t} \\ & + \alpha_4\, ESOexp\_disc_{i,t} \\ & + \alpha_5\, ESOexp\_recog_{i,t} \\ & + \alpha_6\, FVopt\_outstdng_{i,t} \\ & + \textstyle\sum (Y=2005 \text{ to } 2008)\ \theta_Y YR_{Yi,t} \\ & + \textstyle\sum (I=25 \text{ to } 31)\ \phi_I IND_{Ii,t} \\ & + \varepsilon_{i,t} \end{aligned} \qquad (3)$$

[16] An alternative way to address the missing data issue is to use a dummy variable that equals one if FVopt_outstdng is available and zero otherwise. Our inference does not change regardless of the procedure used. Additionally, if we drop missing data from our data set, only 682 firm-year observations are available, representing 256 distinct firms. Our inferences remain unchanged for either data set. We also calculate the average value per option for all firms in each year as well as the average value per option for each industry sector. The regression analyses generate qualitatively similar results.

If investors view the disclosed ESO expense as an expense, we expected α_4 to be significantly negative. Further, as discussed in Section 3, investors probably put little weight on recognized ESO expense due to its negligible size. If investors ignore the recognized ESO expense, we expected α_5 to be insignificant.

In Taiwan, the FASB's position regarding the recognition procedure of the ESO expense is quite clear, as specified in paragraph 11 of No. 39,

> *"The entity shall recognize the goods or services received in a share-based payment transaction when the goods or services are received and recognize an expense when the goods or service are consumed or sold".*

The additional *pro forma* ESO-related disclosure requirement serves as, at most, an expedient measure for the absence of official accounting standards. The purpose of such disclosures is to help investors better understand the possible dilution effects of option grants on firms' profitability. To provide further insights into whether investors incorporate the disclosed ESO expense into their valuation assessment after No. 39 is enforced, we also examine if investors price negatively the disclosed ESO expense to a greater extent for 2008 and 2009.

4. Data and sample

4.1 Sample selection criteria

First, from the Taiwan Economic Journal (TEJ) database, the most widely used financial data bank in Taiwan, we select all listed firms with non-zero number of options outstanding at fiscal year-end from 2004 to 2009 in Taiwan Stock Exchange (TSE) and Over-the-Counter (OTC) markets. A total of 701 firms meet this criterion and the number of firm-year observations is 4,206. Next, we hand collect input assumptions of the option pricing model from the footnote disclosures to the annual

reports retrieved from the Market Observation Posting System (MOPS)[17]. For those firms that disclose incomplete input assumptions relevant to calculate option value outstanding at fiscal year-end, we use an approximated option value instead, as discussed in Section 3.

Next, if firms do not disclose *pro forma* earnings information or report any recognized ESO expense, we then assume disclosed or recognized ESO expense to be zero. Further, some firms' market value and book value of common equity are not available from the TEJ data bank, we thus delete 357 and 141 observations, respectively. The final sample consists of 3,708 observations, representing 701 distinct firms over the sample years from 2004 to 2009. Panel A of Table I shows the data selection procedure and the final dataset.

According to the TSE industry classification code (IC, hereafter), the *high-tech* or electronic industry in Taiwan consists of eight distinct sectors, from Semiconductor Manufacturers (IC=24) to Other Electronics (IC=31). Panel B of Table I provides a list of industry codes with corresponding industry names. From 2004 to 2009, only a negligible number of non-electronic firms grant ESOs to their employees. The number of ESO-issuing firms in the non-electronic sector is on average 39 each year, representing only 3% of all listed firms for each sample year.[18] As such, our analyses in this study focus mainly on firms in high-tech industry.

Panel B of Table I also reveals the data distribution across eight industry classifications. Firms in the Electronic Parts and Components (IC=28) and Semiconductor Manufacturing (IC=24) sectors, representing about 40 percentage of

[17] MOPS is an on-line database similar to the Electronic Data Gathering, Analysis, and Retrieval system (EDGAR) administered by the U. S. Securities and Exchange Commission (SEC).
[18] The number of option-granting firms ranges from 31 to 49 in each of the sample years. The total number of listed firms is about 1,276 during the sample period. The percentage of number of non-electronic option-issuing firms to the total number of listed firms on average ranges from 2-3%.

all sample firms, are heavy option users. On the other hand, there are only 40 firms in the Information Service sector (IC=30), representing 6% of all sample firms. Panel C shows the sample evenly distributed over the sample period.[19]

4.2 Descriptive statistics

Table II reveals that the market value of firms' common equity doubles the book value of equity, indicating that high-tech firms in Taiwan are characterized by their markedly promising growth potential as evident by their price-to-book (P/B) ratios. The mean value of *Equity_bv* is NT$ 8,124 million, indicating that our samples contain mainly larger firms. The mean for *RI_t+1* and *RI_t+2* are NT$ 761 and 1,368 million, respectively, which are consistent with the notion under the RI model that firms with P/B ratio greater than 1 are more likely to generate positive residual income in the future.[20] Further, *RI_t+1* also shows less volatility than *RI_t+2*, indicating that *RI_t+2* has greater uncertainty than *RI_t+1*. Next, the mean value of *ESOexp_disc* is NT$ 13 million, which is about 19 times that of *ESOexp_recog*. Moreover, as expected, more than 75% of *ESOexp_recog* observations are zero along with a barely volatile distribution, casting serious concerns as to whether significant pricing effect could be detected by regression analyses. Lastly, the mean (median) of BS value of option outstanding is NT$ 340 million, accounting for 4% of the book value of common equity.

5. Empirical results

[19] Since a great portion of sample firms disclose incomplete ESO-related information, about 40% of the observations will be deleted from my sample set if we do not use the estimation procedure, especially for those from 2004 to 2006. A couple of reasons account for the data unavailability. First, in the early years of the sample period, there are relatively less firms granting options to their employees (see Figure I), leading to fewer available data than those for latter years. Another reason is firms' lacking experience and skill to meet such intricate and complex disclosure requirements.

[20] Because *RI_t+1* and *RI_t+2* contain many outliers, we winsorize the data at 10 percentile on both sides. The test results stay qualitatively the same, irrespective of whether the winsorized or raw data are used. We only tabulate test results based on winsorized data, unless otherwise specified.

In Table III, column (1) indicates that the coefficients of *Equity_bv*, *RI_t+1*, and *RI_t+2* are all positive, as expected. Further, the coefficient of *ESOexp_disc* (-85.85, t=-9.78) is negative at 1% significance level. The negative pricing effect of *ESOexp_disc* could be inflated, since we do not control for the effect of option value outstanding at year-end on firm value. Further, column (2) shows that, again, the book value of equity and residual income proxies are all positively associated with firm value, as expected. As expected, the recognized ESO expense is negatively related to firm value, but it is insignificant (coefficient=-50.65; t=-0.85). The result for *ESOexp_recog* could be driven by various reasons. We will discuss this issue in greater detail.

Next, column (3) shows that the coefficient on *FVopt_outstdng* is significantly negative (coefficient=-0.16; t=-2.40), as expected. Column (4) shows that after controlling for the effect of the option value outstanding, *ESOexp_disc* (-84.64, t=-9.61) is still negatively related to firm value at 1% significant level. The result confirms our conjecture that the negative pricing effect of *ESOexp_disc* in column (1) is inflated by missing a relevant but omitted variable in the regression model, though the impact of such omission seems negligible.

Next, to test the pricing effect of the recognized ESO expense variable, we add *ESOexp_recog* to the regression and report the result in column (5). The coefficient of *ESOexp_recog* (-39.31, t=-0.66) is still insignificantly negative at 5% significance level as shown in column (2), after controlling for the effect of option value on firm value.

Further, we add *ESOexp_disc* along with *ESOexp_recog* to the regression and report the results in column (6). Column (6) shows that *ESOexp_recog* (coefficient=-8.64, t=-0.15) is still insignificantly negative, as shown in columns (2)

and (5). One possible interpretation of the result is that the average amount of recognized ESO expense during the sample period is too small to attract investors' attention, given its negligible size of dollar amount. Moreover, more than 75% of the observations contain zero value, making it hard for regression analyses to detect any meaningful association between market value of equity and recognized ESO expense.[21] Finally, the result also raises some concerns as to whether the insignificant association between *ESOexp_recog* and firm value is attributable to the mechanical relation between share prices and ESO values. We address this issue in Section 6.3.

More importantly, column (6) shows that *ESOexp_disc* (coefficient=-84.57, t=-9.59) is still significantly negative at 1% level after controlling for the effect of recognized ESO expense as well as the option value outstanding at year-end.[22] Additionally, the result supports the position that markets view disclosed but not recognized ESO expense as an expense of the firm, consistent with Chamberlain and Hsieh (1999), Li (2002), Aboody et al. (2004) and Balsam et al. (2006).[23]

6. Additional analyses

6.1 Cross-sectional analysis of pricing effect of ESO expense

[21] When alternative earnings growth proxy is used, the regression analysis produces similar results.

[22] The incentive effect derived from ESO compensation would be incorporated in residual incomes and book value of equity over time is one of the assumptions underlying our empirical tests. Under this assumption, one may concern that the disclosed expenses may not be independent of these variables. However, since how and in what manner the benefits from the ESO expenses are reflected in residual incomes and book value of equity could be very difficult to specify, if not impossible, it is unclear whether the disclosed ESO expenses are (or are not) linearly related to other independent variables. We do not particularly address this issue in our research design; however, whether disclosed ESO expenses (or other independent variables) suffer this multicollinearity problem can be assessed, to some extent, by the magnitude of the variance inflation factor (VIF). A large VIF, e.g., greater than 10, signifies potential trouble (Chatterjee, Hadi, and Price 2000). The VIFs for *ESOexp_disc*, *ESOexp_recog*, and *FVopt_outstdng* are 1.13, 1.02, and 1.02, respectively. Therefore, as suggested by the low VIFs, the multicollinearity issue should not seriously affect our inferences.

[23] We also use annual growth rate of net income, instead of operating income, as a proxy for earnings growth rate and our result still holds. Further, we use the raw data of *RI_t+1* and *RI_t+2* instead of the winsorized data and our result does not change. Moreover, we delete all estimated data of *FVopt_outstdng* from the approximation procedure and again the regression analyses produce similar results.

To gain more insights into how the pricing effect of ESO-related expense changes over time, we rerun regression (3) for each year and report the results in column (1) to (6) of Table IV. The coefficients on *Equity_bv*, *RI_t+1*, *RI_t+2*, and *FVopt_outstdng* for each year are very similar to those shown in Table III. The coefficients on *ESOexp_disc* are significant for five out of six years. Intriguingly, the t-statistics and signs for coefficients on *ESOexp_disc* demonstrate a stylized pattern over time. From 2004 to 2006, the coefficients on *ESOexp_disc* are significantly positive (t=5.31, 2.95 and 2.22, respectively). The coefficient becomes insignificantly negative for 2007 (t=-0.34) and then turns out to be significantly negative for 2008 (t=-4.00) and 2009 (t=-4.91). More interestingly, the corresponding t-statistics also present a unique pattern. The size of the absolute value of t-statistics decreases from 2004 to 2006 but increases from 2007 to 2009.[24] Lastly, to compare the differential pricing effect of ESO expenses on firm value before and after the new accounting rule becomes enforced, we run the regression for periods 2004-2007 and 2008-2009, separately. We report the results in column (7) and (8). Column (7) reveals that the coefficients on the first three variables are all positive, similar to those in columns (1) to (6). In addition, consistent with the results from year-by-year regressions, we find that, prior to 2008, *ESOexp_disc* is significantly and positively associated with firm value (coefficient=62.58, t=4.69). Further, the coefficient on *ESOexp_recog* is also positive (=360.20, t=1.19) but insignificant. [25] By contrast, column (8) shows that

[24] The regression procedures produce qualitatively similar results as shown in Table IV, if earnings growth rate is defined as the growth rate in net income rather than in operating income. The t-value is 5.35 in 2004 and then goes down to 2.19 in 2006. Then, the sign becomes negative in 2007 and the t-value changes from -0.21 in 2007 to -4.82 in 2009. We repeat the analyses using the raw data of *RI_t+1* and *RI_t+2* and the results remain unchanged, indicating that our result is not driven by the winsorized data. Finally, we delete all estimated data of *FVopt_outstdng* from the approximation procedure and our result still holds.

[25] Regression analysis produces a similar outcome as a result, when we use growth rate in net income rather than operating income.

ESOexp_disc is significantly and negatively related to firm value (coefficient=-104.03, t=-8.47) and coefficient on *ESOexp_recog* is also negative (=360.20, t=1.19) but it is insignificant.

There are several possible interpretations for the results. First, the result from year-by-year analysis clearly suggests that the negative market valuation effect of *ESOexp_disc* from pooled sample analysis is mainly driven by the negative pricing effect of disclosed ESO expense for 2008 and 2009. Since No. 39 becomes effective on 1 January 2008; and therefore, one possible interpretation is that the negative pricing effect is attributable to the new accounting rule for ESOs. However, at this point, it is too early to make any conclusions.

Next, we conjecture that the negative pricing effect for the period 2008-2009 could be driven by the *size effect*. That is, larger amounts of disclosed ESO expense are more likely to attract investor attention and thereby may lead to a more pronounced negative impact on firm value. As shown in Figure II, the mean disclosed ESO expense for the period 2008-2009 is more than triple the amount for the period 2004-2007. Thus, if "size effect" can account for the negative market valuation effect of ESO expense in 2008 and 2009, the "No. 39 effect" view will be weakened.

To test this conjecture, we partition the sample set into two groups, *Large_ESO* and *Small_ESO*, i.e., large-sized and small-sized disclosed ESO expense groups. We calculate the ratio of disclosed ESO expense to reported earnings and then categorize observations with ratios equal to or greater than (less than) the mean of disclosed expense-to-earnings ratios, 0.123, into *Large_ESO* (*Small_ESO*) group. We then conduct regression analyses cross-sectionally for both groups and report the results in Table V.

Column (1) of Table V shows that, as expected, the ratio of large-sized ESO expense-to-earnings demonstrates an increasing fashion. In particular, the ratio increases tremendously after No. 39 becomes effective. More importantly, we do find *ESOexp_disc* is negatively associated with firm value in both 2008 (coefficient=-12.31, t=-1.29) and 2009 (coefficient=-152.99, t=-4.46), consistent with the size effect view. Contrary to our expectation, however, column (2) reveals that small amounts of ESO expense is also negatively related to firm value in 2008 (coefficient=-85.91, t=-3.41) and 2009 (coefficient=-39.39, t=-1.42). This result, together with the results in column (1), indicates that disclosed ESO expense negatively affects firm value in 2008 and 2009, irrespective of the size of *ESOexp_disc*.

Notably, we find the pricing effect of *ESOexp_disc* in column (2) also exhibits a similar pattern as in Table IV, indicating that pattern is mainly attributable to small-sized rather than large-size ESO expense. Lastly, we do not provide interpretation of results for Large-ESO group during the 2004-2007, since we do not find any significant results probably due to the small number of observations. In summary, the finding of negative pricing effect for Small-ESO during 2008-2009 goes against what we expected under the size effect hypothesis. In addition, the negative valuation effect of ESO expense during 2008-2009 for both subsamples is more in line with the "No. 39 effect".

Another interpretation is that the negative results during 2008-2009 are attributable to profitability of the firm. Namely, to the extent that investors believe loss firms are less likely to translate ESO compensation expense into future earnings, they will price disclosed ESO expense negatively for such firms. Thus, if disclosed ESO expense for loss (profitable) firms during 2008-2009 are significantly and

negatively (positively) priced by the market, this will provide evidence supporting that the negative market valuation effect of disclosed ESO expense is actually driven by firm's profitability rather than No. 39. To test this conjecture, we separate dataset into two groups: *Profit* and *Loss*, the former comprising observations with positive reported net incomes and the latter composed of data with negative net incomes. We run the regressions separately for both subsamples and report the results in column (3) and (4) of Table V. Column (4) shows that *ESOexp_disc* for Loss is significantly and negatively related to firm value in 2009, congruent with the profitability hypothesis. On the other hand, however, column (3) also exhibits that ESO expense is significantly and negatively associated with firm value for both 2008 and 2009, which is incongruous with the profitability argument.[26] Further, we also incorporate growth potential into consideration by partitioning the sample into two groups, one containing observation with positive earnings and residual incomes and the other including data with negative earnings and zero or negative growth, and rerun the analysis. Untabulated results suggest a very similar pattern as shown in column (3) and (4), which are again discordant with the profitability view. In summary, the negative pricing effect of *ESOexp_disc* during the 2008-2009 is unlikely driven by the profitability. Rather, the result is more in line with the "No. 39 effect" interpretation.

Lastly, in addition to the No. 39 effect argument, we provide a complementary explanation for the stylized pattern of disclosed ESO expense-firm value relation, the "fade-out" effect. In 2003, the ARDF issued a series of new

[26] We find qualitatively similar results, if using observations with small-sized ESO expenses in our analysis. The result indicates that the negative pricing effect after 2008 is unlikely driven by the size and profitability effects. We do not use Large-ESO in the analysis, since Large-ESO contains only observations with positive earnings. Further, we also incorporate growth potential into consideration by partitioning the sample into two groups: one containing only observation with positive earnings and residual incomes and the other includes only data with negative earnings and zero or negative growth, and rerun the analysis. Untabulated results suggest a very similar pattern as shown in column (3) and (4), which are again discordant with the profitability view.

accounting rules for stock-based compensation, including Interpretations No. 70, 71, 72, and 205.[27] Voluminous ESO-related news are very likely to direct investor intention on how firm's operating results and financial position could be affected by these newly announced rules, thereby leading to intensive discussion over the accounting for stock-based compensation among commentators, standard setters, and accounting practitioners.[28] If such publicized discussions and debates can attract investors' attention and thus make investors gradually accommodate the disclosed stock-based compensation expense into their valuation assessments subsequent to the issuance of these new disclosure rules in 2003, this would explain the observed decreasing trend in positive pricing effect of *ESOexp_disc* over time. Further, the result is also consistent with the notion that as time frame extends between option grant date and the valuation test date, more benefits related to incentive effects of options granted in the past years will be recognized in book value of equity and residual incomes.

In summary, we find that the significant negative pricing effect of *ESOexp_disc* for both 2008 and 2009, regardless of the size of disclosed ESO expense. In addition, we also find market negatively price the disclosed expense in both 2008 and 2009 for profitable firms. These results could not be satisfactorily explained by size or profitability effects. Instead, the results are consistent with two complementary explanations, i.e., the No. 39 and "fade-out" effects.

6.2 Pricing effect of ESO expense across different industry sectors

Table VI reports the pricing effect tests for firms across different industry sectors. As shown in Table VI, most of the coefficients on the first three variables are

[27] In addition, Legislative Yuan of Taiwan, in 2006 May, amended Business Accounting Act requiring that firms record bonuses as expenses instead of the earnings distribution of the firm.
[28] See Interpretations No. 70, 71, 72, and 205 for such discussions.

positive. Further, the coefficients on *ESOexp_disc* for firms in five industry sectors are negative, four of which are significantly negative at 5% level. These results are consistent with the position that investors view the disclosed ESO expense as an expense to the firm, at least for those in the four industry sectors.

We notice that the coefficient on *ESOexp_disc* variable for firms in the Information Services (IC=30) sector is significantly positive. One possible interpretation is that there are 40 firms in the Information Services sector (see Panel B of Table I), representing only 6% of all firms in the electronic industry. Compared with the Electronic Parts and Components (IC=28) and Computer and Peripheral Equipment (IC=25) sectors, there are relatively fewer firms in the Information Services industry. Thus, investors in the Information Services sector are more likely to be less informed than those who follow the Electronic Parts and Components, and the Computer and Peripheral Equipment sectors, leading to a misinterpretation of the economic implications of ESOs[29]. Consistent with this argument, we also find positive results for firms in Electronic Products Distribution (IC=29), the second small scale industry.

We also find that the coefficient on *ESOexp_disc* variable is positive, though insignificant, for firms in the Optoelectronic (IC=26) sector. One interpretation is that firms within the optoelectronic industry appear to continuously demonstrate strong growth potential; and therefore, investors price their ESO-related expense in a positive manner. According to statistics from the Ministry of Economics Affairs (MOEA), the domestic optoelectronics industry has had an output value of NT$ 182 billion in 2008. This is likely to reach around NT$ 320 billion by the year of 2015,

[29] Aboody (1996) argues that, compared with those following large firms, investors following small firms are more likely to misinterpret the economic implications of ESOs since they are likely to be less informed.

representing a massive growth of nearly 76%. The MOEA also announced that investment in the flat panel and photovoltaic materials is likely to reach NT$ 5.9 billion in 2009, going up to NT$ 21.2 billion in 2012, nearly four-fold increase in a matter of three years.[30]

Regarding *FVopt_outstdng*, all coefficients are negative as expected, consistent with prior studies (Li 2002; Aboody et al. 2004). Finally, though the signs of the coefficient on *ESOexp_recog* are inconsistent across different industry sectors, none of them is significant, which is consistent with the findings in Table III and IV.

6.3 Two-stage least square (2SLS) procedure

Option pricing theory suggests option values are a positive function of the price of the underlying stock, leading to a mechanical relation, on the per share basis, between the disclosed ESO expense and share price (Aboody 1996; Bell et al. 2002; Aboody et al. 2004; Li and Wong 2005). We employ a two-stage least square (2SLS) method to address the simultaneity issue and to see whether our result still holds. More importantly, the test result can provide evidence on whether the insignificantly negative coefficient for recognized expense is driven by the simultaneity issue.

In the first stage, we use Tobit regressions. The use of Tobit model is appropriate since the dependent variable contains many observations of zero value.[31] We list the first-stage Tobit model for the disclosed ESO expense variable as follows.

$$\begin{aligned} ESOEXP\_DISC^*_{i,t} = {} & \alpha_0 + \alpha_1 REP\_l_{i,t} + \alpha_2 REP\_v_{i,t} + \alpha_3 REP\_i_{i,t} + \alpha_4 REP\_d_{i,t} \\ & + \alpha_5 VEST_{i,t} \\ & + \alpha_6 OPTGRNT_{i,t} \\ & + \alpha_7 BVE_{i,t} + \alpha_8 RI1_{i,t} + \alpha_9 RI2_{i,t} \\ & + \sum(Y=2005 \text{ to } 2008)\ \theta_Y YR_{Yi,t} \end{aligned}$$

[30] Sources: Pradeep Chakraborty, Photonics.com, August 14, 2009 and MOEA Industrial Technology Intelligence Service and Promotion Project.

[31] The number of zero-value observations to the total number of observations is about 30% and 90 % for disclosed ESO expense and recognized ESO, respectively. The option value outstanding variable contains only 2% of zero observations. Our result is insensitive to either the ordinary least square (OLS) or the Tobit procedure used in the first stage for the option value outstanding variable.

$$+\sum(I=25 \text{ to } 31)\ \phi_I IND_{Ii,t}$$
$$+\ \varepsilon_{i,t}$$

$$ESOEXP\_DISC_{i,t} = \begin{cases} ESOEXP\_DISC^*_{i,t} & if\ \ ESOEXP\_DISC^*_{i,t} > 0 \\ 0 & if\ \ ESOEXP\_DISC^*_{i,t} \le 0 \end{cases} \qquad (4)$$

In regression (4), *ESOEXP_DISC* equals the observed disclosed ESO expense deflated by the number of common shares outstanding at fiscal year-end, *ESOEXP_DISC**, if *ESOEXP_DISC** > 0, and zero otherwise. *REP_l*, *REP_v*, *REP_i*, and *REP_d* are the average of input assumptions from the most recent one to five years. For example, *REP_l* in 2004 is simply the reported expected option life for 2004; *REP_l* in 2008 is the average of the reported expected option life from 2004 to 2008. The reason we use the average reported input assumption is that *ESOexp_disc* is an aggregate expense including amortized expense from options granted in the current year as well as those from options granted in previous years. As such, the *ESOexp_disc* is determined by not only the input assumptions for current grants but by those for previous grants. *VEST* is the vesting period. *OPTGRNT* is the number of options granted for the year deflated by the number of common shares outstanding at year-end. *BVE* is the book value of equity deflated by the number of common shares outstanding at year-end. Both *RI1* and *RI2* are residual incomes for years *t+1* and *t+2*, deflated by the number of common stocks outstanding, respectively.

We list the first-stage Tobit model for the recognized ESO expense variable as follows.

$$\begin{aligned} ESOEXP\_RECOG^*_{i,t} = {} & \alpha_0 + \alpha_1\, rep\_life_{i,t} + \alpha_2\, rep\_vol_{i,t} + \alpha_3\, rep\_int_{i,t} + \alpha_4\, rep\_div_{i,t} \\ & + \alpha_5\, VEST_{i,t} \\ & + \alpha_6\, OPTGRNT_{i,t} \\ & + \alpha_7\, BVE_{i,t} + \alpha_8\, RI1_{i,t} + \alpha_9\, RI2_{i,t} \\ & + \sum(Y=2005 \text{ to } 2008)\ \theta_Y YR_{Yi,t} \\ & + \sum(I=25 \text{ to } 31)\ \phi_I IND_{Ii,t} \\ & + \varepsilon_{i,t} \end{aligned}$$

$$ESOEXP\_RECOG_{i,t} = \begin{cases} ESOEXP\_RECOG^*_{i,t} & if\ \ ESOEXP\_RECOG^*_{i,t} > 0 \\ 0 & if\ \ ESOEXP\_RECOG^*_{i,t} \le 0 \end{cases} \quad (5)$$

In regression (5), *ESOEXP_RECOG* equals the observed recognized ESO expense deflated by the number of common shares outstanding at year-end, *ESOEXP_RECOG**, if *ESOEXP_RECOG** > 0, and zero otherwise. *rep_life*, *rep_vol*, *rep_int*, and *rep_div* are reported input assumptions, i.e., reported option life, reported stock return volatility, reported risk-free interest rate and reported dividend yield, collected from the firm's footnotes to annual report. All other variables are as defined in regression (4).

We list the first-stage Tobit model for the option value outstanding variable as follows.

$$\begin{aligned} FVOPTOSTD^*_{i,t} = {} & \alpha_0 + \alpha_1 WAR\_l_{i,t} + \alpha_2 HIS\_v_{i,t} + \alpha_3 HIS\_i_{i,t} + \alpha_4 HIS\_d_{i,t} \\ & + \alpha_5 OPTGRNT_{i,t} \\ & + \alpha_6 OPTNUM_{i,t} \\ & + \alpha_7 BVE_{i,t} + \alpha_8 RI1_{i,t} + \alpha_9 RI2_{i,t} \\ & + \sum(Y=2005 \text{ to } 2008)\ \theta_Y YR_{Yi,t} \\ & + \sum(I=25 \text{ to } 31)\ \phi_I IND_{Ii,t} \\ & + \varepsilon_{i,t} \end{aligned}$$

$$FVOPTOSTD_{i,t} = \begin{cases} FVOPTOSTD^*_{i,t} & if\ \ FVOPTOSTD^*_{i,t} > 0 \\ 0 & if\ \ FVOPTOSTD^*_{i,t} \le 0 \end{cases} \quad (6)$$

In regression (6), *FVOPTOSTD* equals the observed fair value of options outstanding at year-end deflated by the number of common shares outstanding at year-end, *FVOPTOSTD**, if *FVOPTOSTD** > 0, and zero otherwise.[32] *WAR_l*

[32] According to paragraph #46 of No. 39, firms may adjust the ESO expenses during the vesting period, if subsequent information indicates a difference between the expected and actual number of options cancelled by forfeiture. Accordingly, the disclosed ESO expense could be negative due to such revisions and the number of negative disclosed ESO expense observations in our dataset is 21. In addition, none of the recognized ESO expense data is negative. Further, the fair value of options outstanding is non-negative. Many financial and economic outcome variables such as stock repurchase (Dittmar, 2000) and durable goods consumption are always non-negative values. In the case of stock repurchases, a large proportion of the population is at zero, known as a censoring problem, and this can make the population distribution severely skewed and results in estimation bias. Tobin (1958) proposed an econometric model called Tobit model to deal with censored dependent variable. Consider the following models:

represents the weighted average remaining life disclosed in the footnotes to the annual report. *HIS_v*, *HIS_i*, and *HIS_d* are historical inputs, as defined in Section 4. *OPTNUM* is the number of options outstanding deflated by the number of common shares outstanding at year-end. All other variables are as defined in regression (4).

In the second stage, we first estimate regression (7) to test the pricing effect of ESO-related expense by using the original ESO-related expense and fair value of options outstanding at year-end.

$$\begin{aligned} SP_{i,t} = {} & \alpha_0 + \alpha_1 BVE_{i,t} + \alpha_2 RI1_{i,t} + \alpha_3 RI2_{i,t} \\ & + \alpha_4 ESOEXP\_DISC_{i,t} \\ & + \alpha_5 ESOEXP\_RECOG_{i,t} \\ & + \alpha_6 FVOPTOSTD_{i,t} \\ & + \sum(Y=2005 \text{ to } 2008)\, \theta_Y YR_{Yi,t} \\ & + \sum(I=25 \text{ to } 31)\, \phi_I IND_{Ii,t} \\ & + \varepsilon_{i,t} \end{aligned} \quad (7)$$

Regression (7) is similar to regression (3). The main difference is the variables in regression (7) are measured on the per share basis. *SP* is the closing price per share at year-end. *ESOEXP_DISC*, *ESOEXP_RECOG*, and *FVOPTOSTD* are *ESOexp_disc*, *ESOexp_recog* and *FVopt_outstdng*, deflated by the number of common shares outstanding at fiscal year-end, respectively. All other variables are as defined in regression (4).

Next, we obtain the fitted values, i.e., *ESOEXP_DISC_hat*, *ESOEXP_RECOG_hat* and *FVOPTOSTD_hat* from STATA directly and use the fitted values instead of *ESOEXP_DISC*, *ESOEXP_RECOG*, and *FVOPTOSTD* in the second-stage regression analysis. We then estimate regression (8) as follows.

$$SP_{i,t} = \alpha_0 + \alpha_1 BVE_{i,t} + \alpha_2 RI1_{i,t} + \alpha_3 RI2_{i,t}$$

$y_i^* = x_i \beta + u_i$
$y_i = \begin{cases} y_i^* & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* \le 0 \end{cases}$
where y_i^* is a latent variable. We can think of y_i^* as the desired level of stock repurchases. y_i is the actual value.

$$
\begin{aligned}
&+ \alpha_4 \, ESOEXP\_DISC\_hat_{i,t} \\
&+ \alpha_5 \, ESOEXP\_RECOG\_hat_{i,t} \\
&+ \alpha_6 \, FVOPTOSTD\_hat_{i,t} \\
&+ \sum(Y=2005 \text{ to } 2008) \, \theta_Y YR_{Yi,t} \\
&+ \sum(I=25 \text{ to } 31) \, \phi_I IND_{Ii,t} \\
&+ \varepsilon_{i,t}
\end{aligned} \tag{8}
$$

We expect α_4, α_5, and α_6 to be negative and report the results in Table VII. Column (1) shows results from regression (7). *ESOEXP_DISC* (coefficient=28.96; t=11.96) and *ESOEXP_RECOG* (coefficient=193.46; t=6.30) both are significantly and positively associated with share prices[33]. The results confirm the position that the option-based compensation expense variable suffers from the simultaneity relation and thus the inferences based on results from OLS analyses on the per share basis without controlling for the simultaneity relation could be seriously misleading (Li 2002; Aboody et al. 2004; Li and Wong 2005).

Next, we use the instrumental variables instead and report the regression results in columns (2) to (4). Column (2) shows that *ESOEXP_DISC_hat* (coefficient=-36.48; t=-3.92) and *FVOPTOSTD_hat* (coefficient=-0.02; t=-0.66) are both negatively associated with *SP*, consistent with Table III. Further, similar to Table III, column (3) shows that the coefficient of *ESOEXP_RECOG_hat* is negative (coefficient=-40.48; t=-1.52). This result suggests that the 2SLS may address the simultaneity issue to some extent, but does not affect our inference. Further, *FVOPTOSTD_hat* (coefficient=-0.02; t=-0.73) is still negatively related to share prices.

Finally, column (4) suggests that after we control for the simultaneity issue and the option value outstanding at year-end, *ESOEXP_DISC_hat* (coefficient=-31.03; t=-2.66) is still significantly negatively associated with share prices, and on the other hand, *ESOEXP_RECOG_hat* (coefficient=-13.22; t=-0.78) is again insignificantly

[33] Since in the first-stage regression we need additional instruments to construct our instrumental variables in regressions (4), (5) and (6), the number of observations drops to 1,394.

negatively related to share prices. In summary, these findings are consistent with what we report in Table III, indicating that our results are robust to either total dollar amounts or per share analyses.

7. Conclusion

In Taiwan, more and more firms adopt option plans to incentivize their top executives and employees starting from 2003. The number of options outstanding at year-end in 2007 almost doubles compared with that in 2003. Similarly, the corresponding disclosed ESO expense increases dramatically from 2004 to 2009. However, only a negligible amount of ESO expense is recognized in the same period. More importantly, most of the ESO expense is merely disclosed but not recognized in the financial statement, raising the concerns as to whether investors correctly incorporate those disclosed ESO expense into their valuation assessment.

The purpose of this paper is to examine how investors price the disclosed *pro forma* ESO expense and recognized ESO expense before and after No. 39 becomes enforced. We use a sample consisting of 701 firms in the electronic industry in Taiwan over a sample period from 2004 to 2009. We find that recognized ESO expense does not have significant pricing effect. One possible interpretation is that the average amount of recognized ESO expense during the sample period is too small to attract investors' attention.

On the other hand, we find that investors on average view disclosed but not recognized ESO expense as an expense to the firm, after controlling for the effect of recognized ESO expense as well as the option value outstanding at year-end. Additional analyses suggest that the result still holds after we address the simultaneity issues.

Further, we find the negative pricing effect of the disclosed expense becoming more salient after 2008. Cross-sectional analyses suggest that before 2007, disclosed ESO expense is significantly and positively related to firm value, implying that investors apparently consider ESO-related expense an intangible asset of the firm. In addition, the positive pricing effect gradually changes over time. Beginning from 2007, the disclosed ESO expense becomes negatively associated with firm valuation, but insignificantly. Finally, we find disclosed ESO expense is significantly and negatively associated with firm value in 2008 and 2009. The results cannot be satisfactorily explained by the size of ESO expense or the profitability of the firm. Instead, the results are more congruent with the two complementary explanations: the No. 39 and "fade-out" effects. That is, subsequent to the disclosure rules, investors gradually incorporate the expense into their valuation assessment. In addition, the result is also consistent with the notion that as time frame lengthens between option grant date and the valuation test date, more benefits associated with incentive effects of ESOs granted in prior years will be recognized in equity book value and residual incomes. This leads to a more pronounced negative valuation effect of disclosed ESO expense over time.

Additionally, we find the disclosed ESO expense positively related to their share prices for firms in the Information Services industry groups. Since there are relatively fewer firms in the Information Service sector; they are thus less likely to attract mass media, analysts and investors to follow, leading to a misinterpretation of the economic implications of ESOs.

This paper has several caveats. First, we use only firms within high-tech industry and thus the inferences from the analyses cannot be generalizable to firms in non-electronic industries and how these non-high tech firms affects the inferences is

not clear. Second, our results could be attributable to unknown measurement errors or model misspecifications, albeit the results survive several robustness tests.

Reference

Aboody, D. (1996) Market Valuation of Employee Stock Options. *Journal of Accounting and Economics* 22: 357-391.

_____, M. E. Barth and R. Kasznik. (2004) SFAS No.123 stock-based compensation expenses and equity market values. *The Accounting Review* 79(2):251-275

Aboody, D. (2006) Discussion of "Which approach to accounting for employee stock options best reflects market pricing?" *Review of Accounting Studies* 11: 247-251.

Balsam, S., E. Bartov, and J. Yin. (2006) Disclosure versus Recognition of Option Expense: An Empirical Investigation of SFAS No. 148 and Stock Returns. Working Paper. Temple University, New York University and University of Texas at San Antonio.

Bell, T. B., W. R. Landsman, B. L. Miller, and S. Yeh. (2002) The Valuation Implication of Employee Stock Option Accounting for Profitable Computer Software Firms. *The Accounting Review* 77(4): 971-996

Bloomfield, R. J. (2002) The "Incomplete Revelation Hypothesis" and financial reporting. *Accounting Horizon* 16 (3): 233-243.

Chamberlain, S. L. and S. J. Hsieh. (1999) The effectiveness of SFAS No. 123 employee stock option cost disclosures. Working paper, Santa Clara University.

Chatterjee, S., A. S. Hadi, and B. Price. 2000. Regression Analysis by Example, 3rd edition. New York: John Wiley & Sons.

Dechow, P. M., A. Hutton, R. G. Sloan. (1996) Economic consequence of accounting for stock-based compensation. *Journal of Accounting Research* 34, 1-20.

Dittmar, A. K. (2000), Why do firms repurchase stock? *Journal of Business* 73, 331-355.

Fama, E. F. (1970) Efficient capital markets: a review of theory and empirical work. *Journal of Finance* 25 (2): 383-417.

Garvey, G. T. and T. T. Milbourn. (2002) Do stock prices incorporate the potential dilution of employee stock options? Working paper, Washington University, St. Louis.

Hall, B. J. (2000) What you need to know about stock options. *Harvard Business Review* (March- April): 121-129.

Hirshleifer D. and S. H. Teoh. (2003) Limited attention, information disclosure, and financial reporting. *Journal of Accounting and Economics* 36: 337-386.

Li, F. and M. H. F. Wong. (2005) Employee stock options, equity valuation, and the valuation of option grants using a warrant-pricing model. *Journal of Accounting Research* 43 (1): 97-131.

Li, H. (2002) Employee stock options, residual income valuation and stock price reaction to SFAS 123 footnote disclosures. Working paper. The University of Iowa.

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.

Ohlson, J. A. (1995) Earnings, book values, and dividends in equity valuation. *Contemporary Accounting Research* 11: 661-687.

_____. (2001) Earnings, Book Values, and Dividends in Equity Valuation: An Empirical Perspective. *Contemporary Accounting Research* 18 (1): 107-20

Rees, L. and D. M. Stott. (2001) The Value-Relevance of Stock-Based Employee Compensation Disclosures. *The Journal of Applied Business Research* 17 (2):105-116

Tobin James (1958), Estimation of relationship for limited depended variable, *Econometrica*, 26(1), 24-36.

Figure I
Number of options granted for the year from 2004 to 2009 (in thousands)

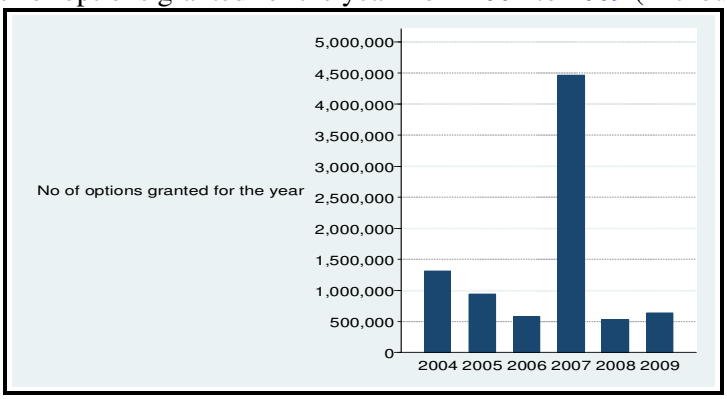


Figure II
Mean of disclosed ESO expense from 2004 to 2009 (in thousand NT dollars)

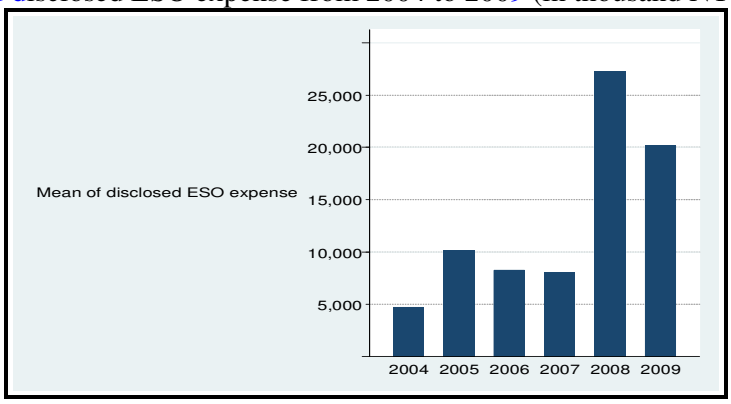
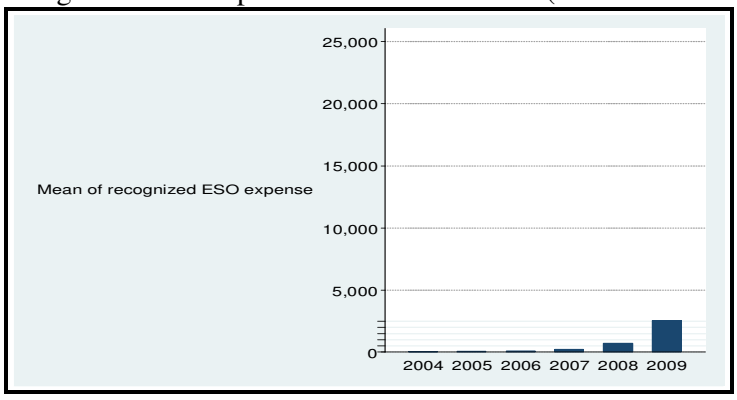


Figure III
Mean of recognized ESO expense from 2004 to 2009 (in thousand NT dollars)



Note: From Taiwan Economic Journal (TEJ) data bank, we collect sample firms within the high-tech industry (TSE industry classification codes from 24 to 31) with non-zero number of options outstanding at fiscal year-end during the sample years from 2002 to 2009.

Table I
Sample firms in the high-tech sector from 2004 to 2009

Panel A
Data selection criteria

		No of firm-year observations
701 firms with options outstanding at fiscal year-end from 2004 to 2009		4,206
Less:	Market value of common equity is missing	357
	Book value of common equity is missing	141
		3,708

Note: 3,708 firm-year observations represent 701 distinct firms. The BS inputs are collected from footnotes to firms' annual reports. Financial data are obtained from TEJ data bank.

Panel B
Distribution of sample firms among eight Taiwan Stock Exchange (TSE) industry classifications

Industry classification code	Industry name	Sample firms	
		N	%
24	Semiconductor	117	16
25	Computer and Peripheral Equipment	102	15
26	Optoelectronic	95	14
27	Communications and Internet	66	9
28	Electronic Parts and Components	165	23
29	Electronic Products Distribution	48	7
30	Information Services	40	6
31	Other Electronics	68	10
	Total	701	100 %

Panel C
Distribution of observations over the sample period

Year	Observations	%
2004	547	15
2005	598	16
2006	628	17
2007	671	19
2008	571	15
2009	693	19
Total	3,708	100

Table II
Descriptive statistics of main variables

Variable[a, b]	N	Units	Mean	Std. dev.	Q1	Median	Q3
Equity_mv	3,708	NT$ million	16,257	82,790	962	2,432	6,808
Equity_bv	3,708	NT$ million	8,124	32,429	789	1,640	3,916
RI_t+1	3,708	NT$ million	761	975	13	261	1,910
RI_t+2	3,708	NT$ million	1,368	1,846	1	346	3,334
ESOexp_disc	3,708	NT$ million	13	69	0	0	1
ESOexp_recog	3,708	NT$ million	0.7	10	0	0	0
FVopt_outstdng	3,708	NT$ million	340	8,618	0	0	71

Note:
[a] All BS inputs are collected from footnotes to firm's financial statement; financial data are from TEJ data bank.
[b] The variable definitions are described as follows.

Equity_mv =the market value of common stock outstanding as of fiscal year-end.
Equity_bv =the book value of common equity as of fiscal year-end.
RI_t+1 =the residual income measured as net income, minus *Equity_bv* (lagged one year) times 2%, the risk-free interest rate, measured as the average interest rate of 10-year treasury bond over the sample period.
RI_t+2 =*RI_t+1* times 1 plus the earning growth rate, measured as the annual growth rate of operating income.
ESOexp_disc =the disclosed ESO expense, measured as reported net income minus *pro forma* net income collected from the annual reports.
ESOexp_recog =the recognized ESO expense collected from the annual reports.
FVopt_outstdng =the BS value of employee stock options outstanding at the fiscal year-end. First, we estimate per option value, using the sample mean of closing stock prices at annual report date in each year as the stock prices and the weighted average exercise prices as the striking prices. The risk-free interest rate is measured as the weighted average yield on treasury bonds with a term equal to the weighted average remaining option life. Next, we use the average dividend yield over the past two years as the expected dividend yield. Stock return volatility is measured as the annualized standard deviation of monthly stock return calculated back over the past 60 months. We use the weighted average remaining option life as a proxy for expected option life. Lastly, *FVopt_outstdng* is obtained by timing the BS per option value by the number of options outstanding at fiscal year-end. If the above input assumptions are missing, for each year, we calculate the average per option value outstanding at year-end for firms in each of eight industry sectors. Then, the firm's estimated option value outstanding at year-end is obtained by multiplying the industry-year average per option value by the number of options outstanding at year-end.

Table III
Regressions of market value of equity on book value of equity, expected residual income for year t+1, expected residual income for year t+2, disclosed ESO expense, recognized ESO expense, and estimated fair value of options outstanding at fiscal year-end

Independent variables[b]	Exp. sign	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	?	-1,140,565 (-0.57)	-3,105,810 (-1.53)	-2,967,076 (-1.46)	-1,040,173 (-0.52)	-2,926,420 (-1.44)	-1,032,835 (-0.51)
Equity_bv	+	2.33***[a] (122.14)	2.29*** (122.07)	2.29*** (122.23)	2.33*** (122.18)	2.29*** (122.14)	2.33*** (122.12)
RI_t+1	+	1.65 (1.08)	1.53 (0.99)	1.58 (1.02)	1.68 (1.10)	1.57 (1.02)	1.67 (1.10)
RI_t+2	+	0.55 (0.69)	0.80 (0.99)	0.77 (0.95)	0.53 (0.66)	0.77 (0.94)	0.53 (0.66)
ESOexp_disc	-	-85.85*** (-9.78)			-84.64*** (-9.61)		-84.57*** (-9.59)
ESOexp_recog	-		-50.65 (-0.85)			-39.31 (-0.66)	-8.64 (-0.15)
FVopt_outstdng	-			-0.16** (-2.40)	-0.11 (-1.59)	-0.16** (-2.34)	-0.11 (-1.57)
Year dummy		controlled	controlled	controlled	controlled	controlled	controlled
Industry dummy		controlled	controlled	controlled	controlled	controlled	controlled
Adjusted R-squared		0.82	0.82	0.82	0.82	0.82	0.82
N=		3,708	3,708	3,708	3,708	3,708	3,708

Note:
[a] *, **, and *** stand for statistically significant at 0.1, 0.05, and 0.01 levels, respectively (two-tailed). t-statistics are reported in parentheses.
[b] See Table II for definitions of all variables. See Table I for industry names under TSE industry classification system.

Table IV

Regression of market value of equity on book value of equity, expected residual income for year t+1, expected residual income for year t+2, disclosed ESO expense, recognized ESO expense, and estimated fair value of ESO value at fiscal year-end for each year and for subsamples (2004-2007 and 2008-2009)

Independent variables[b]	Exp. sign	(1) 2004	(2) 2005	(3) 2006	(4) 2007	(5) 2008	(6) 2009	(7) 2004-2007	(8) 2008-2009
Intercept	?	1,948,875 (0.84)	3,760,872 (1.00)	2,313,744 (0.51)	3,463,786 (0.98)	3,090,614 (1.19)	4,305,862 (1.21)	-140,752 (-0.06)	-2,074,208 (-0.78)
Equity_bv	+	2.31***[a] (64.87)	2.43*** (47.27)	2.59*** (48.14)	2.59*** (60.38)	1.73*** (44.78)	2.55*** (62.62)	2.50*** (104.63)	2.26*** (72.05)
RI_t+1	+	0.19 (0.09)	2.88 (0.85)	2.09 (0.53)	2.97 (0.81)	0.77 (0.24)	2.95 (0.77)	2.06 (1.20)	1.71 (0.61)
RI_t+2	+	-0.36 (-0.32)	0.94 (0.51)	-0.06 (-0.03)	0.47 (0.24)	-0.31 (-0.19)	-0.48 (-0.24)	0.17 (0.19)	-0.07 (-0.05)
ESOexp_disc	-	157.24*** (5.31)	54.00*** (2.95)	68.77** (2.22)	-15.14 (-0.34)	-56.43*** (-4.00)	-92.19*** (-4.91)	62.58*** (4.69)	-104.03*** (-8.47)
ESOexp_recog	-	152.11 (0.04)	-16.28 (-0.01)	905.34 (1.11)	265.00 (0.75)	19.63 (0.11)	-81.23 (-1.34)	360.20 (1.19)	-22.10 (-0.39)
FVopt_outstdng	-	-18.03*** (-12.62)	-8.77*** (-8.51)	-11.65*** (-9.01)	-11.21*** (-10.12)	-17.96*** (-6.20)	-0.02 (-0.36)	-11.14*** (-19.26)	-0.02 (-0.36)
Industry dummy		controlled	controlled	controlled	controlled	controlled	controlled	controlled	controlled
Year dummy		-	-	-	-	-	-	controlled	Controlled
Adjusted R-squared		0.91	0.83	0.82	0.87	0.79	0.87	0.85	0.82
N=3,708		547	598	628	671	571	693	2,444	1,264

[a] *, **, and *** stand for statistically significant at 0.1, 0.05, and 0.01 levels, respectively, (two-tailed). t-statistics are reported in parentheses.

[b] See Table II for definitions of all variables. See Table I for specific industry names under TSE industry classification system.

Table V

Coefficient estimates (t-statistics) on *ESOexp_disc* for observations with large-sized vs. small-sized disclosed ESO expense and for observations with positive vs. negative earnings

	(1) Large-ESO			(2) Small-ESO			(3) Profit			(4) Loss		
Year	Coefficients (t-statictics)	N	%	Coefficients (t-statistics)	N	%	Coefficients (t-statistics)	N	%	Coefficients (t-statistics)	N	%
2004	-	3	1	145.72*** (4.91)	544	99	163.53*** (4.98)	433	79	71.12*** (3.77)	114	21
2005	-14.26 (-1.58)	13	2	119.64*** (4.06)	585	98	41.30* (1.65)	447	75	88.19*** (18.84)	151	25
2006	-21.20 (-0.42)	16	3	76.82** (2.47)	612	97	68.54**(1.98)	514	82	-30.68 (-1.07)	114	18
2007	47.35 (1.58)	21	3	-15.23 (-0.33)	650	97	8.86 (0.12)	557	83	49.26*** (16.16)	114	17
2008	-12.31 (-1.29)	300	53	-85.91*** (-3.41)	271	47	-43.28*** (-2.98)	479	84	14.26 (1.53)	92	16
2009	-152.99*** (-4.46)	372	54	-39.39 (-1.42)	321	46	-48.77** (-2.28)	581	84	-17.07* (-1.72)	112	16
		725			2,983			3,011			697	

Note: [a] *, **, and *** stand for statistically significant at 0.1, 0.05, and 0.01 levels, respectively, (two-tailed). t-statistics are reported in parentheses.

[b] *Large-ESO* (*Small_ESO*) represents observations with disclosed ESO expense-to-earnings ratios equal to or greater than (less than) the mean of disclosed ESO expense-to-earnings ratios. *Profit* (*Loss*) stands for observations with positive (negative) earnings.

Table VI

Regressions of market value of equity on book value of equity, expected residual income for year t+1, expected residual income for year t+2, disclosed ESO expense, recognized ESO expense, and estimated fair value of options outstanding at fiscal year-end for each industry

Independent variables[b]	Exp. sign	TSE Industry classification code[b](IC) 24 (1)	25 (2)	26 (3)	27 (4)	28 (5)	29 (6)	30 (7)	31 (8)
Intercept	?	-9,653,342* (-1.69)	-2,014,164 (-1.47)	-1,321,273 (-0.55)	-1,894,560 (-0.52)	-2,844,745*** (-4.55)	-818,221* (-1.40)	-461,263 (-0.79)	-4,962,441 (-1.39)
BVE	+	2.82***[a] (65.29)	2.00*** (64.75)	1.24*** (45.94)	1.55*** (48.79)	2.64*** (53.54)	2.15*** (28.74)	0.95*** (6.91)	3.48*** (87.67)
RI_t+1	+	2.13 (0.39)	2.30** (1.97)	3.64** (2.00)	7.47 (1.25)	0.04 (0.05)	-0.71 (-0.83)	10.21*** (6.16)	0.95 (0.34)
RI_t+2	+	-1.13 (-0.39)	-0.25 (-0.40)	1.64** (1.67)	2.03 (0.64)	0.51 (1.22)	0.58 (1.25)	-4.89* (-5.52)	1.19 (0.83)
ESOexp_disc	-	-140.05*** (-8.30)	-44.87*** (-4.04)	7.41 (0.62)	-66.12 (-0.52)	-15.19** (-2.07)	14.61 (1.49)	129.28*** (4.40)	-75.75** (-0.34)
ESOexp_recog	-	-110.15 (-1.10)	-50.47 (-0.51)	177.24 (1.06)	-325.87 (-0.28)	-33.17 (-0.61)	81.48 (0.07)	90.93 (0.60)	1,496.50 (0.24)
FVopt_outstdng	-	-0.10 (-0.95)	-3.94*** (-2.96)	-3.32*** (-4.12)	-3.65 (-0.45)	-9.86*** (-14.99)	-11.70*** (-5.21)	-1.63 (-0.35)	-17.44*** (-5.51)
Year dummy		controlled	controlled	controlled	controlled	controlled	controlled	controlled	controlled
Adjusted R-squared		0.89	0.91	0.85	0.89	0.84	0.86	0.49	0.96
N=3,708		618	553	473	368	860	266	215	355

Note:

[a] *, **, and *** stand for statistically significant at 0.1, 0.05, and 0.01 levels, respectively (two-tailed). t-statistics are reported in parentheses.

[b] See Table II for definitions of all variables. See Table I for specific industry name under TSE industry classification system.

Table VII
Regressions of the closing price per share at year-end on book value of equity, expected residual income for year t+1, expected residual income for year t+2, disclosed ESO expense, recognized ESO expense, and estimated fair value of options outstanding at fiscal year-end (all independent variable are measured on the per share basis) – 2SLS

Independent variables[b]	Exp. sign	(1)	(2)	(3)	(4)
Intercept	?	12.95*** (3.42)	15.76*** (5.77)	6.78 (1.47)	12.43** (2.45)
BVE	+	1.19*** (11.23)	1.53*** (12.27)	1.45*** (11.99)	1.54*** (12.29)
RI1	+	1.06*** (5.52)	1.37*** (6.48)	1.38*** (6.45)	1.39*** (6.53)
RI2	+	-0.15 (-1.58)	-0.21** (-2.06)	-0.25** (-2.33)	-0.23** (-2.18)
ESOEXP_DISC	-	28.96*** (11.96)			
ESOEXP_RECOG	-	193.46*** (6.30)			
FVOPTOSTD	-	-0.01 (-0.38)			
ESOEXP_DISC_hat	-		-36.48*** (-3.92)		-31.03*** (-2.66)
ESOEXP_RECOG_hat	-			-40.48 (-1.52)	-13.22 (-0.78)
FVOPTOSTD_hat	-		-0.02 (-0.66)	-0.02 (-0.73)	-0.02 (-0.69)
Year dummy		controlled	controlled	controlled	controlled
Industry dummy		controlled	controlled	controlled	controlled
Adjusted R-squared		0.37	0.24	0.23	0.24
N=		1,394	1,394	1,394	1,394

Note:
[a] *, **, and *** stand for statistically significant at 0.1, 0.05, and 0.01 levels, respectively, (two-tailed). t-statistics are reported in parentheses.
[b] *BVE* is *Equity_bv* deflated by the number of common shares at year-end. *RI1* (*RI2*) is *RI_t+1* (*RI_t+2*) deflated by the number of common shares outstanding at fiscal year-end. *ESOEXP_DISC* is *ESOexp_disc* deflated by the number of common shares outstanding at fiscal year-end. *ESOEXP_RECOG* is *ESOexp_recog* deflated by the number of common shares outstanding at fiscal year-end. *FVOPTOSTD* is *FVopt_outstdng* deflated by the number of common shares outstanding at fiscal year-end. *ESOEXP_DISC_hat*, *ESOEXP_RECOG_hat* and *FVOPTOSTD_hat* are the fitted values from regression (4), (5) and (6), respectively. See Table I for specific industry name under TSE industry classification system.