

**Employee Stock Options (ESOPs) and Restricted Stock:
Valuation Effects and Consequences**

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Management Options and Restricted Stock: Valuation Effects and Consequences

In the last decade, firms have increasingly turned to offering employees options and restricted stock (often with restrictions on trading) as part of compensation packages. Some of this trend can be attributed to the entry of young, cash poor technology firms into the market, many of which have to use equity because they have no choice. However, many larger market cap firms that can afford to pay cash compensation have used stock based compensation as a way of aligning managerial interests with stockholder interests. In this paper, we begin by looking at motives, good and bad, for using equity based compensation, and trends over the last few years. We then turn to the accounting rules, old and new, that govern how equity compensation is recorded and reported. Finally, we consider how best to incorporate employee options and restricted stock – both past and prospective – into discounted cash flow and relative valuation models.

In recent years, many firms have shifted towards equity-based compensation for their employees. It is not uncommon for firms to grant millions of options annually not only to top managers but also to lower level employees. These options create a potentially value decreasing overhang over common stock values. What used to be a simple practice of dividing the estimated equity value by the number of shares outstanding to arrive at value per share has become a daunting exercise. Analysts struggle with how best to adjust the number of shares outstanding (and the value per share) for the possibility that there will be more shares outstanding in the future. They attempt to capture this dilution effect by using the partially diluted or fully diluted number of shares outstanding in the company. As we will see in this paper, these approaches often yield misleading estimates of value per share and we propose a sounder way of dealing with employee options.

We also explore other forms of equity compensation, including the use of restricted and unrestricted stock grants to management, and the effects of such grants on value per share. Like options, these stock grants reduce the value of equity to existing stockholders and have to be considered in valuation.

Equity Based Compensation

There are three forms of equity compensation. The oldest and most established one is to give stock or equity in the firm to management, employees or other parties as compensation. This second is a variant, with common stock and equity grants to employees, with the restriction that these shares cannot be claimed and/or traded for a period after the grants. The third is equity options, allowing employees to buy stock in the firm at a specified price over a period; these usually come with restrictions as well.

In recent decades, equity-based compensation has become a bigger part of overall employee compensation, initially at U.S. firms and more recently in other markets as well. There are three major factors behind this trend:

1. Stockholder-Manager Alignment: As publicly traded firms have matured and become larger, the interests of stockholders (who own these firms) and managers (who run these firms) have diverged. The resulting agency costs have been explored widely in the literature. In a seminal work, Jensen and Meckling argue that managers, acting in

their best interests, often take actions that destroy stockholder value.¹ Researchers have shown that managers, left to their own devices, accumulate too much cash, borrow too little and make poor investments and acquisitions. Offering equity in the firm to managers may reduce the agency problem by making managers think more like stockholders.

2. Scarcity of Cash: The shift towards equity compensation was most pronounced at technology firms in the United States. In particular, young technology firms entered the market in droves in the 1990s, many with little to report in terms of revenues or earnings. Given their cash constraints, the only way in which these firms could attract and hold on to employees was by offering them non-cash compensation, usually with the only currency of value that they had which was their own equity.
3. Employee Retention: Most equity compensation comes with a requirement that the employee stay with the firm for a period of time (the vesting period) to lay claim to the compensation. Employees who receive options or restricted stock as compensation are therefore more likely to stay with a firm, especially if it represents a large proportion of their overall wealth.²
4. Accounting and Tax Treatment: The move towards equity compensation has been aided and abetted by accounting standards that have treated firms that use equity based compensation much more generously (by reporting higher earnings) than firms that use cash based compensation, and by tax laws that provide tax benefits to firms that used options to reward employees.

Of the three forms of equity compensation, the use of common stock represents the fewest problems from a valuation perspective. The value of the stock grant is treated as a compensation expense (when the grant is made) and the number of shares increases in the firm. Stock option grants and restricted stock create more difficult issues for analysts,

¹ Jensen, M.C., Meckling, W.H., 1976. *Theory of the firm: Managerial behavior, agency costs and ownership structure*. Journal of Financial Economics 3, 305-360.

² An additional advantage of using equity options to compensate employees is that their value is likely to be highest when the sector is doing well and alternative job opportunities are greatest for employees. Thus, the cost of switching jobs will be greatest when the opportunity to do so is highest. For a more extensive discussion of this motive and some empirical evidence, see P. Oyers and S. Schaefer, 2004, *Why Do Some Firms Give Stock Options To All Employees? An Empirical Examination of Alternative Theories*, Journal of Financial Economics, v75, pg 99-132.

both in terms of measuring earnings in any period and in coming up with values per share. In the sections that follow, we will first look at equity options and then turn our attention to restricted stock issues.

I. Employee Options

Firms use equity options to reward managers as well as other employees. There are two effects that these options have on value per share. One is created by options that have already been granted. These options, some of which have exercise value today, reduce the value of equity per share, since a portion of the existing equity in the firm has to be set aside to meet these eventual option exercises. The other is the likelihood that these firms will use options on a continuing basis to reward employees or to compensate them. These expected option grants reduce the portion of the expected future cash flows that accrue to existing stockholders and thus the value per share today. In the sections that follow, we will begin by looking at trends in the use of employee stock options and the types of firms where option grants are largest. We will also examine the characteristics of employee options and how they have been accounted for historically. We will close the section by revisiting the debate on whether employee stock options should be expensed and the new accounting rules that will govern option grants.

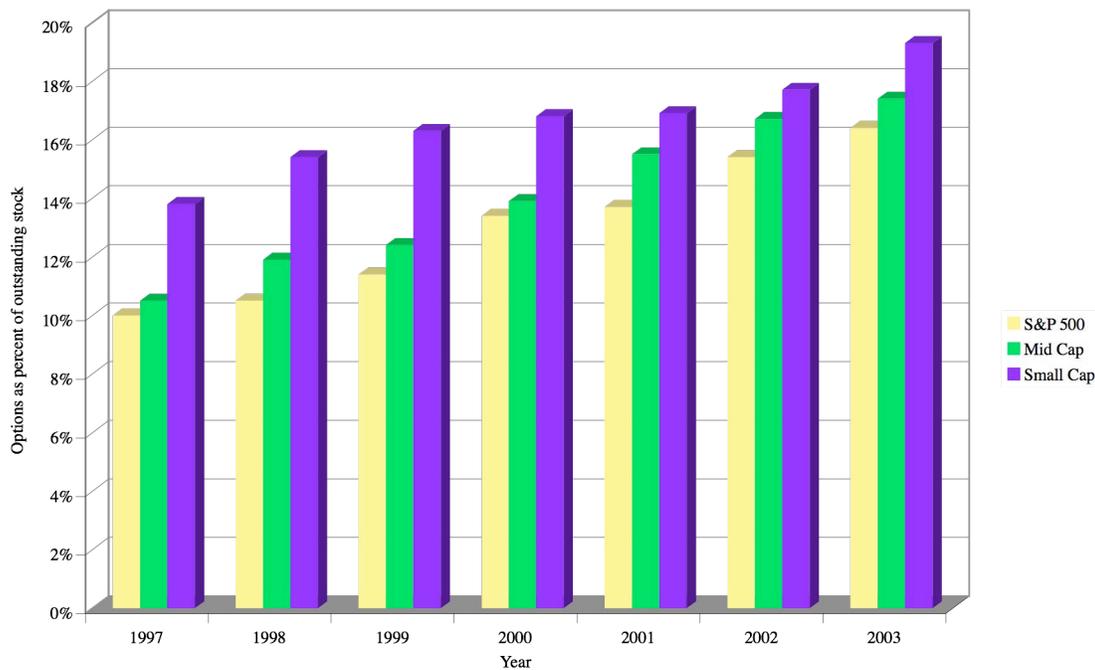
The Magnitude of the Option Overhang

The use of options in management compensation packages is not new to firms. Many firms in the 1970s and 1980s initiated option-based compensation packages to induce top managers to think more like stockholders. What is different about the more recent option grants, especially at technology firms? One is that management contracts at these firms are much more heavily weighted towards options than are those at other firms. The second is that the paucity of cash at these firms has meant that options are granted not just to top managers, but also to employees all through the organization, making the total option grants much larger. The third is that some of the smaller firms have used options as currency to meet operating expenses and pay for supplies.

Market Wide Trends

There are a number of different statistics that we can point to that show the growth in equity option compensation. The simplest measure is the number of employee options outstanding as a percent of the total outstanding shares, also called the option overhang. The Investor Responsibility Research Center (IRRC), an independent watch dog for shareholders, estimated that the overhang was 17% for the 1500 companies it tracks (including the S&P 500, mid cap and smaller cap stocks) in 2003, up from 15.7% in the previous year; the median value for the overhang was 16.3%, up from 14.8% in the prior year. Figure 1 graphs the overhang, as computed by IRRC, from 1997 to 2004:

Figure 1: Option Overhang at US Companies



While smaller companies have higher numbers of options outstanding than larger market cap companies, even the larger market cap companies in the S&P 500 reported an option overhang of 16.4%. The pervasiveness of options can also be seen in the number of companies that grant options to management and in the number where options outstanding represent a very high percent of the outstanding stock. In 2003, for instance, IRRC reported that almost 90% of the firms in their sample had some options overhang

and that 67 companies (about 4.6% of the sample) had more than a 40% overhang, up from 3.6% in 2002 and 3% in 2001.

Another measure of the reach of options is the number of employees who receive options as part of pay packages. The National Center for Employee Ownership estimated that almost 3 million employees received options as part of compensation in 2000, up from less than a million in 1990 and that about 10 million employees held stock options in that year. This is backed up by the national compensation survey of the Bureau of Labor Statistics in March 2003, which reported that about 8% of all employees received options as compensation. The number was much higher for white-collar employees (about 12%) than for blue-collar (6%) and service employees (2%). Notwithstanding recent attempts to widen option grants, they remained heavily loaded towards top management at firms. In 2002, for instance, the value of options granted to the CEO and the top 5 managers at S&P 500 firms accounted for about 9.5% of the total option grants.³

The decision by the Financial Accounting standards board to require all companies to begin expensing options, starting in 2006, has begun to have an effect on option grants. In 2004, IRRC reports a drop in the option overhang at all US companies and notes that companies are reexamining their option grant procedures in light of stockholder disapproval.

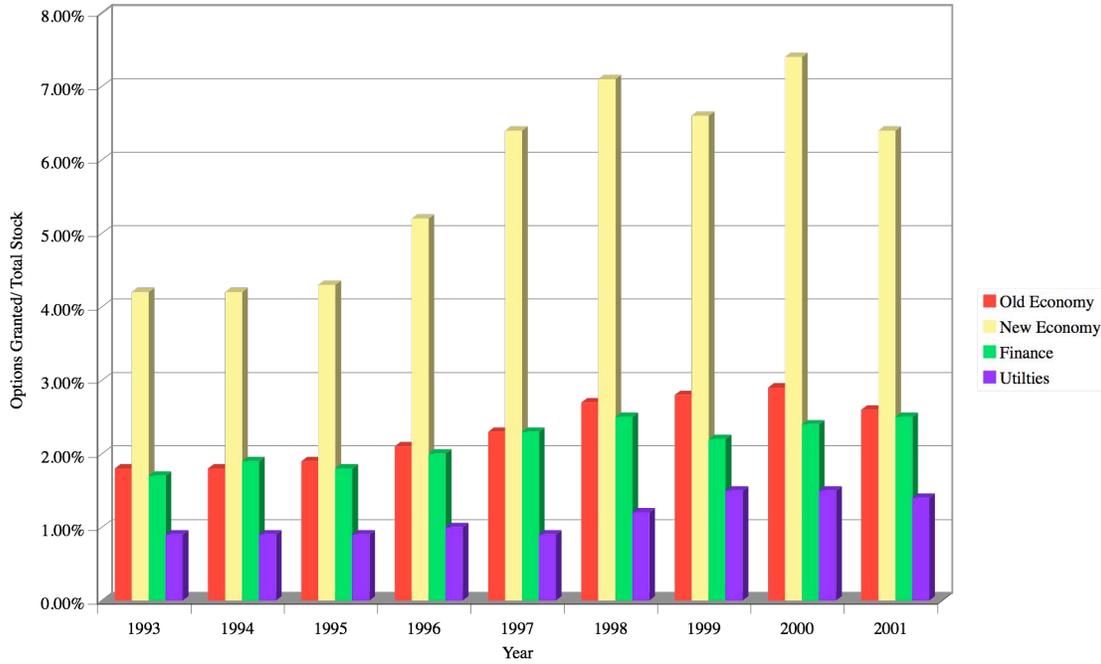
Who uses options?

The IRRC study, quoted in the last section, categorized firms into 10 economic sectors and examined the magnitude of the options overhang in each sector. Technology companies had the biggest average overhang of 24.4% in 2003, up from 20.8% in the previous year. Utility and energy companies had the smallest overhang, averaging less than 8% in 2003. These differences widened during the technology boom in the late 1990s, with the advent of internet and new technology firms. Hall and Murphy, in their study of the problems associated with the use of employee stock options, report on option

³ Hall, B.J. and K.J. Murphy, 2003, The Trouble with Stock Options, Working Paper, NBER. They note that the CEO and top management share of options has dropped from about 15% in the early 1990s to less than 10% in 2002.

grants at old economy and new economy firms from 1993 to 2002. Figure 2 summarizes their findings:

Figure 2: Option Grants by Sector



The differences across sectors may not be surprising but it is worth examining why they exist in the first place. In general, we can outline three factors that may explain these differences:

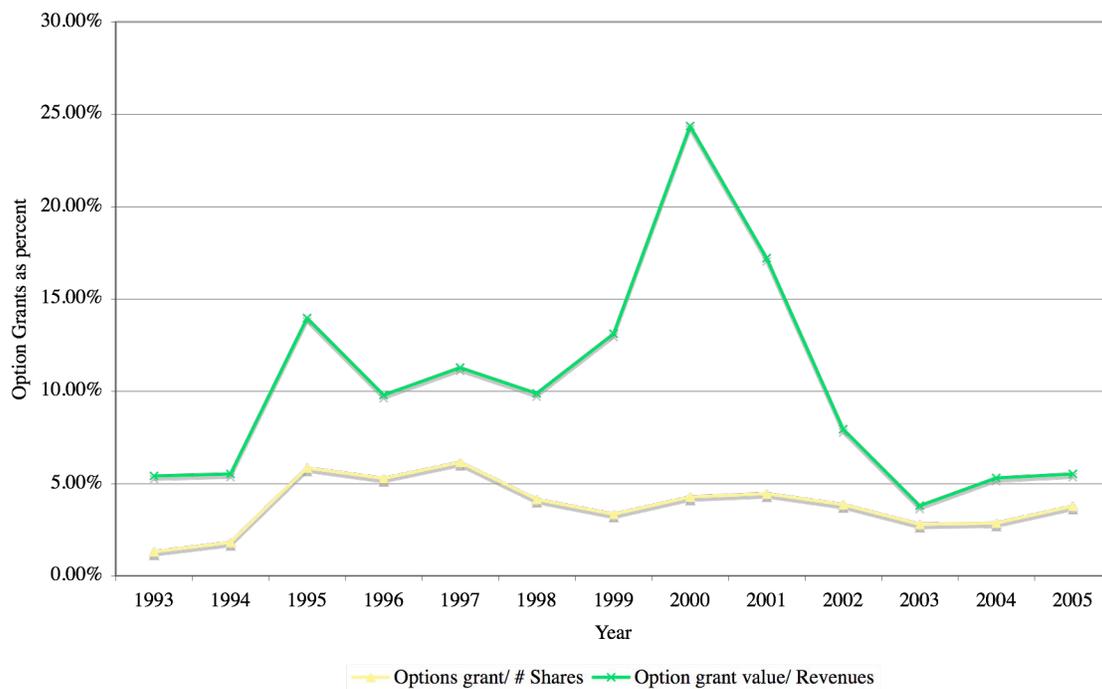
- a. Age and Growth Potential of firm: We would expect younger firms to use equity options substantially more than older and more mature companies. After all, if not having the cash to compensate employees is a factor behind the use of equity options, younger firms are far more likely to be cash constrained than more mature firms.
- b. Riskiness of firm: Riskier firms should be more likely to use equity options than safer firms. While most securities become less valuable as risk increases, options become more valuable. This is especially true if the market is over assessing the risk in a

company, since this firm's options will be over valued by the employees receiving the options.⁴

- c. Market Valuation of firm: As we will see in the next section, there is a tax advantage that accrues to firms that use equity options as compensation. Firms that trade at high multiples of earnings will get a much bigger tax advantage from using options as compensation.

None of these characteristics are static and they will change as firms move through the life cycle. We would expect to see option grants, as a percent of outstanding stock, to be greatest at young, risky firms, with high market valuations, and to decline as growth levels off, cash flows increase and valuations come down to earth. Cisco provides an interesting case study of this transition, with figure 3 reporting on options granted as a percent of the outstanding stock every year from 1995 to 2004.

Figure 3: Option Grants at Cisco - 1993 to 2005



Cisco's option grants as a percent of outstanding stock has decline from above 5% in 1995 and 1996 to about 3% in the 2002-2005 period. The value of option grants peaked

⁴ Bergman, N. and D. Jenter, 2003, Employee Sentiment and Stock Option Compensation, Working Paper, MIT. They make the argument that overoptimistic employees over value option grants and that firms take

in 2000, at the peak of the stock market bubble, and has declined fairly dramatically since.

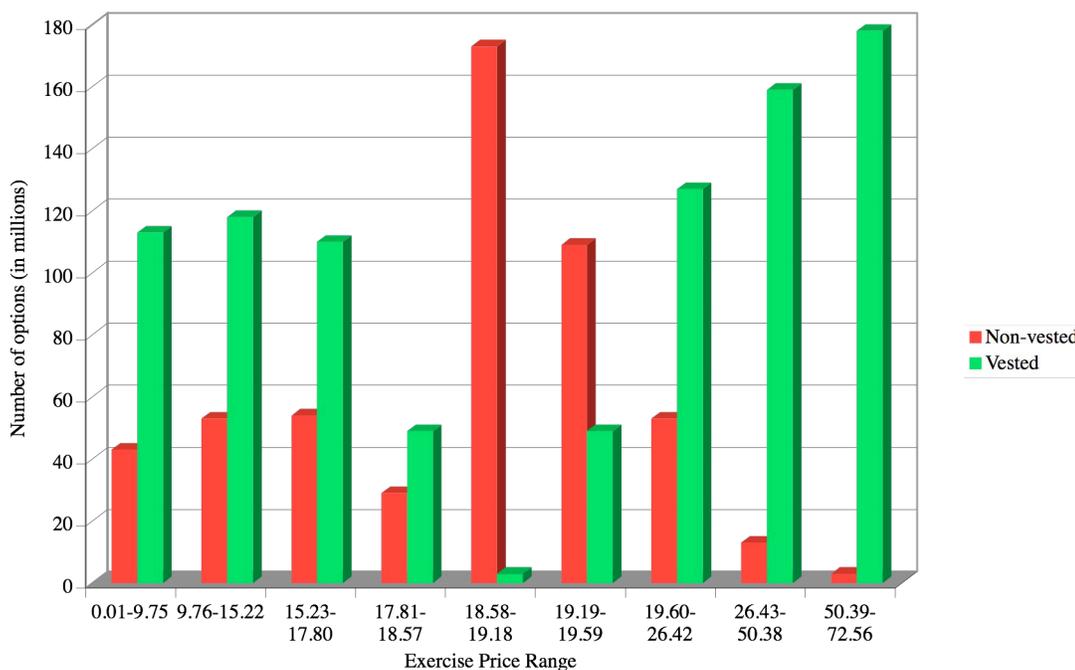
While much of this discussion has centered on the granting of options by publicly traded firms, it is worth noting that the use of equity options is widespread in private businesses as well. The National Center for Employee Ownership surveyed 275 venture-capital backed private businesses in the technology and telecommunications businesses. Of these firms, 77% provided options to all employees while 23% provided them to only select employees. If we couple this behavior with the fact that venture capital investors themselves receive options on equity (often in the form of convertible bonds and preferred stock), many young firms already have a substantial option overhang at the time of their initial public offerings.

Characteristics of Option Grants

Firms that use options as employee compensation typically issue them each year, with the strike price set equal to the prevailing stock price; employee options are usually at-the-money when issued. While maturities vary across firms, these options are typically long term, with a ten-year maturity representing the norm at issue. Naturally, at any point in time, the options outstanding at a firm will represent varying maturities since they were granted at different points in time. Firms that use employee options usually restrict when and whether these options can be exercised. It is standard, for instance, that the options granted to an employee cannot be exercised until they are vested. For this to occur, the employee usually has to remain with the firm for a period that is specified with the contract. While firms add this restriction to keep employee turnover low, it also has implications for option valuation that will be examined later. Figure 4 reports on vested and non-vested options at Cisco in 2005, broken down by exercise price.

advantage of this over optimism.

Figure 4: Vested and Non-vested Options - Cisco in 2005



The peak in the non-vested options around \$19 reflects the fact that Cisco has traded around that price from 2003 to 2005 and most of the options issued during that period are still non-vested. The options that are deep out-of-the-money are almost all vested because they were issued in the halcyon days of high stock prices prior to 2000.

There are other features that are shared by employee options. Employees can generally not trade options and they are thus illiquid. When employees leave a firm, they usually will be forced to exercise their options, assuming that they are vested. In the case of a merger or an acquisition, there will be forced exercise of all of the options outstanding at the target firm.

Accounting For Options

As Warren Buffett said in 1998: "If options aren't a form of compensation, what are they? If compensation isn't an expense, what is it? And if expenses shouldn't go into the calculation of earnings, where in the world should they go?" The debate about option expensing has been tendentious, with those opposed to the practice using every argument in the book, but the rational argument (in favor of expensing) seems to have finally

prevailed. In this section, we consider how accounting has treated employee options hitherto and how it proposes to treat them in the future.

Conventional Treatment

Many of the abuses associated with the use of options can be traced to accounting rules that have consistently miscategorized and misvalued options. In particular, there have been two key (and incorrect) assumptions that have guided the accounting for options:

1. Exercise value is intrinsic value: The accounting rule that has governed the accounting of options grants at most firms through 2004 is the Accounting Principles Board opinion number 25 (APB 25), which defines the intrinsic value of an option as its exercise value and requires firms to show only this value at the time of the grant. Since most firms issue employee options at-the-money, this essentially gives a free pass to these firms; there is no exercise value for these options, and the accounting view of these options is that they are worth nothing at the time of the grant.
2. Focus on exercise date rather than grant date: Closely following on the first assumption is the belief that options outstanding do not affect stockholders until they are exercised. Consequently, the expenses associated with options are considered only when they are exercised.

The tax effect of options has mirrored the accounting treatment. Firms that issue options do not face any tax consequences in the year in which they make the issue. When the options are exercised, however, they are allowed to treat the difference between the stock price and the exercise price as a tax-deductible expense.

As a consequence of this accounting and tax treatment, young and risky companies were able to grant millions of long term options of considerable value to their employees, while recording no expenses for the grants. At the same time, they were able to defer their tax deduction for this expense to future years, when they presumably would receive larger tax benefits.

The Debate about Expensing Options

As we noted at the beginning of this section, the debate about whether to expense options has been going on for more than a decade. Since we don't see any issues worth debating on the fundamental question of whether employee options are an operating expenses, it is worth looking at some of the arguments that have been posed by those who have opposed its expensing:

1. Option grants do not affect current earnings and it is pure speculation as to whether they will affect future earnings: This argument is predicated on the uncertainty associated with whether options will have exercise value in the future. The counter is that the firms granting these options and the employees receiving them believe that they have value at the time of the grant. When firms give away or receive something of value, even if that value is an estimate, we have to record the transaction.
2. Option pricing models do not provide precise estimates of option value: It is true that we need option pricing models to value options at the time of the grant, and that these models make assumptions that may not always hold for employee options. Thus, the values we get from these models are estimates and not precise values. As we will see in the next section, though, there are adaptations of these models that do a reasonably good job of fixing the faulty assumptions. Furthermore, we can confidently state that even the most imprecise option pricing model is likely to yield a value closer to the true value than the model used under conventional accounting which values options at exercise value.
3. Expensing options will create more variability in earnings over time: Options that are recorded at one value at the time of their granting will change in value over time. Some may become worthless and some will become more valuable over time. This will create more earnings variability over time, but there are two counter arguments we would present to this one. The first is that the higher variability in earnings reflects reality: firms that choose to use options to reward employees are adding volatility to stockholder earnings. The second is that using options to compensate employees is a choice. Firms can choose to use stock or restricted stock for compensation and have less earnings variability over time.

4. Young firms will not be able to hire employees if they have to expense options: If those who argue against employee options are believed, expensing options will be the death knell for young technology firms. These firms, it is argued, will no longer be able to issue the options that they used to because of the losses that they would now have to report. We do not believe that there is a basis for this argument. First, investors have shown that they are willing to buy young technology firms with growth potential, even if they make losses. Second, any young firm whose business model and operating margins are dependent upon the accounting treatment of options for its long-term profitability and value is fundamentally a troubled firm. Perhaps, such firms will go under with option expensing and they should.
5. Options are a non-cash expense: There are some accounting and valuation analysts who argue that option grants do not affect cash flows and that it therefore does not affect value. This argument makes no sense. After all, if the option-granting firm had issued the options to the market (as traded warrants) and used the resulting cash proceeds to compensate employees, we would have considered it an operating expense. We cannot reward firms for using their equity as currency. If we do, firms may very well switch to paying for everything with equity (stock or options) and claim to have no cash expenses at all.
6. The information about employee options is already available in financial statements and expensing is just a formality: This is the argument that has the most resonance. Since the late 1990s, firms have provided information on both option grants in the current year and outstanding options. Analysts who want to adjust earnings and cash flows have therefore been able to do so and expensing the options will have little effect on their valuations. Unfortunately, there are many analysts and investors who still rely on the proverbial bottom line, which is accounting earnings. They will presumably get a better sense of the real earnings potential if employee options are expensed.

The protestations and the lobbying power of those who have argued against expensing have delayed the implementation of the new rules for option expensing. Most of the market, though, has moved on. As of February 2004, 276 firms out of the S&P 500

(representing 41% of overall market capitalization) had shifted to accounting for the fair value of employee options at the time of the options were granted.

New Rules on Employee Options

As we noted in an earlier section, most firms historically have used APB 25, which defined the exercise value of employee options as intrinsic value, to account for options. The Financial Accounting Standards Board (FASB) recognized as early as 1994 that this was incorrect and proposed a new standard (FAS 123) where options would be valued at the time of the grant and expensed. However, it allowed firms to continue to report earnings under the old rule and required only pro-forma earnings be computed based upon the new standard.

In 2002, FASB 148 was issued as a stopgap rule, laying out the two new transition methods for firms that wanted to voluntarily shift to value-based accounting for options. In 2003, the final version of the rule (FASB 123R) laid out the rules for accounting for options:

- When options are granted, they have to be valued using an option pricing model. Firms can pick between binomial lattice models, Black Scholes and Monte Carlo simulations to value these options.⁵ The models can be adjusted to reflect the specific characteristics of employee options and a company can use different option pricing models to value different option grants. In addition, the option value has to be adjusted for expected forfeitures of these options.⁶
- The value of the options can be spread over the vesting period, starting with the year of the grant. Thus, an option grant with an estimated value of \$ 10 million and a 5-year vesting period can be spread over the 5 years at \$ 2 million a year.⁷ As a consequence, the employee option expense line item for most firms will reflect not

⁵ The rule does require that the option value be a function of six inputs – the current stock price, the strike price, the expected life of the option (reflecting option maturity and vesting likelihood), the variance in the stock price, the riskless rate and expected dividends.

⁶ This forfeiture rate can reflect historical patterns of exercise and forfeiture. Assuming a higher forfeiture rate will reduce the value of the options.

⁷ The original version of this rule required accelerated write offs of employee option expenses, but the final version allowed firms to choose between the simpler straight line and accelerated write offs.

only the portion of the grant from that year, but also portions of option grants from previous years.

- If the actual forfeiture rate is greater or less than the original estimate (used to value the options at grant), the option value has to be re-estimated in subsequent years and compensation cost adjusted in that year to reflect the changes.⁸
- If option terms are modified, as is the case when the exercise price is reset, the firm has to recognize the change in option value at the time of the modification.

Undoubtedly, the rule will be revisited once firms begin expensing options and run into real world problems.

International Differences

As the use of employee options as compensation expands outside the United States, international accounting standards have also had to grapple with how best to deal with them. The International Financial Reporting Standards Board released IFRS 2 in February 2004, requiring companies that use equity options as compensation to value them at the time of the grant. In fact, IFRS 2 is more expansive than FAS 123R in its coverage of equity-based compensation. For the most part, though, the two statements agree or more than they disagree and the differences that remain are minor. Some of them are listed below:

- Private versus Public entities: IFRS 2 applies the same rules about option valuation to both public and non-public entities; both have to value options at fair value at the time of the grant and treat it as an expense. While FAS 123R requires nonpublic entities to account for options based on their fair value, it does allow the use of industry average variances in valuing private company options and for the use of intrinsic value (exercise value) when option valuation is difficult to do.
- Deferred Tax Treatment: In tax jurisdictions such as the United States, where only the exercise value of the option is tax deductible (rather than the entire value of options), IFRS 2 requires that a deferred tax asset be recognized only if and when the share

⁸ To provide an illustration, assume that a firm assumes a forfeiture rate of 3% and estimates the value of the options when they are granted at \$ 10 million; the annual cost each year over a 5-year vesting period will be \$ 2 million a year. If a year later, the forfeiture rate is running at 2%, the firm will have to revalue the options using the actual forfeiture rate and adjust the compensation that year to reflect the change.

options have exercise value that can be deductible for tax purposes. Therefore, options that are issued at the money will not create deferred tax assets until that award is in the money. In contrast, FAS 123R requires recognition of a deferred tax asset based on the grant-date fair value of the award. The effects of subsequent decreases in the share price (or lack of an increase) are not reflected in accounting for the deferred tax asset until the related compensation cost is recognized for tax purposes. The effects of subsequent stock price increases that generate excess tax benefits are recognized when they affect taxes payable.

Over time, we can expect to see the remaining differences narrow and a convergence between U.S. and International standards.

Options Effect on Value

Why does the granting of options affect value per share? Note that not all options do. In fact, options issued and listed by the options exchanges have no effect on the value per share of the firms on which they are issued. The options issued by firms do have an effect on value per share, since there is a chance that they will be exercised in the near or far future. Given that these options offer the right to individuals to buy stock at a fixed price, they will be exercised only if the stock price rises above that exercise price. When firms grant options to employees, it is existing stockholders who pay for these options. Consequently, the question is not whether options affect value but how they affect value.

In this section, we will consider three levels at which options affect equity value per share. The first and narrowest measure is the effect that granting options in the current year will have on the current earnings of a firm. The second is the potential dilution effect created not just by options issued in the current year but by the cumulative options outstanding at the firm; the exercise of options will increase the number of shares at some future date, but expectations of that happening will affect the value per share today. The third and broadest measure looks at the effect that the continued granting of options will have on expected future earnings and thus on value per share.

Earnings Effect

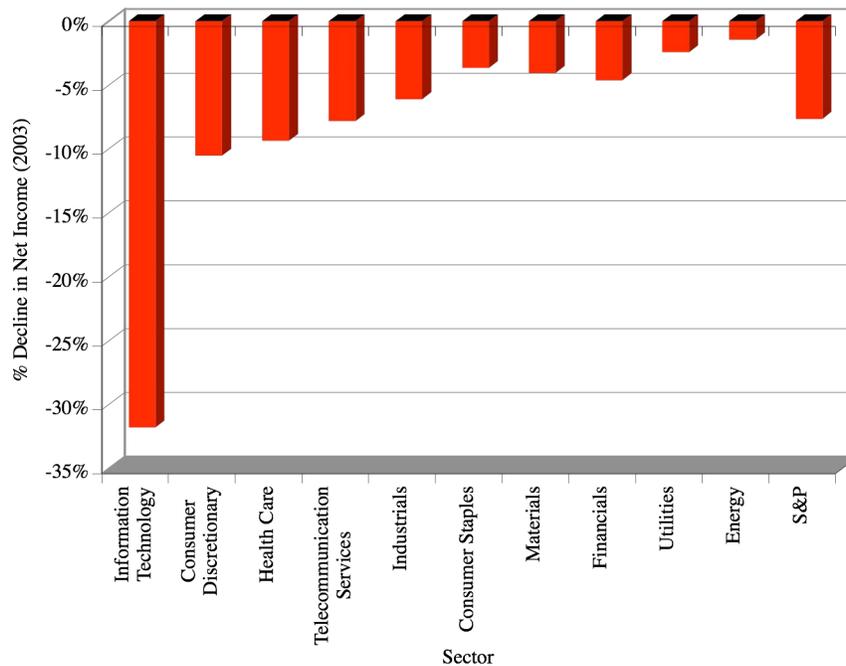
In the last section, we presented the argument, that accounting standards have now accepted for the most part, that employee options are compensation and should be treated as part of operating expenses. If we accept this argument, firms that grant options as part of compensation will report lower earnings.

The earnings effect of option grants varies across firms. In a study of the S&P 500 and the NASDAQ 100 firms, Bear Stearns estimated the effect of employee options being treated as expenses on the earnings of individual firms.⁹ On average, they estimated that earnings would decline 8% at S&P 500 companies if option grants were treated as expenses and by 25% at NASDAQ 100 companies.¹⁰ They also estimated the earnings effect of option expensing on each of the 600 companies. Figure 5 summarizes the effect on net income of considering share-based employee compensation as an expense on firms in different sectors of the S&P 500:

⁹ *2004 Earnings Impact of Stock Options on the S&P 500 and NASDAQ 100 Earnings*, Bear Stearns Equity Research publication, March 21, 2005.

¹⁰ The Bear Stearns study looks at the effect of forcing option expensing on all companies and comes up with a 5% drop in net income at S&P 500 companies and 22% at technology companies. However, it also notes that some companies had already switched to expensing options in 2003. The numbers we report include the option expenses at those companies as well and are thus larger.

Figure 5: Effect of Employee Option Expenses on Net Income



The effect was greatest at technology companies, where the cumulative cost of share-based compensation would have amounted to \$15.43 billion in 2004, representing 32% of the unadjusted net income (prior to expensing share-based compensation) of \$ 48.53 billion.

Dilution Effect

While option grants in the current year reduce earnings for the year, the value of equity per share in a company is weighed down by the cumulative effect of options that have been granted over time that are still outstanding. While some of these options may be out-of-the-money, there is still a probability that they will be exercised in the future, thus increasing the number of shares outstanding. This potential dilution effect from options outstanding will reduce the value of equity per share, and will do so more at firms that have more options outstanding (as a percent of outstanding shares) than at firms with less. Figure 2, reported earlier, noted the differences in the option overhang at firms in old economy, new economy, financial service and utility companies.

Analysts and accountants have tried to grapple with the potential value loss from dilution by using fully diluted (where all options are treated as outstanding shares) or

partially diluted (where only in—the-money options are considered) numbers of shares when computing the earnings per share. These measures do not reflect or even attempt to measure the probabilities that options will be exercised and thus provide only a very rough proxy for the dilution effect.

There are some who argue that there does not have to be a dilution effect from option exercise. Many firms, they note, repurchase stock and set them aside to cover option exercise rather than issuing new shares. That is true but such actions still affect value per share by affecting expected cash flows. In the absence of these options, the stockholders of these firms would have been able to lay claim to much larger cash flows each year (even though they might not have received them as dividends).

Future Earnings Effect

Looking at options granted in the current year (and the effect on earnings) and cumulative options (and the dilution effect) allows analysts to consider the effect of past option grants on value. However, most firms that grant options will continue to use them in the future, thus affecting future earnings. The expected option grants are employee compensation and will increase operating expenses in future years and reduce operating income. The value of a firm today is the present value of expected cash flows, and these will be much lower for a firm that is expected to be more generous with its option grants.

Accounting standards have finally come to grips with the effect of granting options on current earnings (see FAS 123R) and analysts do attempt to capture the dilution effect, albeit sloppily, with diluted share numbers. Analysts, though, are still haphazard about dealing with expected future option grants. While some try to forecast the magnitude of these grants, most valuations either completely ignore them or build them in implicitly by forecasting out a current income number that incorporates option expenses.¹¹

¹¹ For example, assume that we are valuing Coca Cola, a company which has been expensing employee options since 2003. If we use earnings in 2004 as our base year and apply an expected growth rate to it, we are assuming that option expenses will continue as a line item into the future but that it will remain at the same percentage of revenues it was in 2004.

Ways of incorporating existing options into discounted cash flow valuations

As we noted in the last section, the value per share is weighed down by the cumulative effect of all options outstanding. There are four approaches that are used to incorporate that effect of options that are already outstanding into the value per share. The first is to adjust the number of shares outstanding to reflect options outstanding. The second is to try to forecast out when the options will be exercised and the effect on share numbers in future years. The third, called the treasury stock approach, is an extension of the first approach. In addition to using diluted shares, this approach also adjusts the value of the equity to reflect the expected proceeds from the option exercise. The last approach values the options outstanding at fair value rather than at exercise value, and subtracts this from the overall value of equity to arrive at the value of equity in common stock. We believe that the last approach is the only one that completely incorporates the effect of existing options into value per share.

I. Use fully diluted number of shares to estimate per-share value

The simplest way to incorporate the effect of outstanding options on value per share is to divide the estimated value of equity from a discounted cash flow model by the number of shares that will be outstanding if all options are exercised today – the fully diluted number of shares. While this approach has the virtue of simplicity, it will lead to too low of an estimate of value per share for three reasons:

- It considers all options outstanding, not just ones that are in the money and vested. To be fair, there are variants of this approach where the shares outstanding are adjusted to reflect only in-the-money and vested options.
- It does not incorporate the expected proceeds from exercise, which will comprise a cash inflow to the firm.
- Finally, this approach does not build in the time premium on the options into the valuation.

Illustration 1: Fully Diluted Approach to estimating Value per Share

To apply the fully diluted approach to estimate the per share value, we will value two companies with significant option overhangs – Cisco and Google. In Table 1 we summarize the equity values we estimated for the companies, using conventional

discounted cash flow models, and then adjust for value per share using fully diluted shares.¹²

Table 1: Fully Diluted Approach to Estimating Value per Share

	<i>Cisco</i>	<i>Google</i>
Value of Equity (in millions)	\$ 65,622	\$ 32,187
Primary Shares (in millions)	6,487	277.78
Options outstanding	1436	25.61
Fully Diluted Shares	7,923	303.39
Value per share (Primary)	\$ 10.12	\$ 115.87
Value per share (fully diluted)	\$ 8.28	\$ 106.09

The value per share, using the fully diluted approach, is significantly lower than the value per share, using the primary shares outstanding. This value, however, ignores both the proceeds from the exercise of the options as well as the time value inherent in the options. At Cisco, for example, a significant number of the options issued in past years are out-of-the-money and may never be exercised.

A modified version of this approach counts only in-the-money options when computing diluted shares. With this approach, we estimate the following values per share for Cisco and Google:

	<i>Cisco</i>	<i>Google</i>
Value of Equity (in millions)	\$ 65,622	\$ 32,187
Primary Shares (in millions)	6,487	277.78
In-the-money options	591	25.61
Partially Diluted Shares	7,076	303.39
Value per share (partially diluted)	\$ 9.27	\$ 106.09

For Google, there is no effect from the adjustment since all their options are in-the-money. For Cisco, only 591 million shares are in-the-money (based upon the stock price of \$17.67 at the time of the analysis). In fact, counting only vested in-the-money options at Cisco would reduce the number of options considered to 441 million options and increase the value per share a little more.

¹² These were conventional discounted cash flow valuations. Details of the valuations can be obtained on my web site (<http://www.damodaran.com>).

II. Estimate expected option exercises in the future and build in expected dilution

In this approach, we forecast when in the future options will be exercised and build in the expected cash outflows associated with the exercise, by assuming that the firm will go out and buy back stock to cover the exercise. The biggest limitation of this approach is that it requires estimates of what the stock price will be in the future and when options will be exercised on the stock. Given that our objective is to examine whether the price today is correct, forecasting future prices to estimate the current value per share seems circular. In general, this approach is neither practical nor is it particularly useful in coming up with reasonable estimates of value.

III. Treasury Stock Approach

This approach is a variant of the fully diluted approach. Here, the number of shares is adjusted to reflect options that are outstanding, but the expected proceeds from the exercise (the product of the exercise price and the number of options) are added to the value of equity. The limitations of this approach are that, like the fully diluted approach, it does not consider the time premium on the options and there is no effective way of dealing with vesting. Generally, this approach, by under estimating the value of options granted, will over estimate the value of equity per share.

The biggest advantage of this approach is that it does not require a value per share (or stock price) to incorporate the option value into per-share value. As we will see with the last (and recommended) approach, there is a circularity that is created when the stock price is an input into the process of estimating option value which, in turn, is needed to obtain the value per share.

Illustration 2: Treasury Stock Approach

In Table 2, we re-estimated the value per share is estimated using the treasury stock approach for Cisco and Google:

Table 2: Value of Equity per Share: Treasury Stock Approach

	<i>Cisco</i>	<i>Google</i>
Number of options outstanding	1436	25.61
Average exercise price	\$ 25.02	\$24.41
Proceeds from Exercise	\$ 35,928	\$ 625
Value of Equity	\$ 65,622	\$ 32,187

+ Proceeds from Exercise	\$ 35,928	\$ 625
Total Value	\$101,550	\$32,812
Fully Diluted number of shares	7923	303.39
Value per share	\$12.82	\$108.15

Note that the value per share using this approach is higher than the value per share using the fully diluted approach for both companies. The difference is greatest for Cisco because the average exercise price is high, relative to the current stock price. For Google, the effect is much smaller since the exercise price is well below the current stock price (of almost \$300). The estimated value per share still ignores the time value of the options.

As with the diluted approach, there are modified versions of this approach where only in-the-money options are considered. This will reduce the value per share for Cisco considerably since the average exercise price for the in-the-money options is much lower than the weighted average exercise price of \$25.02.

IV. Valuing Options

The correct approach to dealing with options is to estimate the value of the options today, given today's value per share and the time premium on the option. Once this value has been estimated, it is subtracted from the estimated equity value, and divided by the number of shares outstanding to arrive at value per share.

Value of Equity per share = (Estimated Value of Equity – Value of Employee Options outstanding) / Primary number of shares outstanding

In this section, we will consider both the measurement issues associated with valuing employee options and the models that have been developed to value them.

Measurement Issues

In valuing employee options, however, there are five measurement issues that we have to confront. One relates to the fact that not all of the options outstanding are vested, and that some of the non-vested options might never become vested. The second centers on the illiquidity of employee options. As a result, employee options are often exercised before maturity, making them less valuable than otherwise similar traded options that are marketable. The third relates to the stock price to use in valuing these options. While conventional option pricing models are built around using the current market price as a key input, we do come up with estimates of value per share when we value companies,

and these estimates can be very different from current stock prices. We have to consider whether we want to use our estimates of value per share, rather than the market prices, to preserve valuation consistency. The fourth issue is taxation. As we noted earlier in the section on accounting for options, firms are allowed to deduct the difference between the stock and the exercise price of an option at exercise and there is potential tax saving at the time of option exercise. The final issue relates to options granted at private firms or firms on the verge of a public offering. Key inputs to the option-pricing model, including the stock price and the variance, cannot be obtained for these firms, but the options have to be valued nevertheless.

a. Vesting

As noted earlier in the paper, firms granting employee options usually require that the employee receiving the options stay with the firm for a specified period, for the option to be vested. Consequently, when we examine the options outstanding at a firm, we are looking at a mix of vested and non-vested options. The non-vested options should be worth less than the vested options, but the probability of vesting will depend upon how in-the-money the options are and the period left for an employee to vest. There have been attempts¹³ to develop option pricing models that allow for the possibility that employees may leave a firm before vesting and forfeit the value of their options. Carpenter (1998) developed a simple extension of the standard option pricing model to allow for early exercise and forfeiture, and used it to value executive options.¹⁴ Since the new accounting standards governing employee options require firms to estimate forfeiture rates at the time of the grant, there will undoubtedly be attempts to build new models for vesting and forfeiture.

b. Illiquidity

Employees who are compensated with options can become wealthy on paper but may not be able to cash in on their implicit wealth because the options cannot be traded. In addition, it is often infeasible or illegal to hedge these options. The effect of this

¹³ Cuny, C. and P. Jorion, 1995, *Valuing Executive Stock Options with Endogenous Departure*, Journal of Accounting and Economics, v20, 193-205.. They examine the valuation of options when there is the possibility of forfeiture.

¹⁴ Carpenter, J.N. (1998), 'The exercise and valuation of executive stock options', *Journal of Financial*

illiquidity on option value has been both widely studied and well debated. In particular, the illiquidity of these options may induce employees to exercise options early and give up the time premiums on these options.

While some have argued that early exercise is irrational, there are clearly good reasons for early exercise. Huddart (1994) shows that early exercise is in fact optimal for a risk-averse investor.¹⁵ Lambert, Larcker, and Verrecchia (1991) and Hemmer, Matsunaga, and Shevlin (1994), show that restrictions on short selling and hedging option positions can lead to early exercise.¹⁶ Brooks, Chance and Cline (2005) argue that private information may also cause early exercise: the managers who hold employee options often have the information to make a judgment on whether their stock is over valued or not. If it is over valued, in their estimation, early exercise becomes more likely.¹⁷

The empirical evidence is also clearly supportive of the early exercise theory. In a comprehensive study of 262,931 option exercises of employee options between 1996 and 2003 by U.S. companies, Brooks, Chance and Cline (cited above) note that 92.3% exercise early. On average, they find that exercise takes place 2.69 years after vesting, with 4.71 years left to expiration. Put another way, an employee option with a stated maturity of 10 years is usually exercised in 5.29 years. Bettis, Bizjak and Lemmon (2003) also find significant variation in exercise policies across firms, with employees in riskier firms exercising their options almost one and a half years earlier than employees in more stable firms.¹⁸ The implications for option valuation are straightforward. Using the stated maturity in option pricing models, which is what we do for most marketable options, will overstate the value of employee options.

Economics, v **48**, 127–158.

¹⁵ Huddart, S. 1994. *Employee Stock Options*. *Journal of Accounting and Economics*, 18, 207-231.

¹⁶ Lambert, R., D. Larcker, and R. Verrecchia. 1991. *Portfolio Considerations in Valuing Executive Compensation*. *Journal of Accounting Research*, Spring, 129-149; Hemmer, T., S. Matsunaga, and T. Shevlin. 1994. *Estimating the 'Fair Value' of Employee Stock Options with Expected Early Exercise*. *Accounting Horizons*, vol. 8, no. 4 (December): 23-42.

¹⁷ Brooks, R., D. Chance and B.N. Cline, *Private Information and the Exercise of Executive Stock Options*, Working Paper, SSRN.

¹⁸ Bettis, J.C., J.M. Bizjak and M.L. Lemmon, 2003, *The Cost of Employee Stock Options*, Working Paper, SSRN.

c. Which stock price?

The answer to this question may seem obvious. Since the stock is traded, and we can obtain a stock price, it would seem that we should be using the current stock price to value options. However, we are valuing these options to arrive at a value per share that we will then compare to the market price to decide whether a stock is under or over valued. For instance, we may conclude that a stock with a price of \$ 25 per share is really worth only \$12 per share. Using the current market price to arrive at the value of the options and then using this option value to estimate an entirely different value per share seems inconsistent.

There is a solution. You can value the options using the estimated value per share. This creates circular reasoning in our valuation. In other words, we need the option value to estimate value per share, and the value per share to estimate the option value. We can estimate the value per share using the treasury stock approach, and we can then converge on the proper value per share by iterating.¹⁹

There is another related issue. When options are exercised, they increase the number of shares outstanding, and thus have an effect on the stock price. In conventional option pricing models, the exercise of the option does not affect the stock price. These models have to be adapted to allow for the dilutive effect of option exercise.

d. Taxation

When options are exercised, the firm can deduct the difference between the stock price at the time and the exercise price as an employee expense, for tax purposes. This potential tax benefit reduces the drain on value created by having options outstanding. To provide an illustration of the magnitude of the tax benefit, Cisco claimed a tax deduction of \$2.5 billion for option exercise in 2000, almost entirely offsetting its operating income of \$2.67 billion that year and effectively paying little in taxes. There are three ways in which we can account for this tax deductibility in valuing employee:

1. Reduce tax rates on operating income to reflect employee option deductions: To compute free cashflow to the firm, we use after-tax operating income. If a firm has

¹⁹ The value per share, obtained using the treasury stock approach, will become the stock price in the option pricing model. The option value that results from using this price is used to compute a new value per share which is fed back into the option pricing model and so on.

substantial numbers of options outstanding, we could use a much lower tax rate in the near years of the forecasts to reflect tax deductions from employee options.²⁰ This will increase cash flows in those years (and consequently value). We would move the tax rates towards statutory tax rates as we approach terminal value, since the option exercise tax savings will fade over time.

2. Tax Effect the exercise value of options; A simpler way to estimate the tax benefit is to multiply the difference between the stock price today and the exercise price by the tax rate; clearly, this would make sense only if the options are in-the-money. While this does not allow for the expected price appreciation over time, it has the benefit of simplicity.

3. Tax Effect the fair value of options: An alternative way of estimating the tax benefit is to compute the after-tax value of the options:

After-tax Value of Options = Value from option pricing model (1- tax rate)

This approach is also straightforward and allows us to consider the tax benefits from option exercise in valuation. One of the advantages of this approach is that it can be used to consider the potential tax benefit even when options are out of the money.

Now that the accounting rules have changed to force option expensing, it seems to us only a matter of time before the tax rules change as well to match. If that does happen, we will be able to expense option grants in the periods that they are made and we will no longer need to tax effect the existing options (since the tax savings would have accrued when the options were granted).

e. Non-traded Firms

A couple of key inputs to the option pricing model – the current price per share and the variance in stock prices – cannot be obtained if a firm is not publicly traded. There are two choices in this scenario. One is to revert to the treasury stock approach to estimate the value of the options outstanding and abandon the option pricing models. The other is to stay with the option pricing models and to use the value per share, from the

²⁰ Edwards, C., J. R. Graham, M.H. Lang and D. Shackelford, *Employee Stock Options and Taxes*, Working Paper, SSRN. In this paper, they estimate the tax rates for firms with substantial employee options outstanding and note that it is well below the marginal tax rate. For Dell, they estimate a tax rate of 20%, as a result of option expensing, as opposed to the marginal tax rate of 35%.

discounted cash flow model. The variance of similar firms that are publicly traded can be used to estimate the value of the options.

Option Pricing Models

With all of these issues affecting valuation, how do we adapt conventional option pricing models to value employee options? This question has been addressed both by academics who value options and by FASB, in its attempts to give guidance to firms that have to value these options for expensing.

Black Scholes and Modifications

The conventional Black Scholes model is designed to value European options on traded assets and does not explicitly factor in the dilution inherent in employee options or the illiquidity/vesting issues specific to these options. However, adaptations of the model provide reasonable estimates of value:

1. Build in expected dilution into the stock price: One of the inputs into the Black Scholes is the current stock price. To the extent that the exercise of options increases the number of shares outstanding (at a price less than the current stock price), the stock price will drop on exercise. A simple adjustment to the stock price can incorporate this effect:

$$\text{Adjusted Stock Price} = \text{Current Stock Price} \left[\frac{n_{\text{shares outstanding}}}{(n_{\text{shares outstanding}} + n_{\text{options}})} \right]$$

The resulting lower adjusted stock price will also reduce the option value.

2. Reduce the life of the option to reflect illiquidity and early exercise: Earlier in this paper, we noted that employees often exercise options well before maturity because these options are illiquid. Typically, options are exercised about half way through their stated lives. Using a reduced life for the option will reduce its value.
3. Adjust option value for probability of vesting: The vesting adjustment can be made in the process of calculating of the option value. If we can assess the probability of vesting, multiplying this probability by the option value will yield an expected value for the option.

While purist would still resist, the model has provided remarkably resilient even in environments where its basic assumptions are violated.

There are numerous variants of the Black-Scholes model that have been developed for employee options. Two examples are listed below:

1. The FASB Model: While FASB does not propose a specific model, they recommend that employee options be valued assuming a forfeiture rate for employees (based upon the firm's history) and using a shorter life than the stated maturity (allowing for the early exercise option). To make both estimates, they recommend using historical data.
2. The Bulow-Shoven Model: The Bulow-Shoven model starts off with the premise that long-term employee options are not long term at all. The model proposes a technique that begins by treating all employee stock options as if they have a 90 day life, in estimating an initial value using a Black-Scholes model. However, as employees continue working for the firm day to day, quarter to quarter, they are granted 90-day extensions on the term of their options and these extensions are valued as options and treated as expenses in subsequent periods.²¹

These variations yield lower values for employee options than using the unadjusted Black Scholes models.

Binomial Models

The possibility of early exercise and non-vesting, which is substantial in employee options, leads many practitioners to argue for the use of Binomial lattice models to value employee options. Unlike the Black-Scholes, these models not only can model for early exercise, but can be modified to allow for other special features specific to employee options, including vesting. In addition, binomial models allow for more flexibility on inputs, with volatility changing from period to period rather than remaining constant (which is the assumption in the Black-Scholes model). The limitation of the binomial models is that they are more information intensive, requiring the user to input prices at each branch of the binomial model. In any realistic version of the model, where the time intervals are short, this could translate into hundreds of potential prices.

It is true that we can derive binomial trees from standard deviations and thus avoid the estimation problems associated with developing these trees, but the resulting values tend to be close to Black-Scholes model values. In other words, to get the full

²¹ Bulow, J. and J..B. Shoven, 2004, *Accounting for Stock Options*, Working Paper, SSRN.

benefits of the binomial model, we have to go through the exercise of developing the pricing tree. The initial version of FAS 123R did require firms to use binomial models to value employee options. The final version wisely left the model choice decision to the firm.

The primary benefit of binomial models comes from the flexibility that they offer users to model the interaction between the stock price and early exercise. One example is the Hull-White Model, which proposes reducing the life used to value employee options to a more realistic level.²² This model take into account the employee exit rate during the vesting period (thus taking into account the probability that options will end up unvested and worthless) and the expected life of the option after they get vested. To estimate the latter, the model assumes that there will be exercise if the stock price reaches a pre-specified multiple of the exercise price, thus making exercise an endogenous component of the model, rather than an exogenous component. The resulting option values are usually lower than those estimated using the Black-Scholes model.

Simulation Models

The third choice for valuing employee options is Monte Carlo simulation models. These models begin with a distribution for stock prices and a pre-specified exercise strategy. The stock prices are then simulated to arrive at the probabilities that employee options will be exercised and an expected value for the options based upon the exercise. The advantage of simulations is that they offer the most flexibility for building in the conditions that may affect the value of employee options. In particular, the interplay between vesting, the stock price and early exercise can all be built into the simulation rather than specified as assumptions. The disadvantage is that simulations require far more information than other models.

Market Prices

All of the models proposed to value employee options can be contested as hypothetical and unrealistic. In fact, there is a reasonable argument that what we would really want to use to value employee options are market prices for these options. While

²² J. Hull and A. White, How to Value Employee Stock Options, *Financial Analysts Journal* 60 (1) (2004), 114-119.

this may seem unrealistic, Cisco proposed a novel solution to the employee option valuation problem, by creating a "market instrument" that would parallel employee options. Buyers of the new instruments, called *employee stock option reference securities*, or ESORs, would not be able to transfer them and would have options that would vest over five years. Both provisions are similar to those in employee stock options. Cisco argued that the market prices for these securities should be used to value employee options. In September 2005, the SEC rejected the Cisco proposal, arguing that investors in companies would not value employee options at the same level as employees would. They did leave the door open to a market based solution at a future date.

How much does the model matter?

How much does the model used to value employee options matter? Put another way, are there significant differences in values when we use alternative models to value employee options? For the most part, the biggest single component determining employee option value is the life of the option. Using the stated life of employee options in the Black-Scholes models yields too high a value for these options. If we use an expected life for the option (which takes into account early exercise and vesting probabilities), the values that we arrive at are not dissimilar using different models. Ammann and Seiz (2003) show that the employee option pricing models in use (the binomial, Black Scholes with adjusted life and Hull White) all yield similar values.²³ As a consequence, they argue we should steer away from models that require difficult to estimate inputs (such as risk aversion coefficients) and towards simpler models.

Illustration 3: Option Value Approach

In Table 3, we begin by estimating the value of the options outstanding at Cisco and Google, using the Black-Scholes model, adjusted for dilution and using half the stated maturity (to allow for early exercise). To estimate the value of the options, we first

²³ Ammann, M., and R. Seiz, 2003, *Does the Model Matter? A Valuation Analysis of Employee Stock Options*, Working Paper, SSRN.

estimate the standard deviation in stock prices²⁴ over the previous 2 years. Weekly stock prices are used to make this estimate, and this estimate is annualized²⁵. All options, vested as well as non-vested, are valued and there is no adjustment for non-vesting.

Table 3: Estimated Value of Options Outstanding

<i>Option Pricing Model</i>	<i>Cisco</i>	<i>Google</i>
Number of Options Outstanding	1436	25.61
Average Exercise Price	\$ 25.02	\$24.41
Estimated Standard Deviation (Volatility)	45%	55%
Average stated maturity	5.17	9.00
Maturity adjusted for early exercise	2.58	4.50
Stock Price at time of analysis	\$17.67	\$295.97
Value per option	\$ 2.27	\$ 274.27
Value of options outstanding	\$ 3,257	\$ 7.023
Tax Rate	36.80%	35.00%
After-tax Value of options outstanding	\$ 2,058	\$ 4,565

In estimating the after-tax value of the options at these companies, we have used the marginal tax rate of 35%. Since the tax law allows for tax deductions only at exercise and only for the exercise value, we are potentially overstating the possible tax benefits (and understating the costs).

The value per share is computed in Table 4 by subtracting the value of the options outstanding from the value of equity and then dividing by the primary number of shares outstanding:

Table 4: Value of Equity per Share

	<i>Cisco</i>	<i>Google</i>
Value of Equity	\$65,622	\$ 32,187
- Value of Options outstanding	\$ 2,058	\$ 4,565
Value of Equity in shares outstanding	\$ 63,564	\$ 27.622
Primary shares outstanding	6487	277.78
Value per Share	\$ 9.80	\$99.44

²⁴ The variance estimate is actually on the natural log of the stock prices. This allows us to cling to at least the possibility of a normal distribution. Neither stock prices nor stock returns can be normally distributed since prices cannot fall below zero and returns cannot be lower than -100%.

²⁵ All of the inputs to the Black Scholes model have to be in annual terms. To annualize a weekly variance, we multiply by 52.

The inconsistency averred to earlier is clear when we compare the value per share that we have estimated in this table to the price per share that we used in the previous one to estimate the value of the options. For instance, Google's value per share is \$99.44, whereas the price per share used in the option valuation is \$ 295.97. If we choose to iterate, we would revalue the options using the estimated value of \$99.44, which would lower the value of the options and increase the value per share, leading to a second iteration and a third one and so on. The values converge to yield a consistent estimate. The consistent estimates of value are provided in Table 5:

Table 5: Consistent Estimates of Value per Share

	<i>Cisco</i>	<i>Google</i>
Value of Options (with current stock price)	\$ 2,058	\$ 4,565
Value per share	\$9.80	\$99.44
Value of Options (with iterated value)	\$ 332	\$1,501
Value per share	\$ 10.07	\$ 110.47

For both firms, the estimated after-tax value of the options drops dramatically, leading to an increase in value per share.

Ways of incorporating existing options into relative value

Just as options affect intrinsic valuations, they also affect relative valuations. In particular, comparing multiples across companies is complicated by the fact that firms often have varying numbers of employee options outstanding. A failure to explicitly factor these options into analysis will result in companies with unusually large or small (relative to the peer group) numbers of options outstanding looking misvalued on a relative basis.

To see the effect of options on earnings multiples, consider the most widely used one, which is the PE ratio. The numerator is usually the current price per share and the denominator is earnings per share. Analysts who use primary earnings per share are clearly biasing their analysis towards finding companies with higher option overhang to be undervalued. To see why, note that the price per share should incorporate the effect of options outstanding – the market price will be lower when there are more employee options outstanding, but the denominator does not since it reflects actual shares

outstanding and does not capture potential dilution. Note that this bias will not disappear when firms switch to expensing options.

To counter this, analysts often use fully diluted earnings per share to incorporate the effect of outstanding options, thus penalizing companies with large numbers of options outstanding. The problem with this approach is that it treats all options equivalently, with the number of shares increasing by the same unit whether the option is out-of-the-money and has three weeks left to expiration or deep in-the-money and has five years left to maturity. Clearly, firms that have more of the latter should trade at lower market values (for any given level of earnings) and will look cheaper on a diluted basis.

What is the solution? The only way to incorporate the effect of options into earnings multiples is to value the options at fair value, using the current stock price as the basis, and add this value on to the market capitalization to arrive at the total market value of equity.²⁶ This total market value of equity can be divided by aggregate net income to arrive at a PE ratio that incorporates (correctly) the existence of options. This will allow analysts to consider all options outstanding and incorporate their characteristics into the value.

$$\text{Option corrected PE} = \frac{(\text{Market Capitalization} + \text{Estimated value of options outstanding})}{\text{Net Income}}$$

The net income used should be the earnings estimated on the assumption that employee options are compensation and operating expenses. With the adoption of 123R, this should become a little easier to do.

Everything that we have said about earnings multiples can also be said about book value multiples. Failing to incorporate the value of equity options into the market value of equity will make option-heavy companies look cheaper, relative to companies that have fewer options outstanding. The solution is the same as it was for earnings multiples. Estimating the value of employee options and adding them to market capitalization will almost always eliminate the bias in the comparison process.

²⁶ Harking back to the last section, the value of options used should be calculated based upon the current stock price (rather than an estimated value) and on a pre-tax basis.

Illustration 4: Adjusting PE ratio for options outstanding

Consider Cisco and Google, two companies for which we estimated the value of options outstanding in illustration 3. In table 6, we estimate the conventional PE ratio and contrast it with the adjusted PE ratio, using the approach described above:

Table 6: PE ratio versus Adjusted PE ratio: Cisco and Google

	<i>Cisco</i>	<i>Google</i>
Stock price	\$ 17.67	\$ 295.97
Primary EPS	\$ 0.885	\$3.48 (Trailing 12 month)
Diluted EPS	\$0.725	\$3.19
Primary PE	19.97	84.92
Diluted PE	24.39	92.75
Market Capitalization	\$114,625 million	\$82,214 million
+ Value of options	\$ 3,257 million	\$ 7.023 million
Market Value of Equity	\$ 117,882 million	\$89,237 million
Net Income	\$ 5,741 million	\$ 968 million
Net Income after option expensing	\$ 4,712 mil	\$ 953 million
Adjusted PE	$117,882/4712 = 25.02$	$89,237/953 = 93.64$

In making the adjustments to net income for option expensing, we use the information provided by the firms in their financial statements to estimate pro-forma income. Cisco reported \$1,628 million in employee option expenses for the current year, thus creating an after-tax expense of \$1.029 million. This is subtracted from the stated net income. For Google, we had to improvise since the net income number used was based upon trailing 12-month data (through June 30, 2005) and the employee option adjustment is available only for the last financial year (ending December 31, 2004). Google reports an adjustment to net income of \$ 15 million in after-tax terms for the 2004 fiscal year income. We had made the same adjustment to the trailing 12-month earnings, though the actual adjustment will probably be higher.

Future Option Grants and Effect on Value

While existing options act as a drag on value, they are but part of the problem. Firms that have issued options in the past will probably continue to keep using them in the future. In this section, the argument for why these expected future option issues affect value and how to incorporate these effects into value is presented.

Why future option issues affect value

Just as options outstanding represent potential dilution or cash outflows to existing equity investors, expected option grants in the future will affect value per share by increasing the number of shares outstanding in future periods.

- The simplest way of thinking about this expected dilution is to consider the terminal value in the discounted cash flow model. When valuing a company, the terminal value is estimated at a point in time in the future, is discounted to the present and is then divided by the shares outstanding today to arrive at the value per share. However, expected option issues in the future will increase the number of shares outstanding in the terminal year, and therefore reduce the portion of the terminal value that belongs to existing equity investors.
- An alternate way of considering why future option grants affect value is to treat them as employee compensation. The resulting increase in operating expenses will decrease operating income and after-tax cash flows in future years, thus reducing the value that we would attach to the firm today.

Ways of incorporating future options into discounted cash flow value

It is much more difficult to incorporate the effect of expected option issues into value than existing options. This is because we have to forecast not only how many options will be issued by a firm in future periods, but also what the terms of these options will be. While this may be possible for a couple of periods with proprietary information (where the firm lets us know how much it plans to issue and at what terms), it will become more difficult beyond that point. We will consider an approach which we can use to obtain an estimate of the option value, and look at two ways of dealing with this estimate, once obtained.

a. Estimate option value as an operating or capital expense

We can estimate the value of options that will be granted in future periods as a percentage of revenues or operating income. By doing so, we can avoid having to estimate the number and terms of future option issues. Estimation will also become easier since we can draw on the firm's own history (by looking at the value of option grants in previous years as a proportion of revenues or operating expenses) and the experiences of more mature firms in the sector. Generally, as firms become larger, the value of options granted as a percent of revenues should become smaller.

Having estimated the value of expected future option issues, we are left with another question. Should we consider this value each period as an operating expense and compute the operating income, after the expense? If we do, we are assuming, then, that option issues form part of annual compensation. Alternatively, we can treat it as a capital expense and amortize it over multiple periods. While the cash flow in the current period is unaffected by this distinction, it has consequences for the return on capital and reinvestment rates that we measure for a firm.

It is important that we do not double count future option issues. The current operating expenses of the firm may already incorporate the expense of employee options in one of two ways.

- If the firm is expensing option at fair market value at grant time, the current earnings will reflect the value of the option grant in the most recent year. If we forecast future earnings, based upon this current income, we are implicitly assuming that the firm will not only continue to grant options in the future but also that the value of option grants will remain at the current period's proportion of revenues.
- If the firm is not expensing options, the current earnings of the firm may already include the expenses associated with option exercises in the current period. If the effect on operating income of option exercise in the current period is less than the expected value of new option issues, we have to allow for an additional expense associated with option issues. Conversely, if a disproportionately large number of options were exercised in the last period, we have to reduce the operating

expenses to allow for the fact that the expected effect of option issues in future periods will be smaller.

In making forecasts of future option issues, it is important to also consider the effects of the changing size of the firm on option issues. As firms become larger, the option grants as a percent of revenues or value will tend to become smaller. Thus, we should move option grants for firms towards industry averages or mature firm practices as we forecast out further into the future.

Illustration 5: Valuing with expected option issues

When valuing Cisco and Google, the current operating income of the companies and the industry averages were key inputs. The way the two firms have dealt with employee option expenses will play a key role in what operating income we will use in valuation. With Cisco, the stated pre-tax operating income for the most recent year is \$7,416 million. The firm, however, neither expenses employee options granted in the current year nor does it show the cost of option exercise in its earnings. Instead, it adjusts for the latter in the book value of equity. Consequently, the entire cost of the option grant for this year, valued at fair market value, should be netted out against the pre-tax operating income to arrive at a more reasonable measure of operating income:

Stated Pre-tax Operating Income =	\$7,416 million
+ Expenses from option exercise considered	\$ 0 million
- Fair market value of options granted during year	\$1,628 million
Adjusted Pre-tax Operating income	\$5,786 million

If we use this pre-tax operating income as our base for forecasting future operating income, we are assuming that employee option grants will continue into the future and that the value of these grants as a percent of revenues will remain at this year's level of 6.56%. Since this is high, relative to the peer group (where the average option grants as a percent of value is closer to 3%), we assumed that option grants as a percent of revenues will decrease from existing levels to 3% over the next 10 years.²⁷ More importantly, failing to adjust the operating income for employee option expenses will result in income,

²⁷ To do this, we have to make separate forecasts of the stated pre-tax operating income and employee option expenses, with the latter defined as a percent of revenues each year.

cash flows and value all being overstated. In fact, the value of equity would be overstated by almost \$ 24 billion if we used the stated operating income for our calculations.

Google, on the other hand, reported \$ 1,433 million in pre-tax operating income for the four quarters ended June 30, 2005. Like Cisco, it does not expense employee option grants in the current year but unlike Cisco, it does show the expenses of option exercise as an operating expense. The adjustment to get to the correct operating income is therefore a little more complicated:

Stated Pre-tax Operating Income =	\$ 1,433 million
+ Expenses from option exercise considered	\$ 264 million
- Fair market value of options granted during year	\$ 286 million
Adjusted Pre-tax Operating income	\$ 1,455 million

The value of option grants as a percent of revenues in the most recent year is 6.39%. As with Cisco, we lower this value to 3% over the next 10 years, reflecting our expectation that as the firm grows, its option grants will become a smaller percent of revenues. This reduction, in turn, will push up operating margins in future years.

The adjustments that we had to make to get to the corrected operating income for Cisco and Google provide a measure of how difficult it is to make these adjustments for all companies, at least until FAS 123R creates some uniformity in practices across companies. In 2005, for instance, some firms were already expensing employee options and others were not. Among the firms that did not expense options, some firms showed the expenses associated with options being exercised as operating expenses (like Google) whereas others (like Cisco) showed it as adjustments to book value of equity. The adjustments therefore vary from company to company and we are largely dependent upon the pro-forma adjustments that all companies are required to show for employee option expenses. The biggest benefit of forcing all companies to follow one rule and expense options (FAS 123R) is that we will be able to compare operating margins across companies (or average them) without having to worry about comparing pre-employee option expense margins for some companies to post-employee option expense margins for other companies.

b. Estimate expected stock price dilution from option issues

The other way of dealing with expected option grants in the future is to build in the expected dilution that will result from these option issues. To do this, we have to make a simplifying assumption. For instance, we could assume that options issued will represent a fixed percent of the outstanding stock each period, and base this estimate on the firm's history or on the experience of more mature firms in the sector. Generally, this approach is more complicated than the first one and it does not lead to a more precise estimate of value. Clearly, it would be inappropriate to do both – show option issues as an expense and allow for the dilution that will occur from the issue. That double counts the same cost.

Does the market value employee options correctly?

The debate about how best to incorporate employee options into estimates of value becomes academic if the market consistently fails to account for them when valuing equity per share in companies. In fact, there are many analysts who argue that being sloppy about employee options in either discounted cash flow or relative valuation creates little in costs because the market is also sloppy in its assessments. There are three dimensions on which we can consider how markets view employee options: How do markets react when options are granted to employees? How do markets react when employees exercise their options? Does the market incorporate the option overhang when valuing equity in a publicly traded company? The evidence on each question is presented below:

1. Price reaction to option grant: There is no evidence that the market reacts negatively to option grants by companies. There are some who believe that this is because companies have historically not shown these option grants as expenses, but there is no reason to believe that option grants themselves are bad news for stockholders. In fact, if we view option grants as compensation, they are part of the normal cost of doing business for a young firm with a cash flow problem. Consequently, news of option grants by themselves should be neither good nor bad news to markets.

2. Price reaction to option exercise: Garvey and Milbourn (2002) examine how stock prices react to the dilution that is caused when options are exercised.²⁸ They argue that in an efficient market that incorporates the potential dilution from option exercise, the actual exercise should be a non-event with no stock price consequences. What they find, however, is that stock prices react negatively to option-exercise associated dilution, which they see as evidence that markets do not fully incorporate the option overhang. This may not necessarily be true, since option exercise, by itself, convey information to the market. In particular, a large number of option exercises by employees can be viewed as a signal that they believe that the stock is overvalued.

3. Market Value and Option overhang: Li and Wong (2004) examined the market valuation of companies with employee stock options.²⁹ They find that the market price is in fact lower for companies with substantial overhang (by about 6%) and that adjusting for employee stock options in valuation yields values that are closer to the market prices. This can be viewed as evidence that markets do consider the value of outstanding options when valuing companies.

This debate has become more intense with the potential shift in accounting rules in 2006, requiring companies to expense option grants at fair market value. Such expensing, it is argued, will catch the market by surprise and lead to significant valuation reassessments, at least at companies that have disproportionately large option grants. A study of companies that have switched to expensing in 2002 and 2003 suggests that these fears may be misplaced. In this study, companies that switched to expensing options experienced neither positive nor negative returns; in other words, the expensing, by itself, had no effect on value, which would imply that the valuations of these companies effectively incorporated the option expensing prior to it happening.³⁰

At the risk of oversimplifying the debate, we believe that there are ways in which we can resolve the differences between these studies. The studies that find that equity values incorporate the existence and potential dilution that will be caused by options are

²⁸ Garvey, G.T. and T.T. Milbourn, 2002, *Do Stock Prices incorporate the Potential Dilution Effect of Employee Options?*, Working Paper, SSRN.

²⁹ 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, SSRN.

generally right. Most investors and analysts do consider employee options when valuing stocks but only in a very rough sense by using fully diluted earnings per share in making valuation judgments. The studies that find negative stock price reactions to option exercise are probably also right, at least for firms that have made disproportionately large option grants (relative to other companies in the sector) or at excessively favorable terms (vesting and exercise price). What are the implications for stock prices when all companies will have to expense option grants next year? Assuming that firms do not change their option granting behavior next year, the transparency of the expense associated with option grants will lead to reassessments of value of equity per share at some companies, with values per share increasing at companies that have lower option expenses than expected (given the industry standards) and decreasing at companies that have higher option expenses than expected. We would expect that many of the latter group, though, will reduce option grants to bring them closer to industry averages. The net result will be fewer employee option grants, more standardization of grants across companies in a sector and no large market impact when FAS 123R finally comes into effect.

Consequences of Option Based Compensation

Earlier in this paper, we looked at the reasons behind the shift towards equity compensation in recent years. The granting of employee options, in addition to affecting earnings and value, also has implications for corporate financial policy. As we will see in this section, firms that use employee options extensively adopt very different investment, financing and dividend policies than firms that do not. While a significant portion of the differences can be attributed to the fact that option-granting firms tend to be younger, higher growth and higher risk firms, some of the differences can be attributed directly to the presence of employee options and their effects on management incentives.

³⁰ Semerdzhian, M., 2004, *The Effects of Expensing Stock Options and A New Approach to the Valuation Problem*, Working Paper, SSRN.

Investment Policy

Conventional corporate financial theory recommends that firms pick investments that have positive net present values but is generally agnostic about risk in projects. In other words, firms should accept both safe and risky projects with positive net present values, assuming of course that the discount rates used to analyze the projects incorporates the risk. If two projects have the same net present value, firms should be indifferent between them. When managers are rewarded primarily with options, we alter this balance. Since options are rendered more valuable by higher volatility, managers will prefer higher risk investments to safer investments. While this may not be a problem if the net present values on the investments are the same, it can become a problem when the safer investment with the higher net present value is rejected in favor of the riskier investment with a lower net present value. In effect, common stockholders in these firms are subsidizing option-holding managers. In practice, the bias towards higher risk can manifest itself in many ways:

- Cash versus Real Investments: Cash invested in treasury bills and commercial paper is a zero net present value investment, but it is riskless. It is possible that managers will feel the urge to invest the cash in risky real projects (or acquisitions), even if these projects have negative net present value.
- Risk Shifting: Over time, managers may move the firm towards riskier business mixes, even if it does not make economic sense. The loss in value may be offset by the gains on option holdings for managers.

The empirical evidence on the interplay between the existence of management options and investment policy is mixed. Some studies seem to indicate that managers who are compensated with options actually take less risk because they have so much of their wealth tied to how well the firm is doing.

Financing Policy

Building on the theme that option-holders gain when equity becomes more risky, we would anticipate more debt in firms with more options outstanding. Higher financial leverage increases the volatility in stock prices and should also increase equity value. There is one counter availing factor. As we noted earlier, the exercise of equity options

creates tax deductions for firms and reduces the effective tax rate for the near term. This may reduce the tax benefits from the use of debt. The net effect will determine whether debt ratios increase or decrease as a consequence. Graham, Land and Shackelford (2003) find that firms that issue employee options have little debt and argue that the tax savings from option expensing that these firms gain reduce the marginal tax rates and thus the potential benefits to borrowing.³¹

Dividend Policy

The use of employee options can have significant consequences for both how much firms return to stockholders and the form of that return (dividends or stock buybacks). On the first issue, we would expect more cash to be returned to stockholders in firms with options than firms without these options; cash, after all, is a zero risk investment and makes options on the equity less valuable. On the second, we would anticipate that less of the cash will be paid out in dividends and more will be used for stock buybacks. Dividends, after all, reduce the stock price whereas an equivalent stock buyback reduces shares outstanding and may well lift the stock price.

There is some evidence that firms with significant employee options outstanding are more likely to buy back stock than to pay dividends. Fenn and Liang (2002) note that dividend payouts tend to be lower at firms with employee options than at otherwise similar firms without these options.³² Kahle (2004) presents evidence that stock buybacks are more common when firms have large numbers of options outstanding, and suggests that the repurchases may be motivated by both the need to cover the exercise of these options and the desire to keep the stock price high.³³ At the same time, financial markets react less positively to these buybacks, suggesting that they recognize the motives for the buybacks.

³¹ Graham, J.R., M.H. Lang and D. A. Shackelford, 2004, *Employee Stock Options, Corporate Taxes and Debt Policy*, Journal of Finance.

³² Fenn, George and Nellie Liang. 2001. *Corporate Payout Policy and Managerial Stock Incentives*, Journal of Financial Economics. 60, pp. 45-72. Similar conclusions are arrived at in Lambert, Richard A., William Lanen, and David F. Larcker. 1989. *Executive Stock Option Plans and Corporate Dividend Policy*. Journal of Financial and Quantitative Analysis. 24:4, pp. 409-425.

³³ Kahle, K.M., 2004, *When a buyback isn't a buyback: Open Market Repurchases and Employee Options*, Working Paper, SSRN.

The Bottom Line

Options and common stock may both be equity instruments but they have different characteristics. In particular, risk that can affect common stock values negatively can increase option values. This fundamental contrast can explain why firms should be cautious about jumping on the option compensation bandwagon. If the reasons for using options are reducing the gulf between managerial and stockholder interests and a cash shortage, using common stock (restricted or otherwise) will accomplish these objectives without the side costs of options.

II. Restricted Stock

While options have claimed the lion's share of the attention, when it comes to equity compensation, giving equity in firms is a practice that predates options by decades. Firms, private and public, have attracted employees by offering them equity stakes, in addition to conventional compensation. When shares are offered to employees, it is not surprising that there are restrictions often imposed on laying claim to these shares and trading them. These restricted stock issues have made a comeback in recent years as the abuses of employee options have come to light. In July 2003, Microsoft switched from using options to restricted stock, representing the most prominent example of this trend.

Use of and Accounting for Restricted Stock

As with employee options, we will begin by looking at both the prevalence of restricted stock issues and the question of what types of companies are most likely to use restricted stock. We will also look at the typical restrictions that are built into these shares, and how accounting rules for restricted stock have evolved over time.

Magnitude and Usage

There has been a clear shift away from employee options, especially since the announcement of FAS 123R, though the evidence is still anecdotal for the most part. A survey by Mercer, a consulting firm, in May 2004 noted that about two thirds of all firms surveyed had changed their equity compensation programs in response to the option expensing rule. Among the firms that had already instituted changes, 22% of firms had

reduced option-based compensation by 40% or more. Among the 36% of the firms that replaced employee options with another form of equity compensation, restricted stock was the most common choice. As an example, consider Amazon, a heavy user of employee options in the late 1990s. In 2001, Amazon granted 46.25 million options to employees but in 2002, but the number of options granted dropped to 3.045 million in 2003 and to 226,000 in 2004. The number of restricted shares granted to employees rose to 2.9645 million in 2003 and 2.1 million in 2004

The switch to restricted stock is likely to continue and perhaps accelerate in the future as option expensing becomes a given, and the historical accounting bias (created by APB 25) towards employee options disappears. It is unlikely, though, that restricted stock will completely replace equity options. After all, there are some firms that will be still better served with option grants than restricted stock grants to managers. In particular, we should expect to see equity options still be the dominant choice for risky, high growth firms early in the life cycle, trying to induce employees to bet on future growth. As firms move through the life cycle and become a little more mature, we would expect to see a shift towards restricted stock, as both volatility and growth flag.

Characteristics of Restricted Stock and Variants

Restricted stock plans generally come with two constraints. The first relates to whether the employee stays with the firm. In most cases, the restricted stock is forfeited if the employee terminates employment. The second relates to trading on the stock. Generally, restricted stock cannot be traded until the end of the restriction period. These two conditions should make restricted stock less valuable than unrestricted stock. A variation of restricted stock is phantom stock. With phantom stock, the firm deposits hypothetical shares in an employee's account. These shares become actual shares at the end of a specified period, if the employee remains with the firm. Effectively, there is little difference from a valuation perspective between restricted stock and phantom stock, though there may be accounting differences. A third variation is stock bonus plans, where the granting of shares is contingent on the firm reaching a specified operating target – doubling of revenues, 20% growth in net income etc.

Accounting for Restricted Stock

The accounting rules that govern restricted stock have remained relatively stable over time, unlike the rules for employee compensation. When a restricted stock issue is made, firms have to estimate the value of the restricted stock and treat it as a compensation cost. Like employee options, the value of the restricted stock is spread over the vesting period. For instance, a restricted stock grant with a four-year vesting period and an estimated value of \$ 1 million will create an accounting expense of \$ 250,000 each year for the next four years.

In making the estimation of the value of restricted stock, firms are allowed to factor in both the probability that the employee will forfeit (by leaving the company) and the illiquidity of the shares, and discount the observed market price. Quoting FASB:

“Restricted securities are often purchased at a discount from the quoted price of otherwise identical unrestricted securities, reflecting the lack of liquidity relating to the inability to access that market for the specified period. Therefore, in estimating the fair value of restricted securities, the quoted price of an otherwise identical unrestricted security shall be adjusted for the effect of the restriction, considering factors such as the nature and duration of the restriction, the volatility of the unrestricted security, and the risk-free interest rate.”³⁴

FASB goes on to add that determining the discount requires the analyst’s judgment.

Valuing Restricted Stock

As we noted earlier, there are generally three modifications to restricted stock that can affect value. The first is the employment restriction. Since restricted stock vest with the employee only if he or she remains employed by the firm, the greater the likelihood of employment termination, the less valuable restricted stock will become. Adjusting for this factor requires an estimate of the probability that an employee will stay employed by the firm during the restriction period, and multiplying that probability by the stock price today.

³⁴ FASB Financial Accounting Series, No 1201-100, June 23, 2004.

The most common version of restricted stock prevents employees from trading the stock for a specified number of years after they have been granted the stock. Thus, restricted stock is illiquid, relative to other stock, and should trade at a discount on the observed market price. How much of a discount? That will depend upon several factors:

1. Period of illiquidity: The longer the non-trading restriction period, the larger the illiquidity discount should be for restricted stock. To provide a sense of the magnitude of the discount, note that firms that raise funds through the issue of restricted stock to investors (as opposed to using it as management compensation) typically accept discounts of 20-30% on the market price.
2. Hedging/ Borrowing Constraints: Employees with restricted stock may very well be able to avoid the biggest costs of illiquidity if they can hedge against price movements (thus enabling them to lock in high stock prices on the restricted stock) and borrow against the estimated market value of the restricted stock. As the constraints on hedging and borrowing become tighter, the illiquidity discount attached to restricted stock should increase.
3. Stock Volatility: The cost of illiquidity becomes much larger when the restricted stock is in a volatile company, since the stock price can swing wildly from period to period and employees can do little to protect themselves or cash out.

The estimation of the illiquidity discount on restricted stock is far too detailed for this paper, but there is a companion paper that does deal with this issue.³⁵

The third is a performance contingency. If the employee will receive the stock only if a performance condition is met (whether that condition be stated in terms of revenues or earnings), the value of the restricted stock will have to reflect the likelihood of this happening.

Incorporating Restricted Stock into Valuation

Incorporating restricted stock into valuations is far easier than incorporating employee options, which should be an argument in favor of the use of restricted stock. In

³⁵ Damodaran, A., 2005, *Marketability and Value: Measuring the Illiquidity Discount*, Working Paper, www.damodaran.com.

this section, we will consider how best to consider restricted stock issues in both discounted cash flow and relative valuation.

Discounted Cash flow Valuation

As with employee options, there are three dimensions along which restricted stock issues can affect value. Restricted stock issues in the past will create an overhang of restricted stock that can affect the value per non-restricted share. Restricted stock issues to compensate employees in the current year will reduce current earnings, because they are compensation expenses. Expected restricted stock issues in the future will reduce future earnings and cash flows.

- Restricted Stock Issues in the past: Restricted stock issues in the past will be reflected in the number of shares outstanding at a firm at any point in time. Thus, assume that a firm that has issued 20 million restricted stock issues over the last 5 years and that they remain restricted. In addition, assume that this firm has 80 million unrestricted shares trading in the market today as conventional shares. The firm will report having 100 million shares outstanding, but the shares are not equivalent. In particular, as we noted in the last section, restricted shares should be less valuable than unrestricted shares. Thus, if the overall value of equity is \$ 1 billion, the restricted shares should have values less than \$ 10 and the unrestricted shares should have values greater than \$ 10.
- Restricted Stock Issues in the current year: The arguments we used for treating employee options as compensation expense apply just as strongly for restricted stock. Thus, the value of restricted stock (allowing for the illiquidity discount) granted in the current year to employees should be treated as an operating expense and reduce the current year's operating and net income.
- Expected Restricted Stock Issues in the future: Expected restricted stock issues in the future are an operating expense line item. As with options, the best way to estimate the line item is to compute the value of restricted stock granted each year as a percent of revenues historically and then forecast out this value for future years. This will reduce expected future cash flows and, by extension, the value per share today.

In summary, the treatment of restricted stock issues mirrors the treatment of employee options with the one obvious qualifier. There are fewer valuation issues related to valuing restricted stock than options, at least for publicly traded firms. The only real debate is about the size of the illiquidity discount to be attached to the stock price.

Relative Valuation

Since accountants have typically adjusted the number of shares outstanding for restricted stock outstanding, analysts have generally had an easier time incorporating the effect of restricted stock into relative valuation. The one potential problem that is often overlooked is that restricted shares add to the share count just like regular shares but they should have lower values (because of illiquidity). As a consequence, we are likely to overstate all multiples for firms with substantial restricted stock outstanding. To see why, note that any multiple (equity or enterprise value) has the market capitalization as one of the ingredients in the numerator. The conventional computation of market capitalization involves multiplying the number of shares outstanding by the observed market price. Since restricted stock should have lower values, the market capitalization will be overstated for companies with significant restricted stock overhang. As an example, consider the firm with 80 million regular shares and 20 million restricted shares, and assume that the stock price is \$10.15 (for the traded shares). Multiplying the market price (\$10.15) by the number of shares outstanding (100 million) will generate a market capitalization of \$1.015 billion. In reality, though, the 20 million restricted shares would have traded at a discount (if they had traded) and the cumulative market cap would have been lower (say \$ 1 billion)

Notwithstanding this problem, restricted stock is less likely to skew relative valuations than employee options, because restricted stock overhangs tend to be small (relative to option overhangs) and the illiquidity discount is small (again relative to the variability in option values).

Conclusion

The use of equity as employee compensation is not new. Firms have always used equity grants as sweeteners not only to attract managers to their firms but to also make

them think like stockholders. In the last two decades, the floodgates have opened on equity compensation, especially at technology firms. At many of these firms, managers were rewarded primarily through options, aided by the lax accounting and tax treatment of these grants (by not expensing them until exercise). In the last few years, the awareness of employee options has been raised by two developments. The first is the recognition that some managers were receiving wildly disproportionate rewards for any efforts that they were putting in, with options packages valued in tens of millions of dollars. The second was the belated acceptance by accounting standards boards that employee options are compensation and that they should be valued and expensed at the time of the grant (and not at exercise).

Questions have come with this awareness: How do we value employee options? How do they affect the intrinsic (discounted cash flow) value of a firm? How can we compare multiples of earnings or book value across companies with widely divergent policies on the use of employee options? In this paper, we have developed answers to these and other questions. In particular, employee option grants affect value per share because they affect current and future earnings and also because they have the potential for altering the number of shares outstanding.

In the final part of the paper, we looked at the re-emergence of restricted stock and how best to deal with its use in valuing a company. Restricted stock should generally be valued lower than other stock because of their illiquidity. Like options, they affect value per share.
