Giving Options to Everyone: Are There Financial Implications to the Firm?

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Abstract

Using simulated returns series and empirically observed stock returns, we show that broad-based option grants can generally lead to direct financial benefits for the company. Cash resources can be preserved internally by substituting options for a portion of payment in cash. However, the substitution of options for $1000 cash pay will result in only $10-$30 dollars of savings to the firm. This raises the question of whether savings of this magnitude can be universally considered as economically significant. We find that the sorting mechanisms in option grants and the financial-constraints explanation cannot be easily separated and both hypotheses should be studied jointly. The financing-constraints explanation for option grants can simply be a positive supplement to the sorting processes in compensating structures used by the firms.

I. Introduction

Substantial chain of literature focuses on identifying the original motivating factors behind option grants. Many of the recent studies search for firm-specific characteristics and theoretical explanations that can explain what makes some companies grant options to all of their employees. Hall, Murphy (2003) suggest that accounting rules play a central role in the decision to use broad option grants in compensation practices. Shifting a portion of pay into options allows firms to reduce their reported compensation expenses and thus increase reported earnings. However, Murphy (1999) shows that stock options represented a large fraction of the total compensation of the top managers and, therefore, managers and directors should understand significant wealth transfers from the owners to employees. Oyer, Schaefer (2005) support the Hall, Murphy (2003) proposition, suggesting that managers understand these costs but are not motivated to act in the shareholders' best interests. In a later study, Oyer, Schaefer (2006) address managerial awareness of the high stock-option costs to shareholders. They argue that if broad option grants result in large costs to shareholders, then institutional shareholders will utilize their control rights to discourage such compensation practices, or corporate raiders will threaten the current managers with takeovers.

Employee sorting and retention are two further thoroughly studied explanations of firm-wide option grants. Lazear (1999) is one of the earlier studies on sorting models in option-based compensation literature. The author agrees that improved performance is the outcome of a heightened employee effort, but he extends the argument, stating that a greater sensitivity of employees' pay to performance attracts higher-quality workers. Oyer (2004) and Oyer, Schaefer (2005) follow this insight with an examination of the role of option grants in employee retention. If a firm's valuation is tied to its employees' outside employment options, then non-cash

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compensation schemes will help retain employees who might otherwise pursue opportunities outside the firm. Since option grants typically have a vesting period of a few years, leaving the company earlier will result in higher costs to the employees. Oyer, Schaefer (2005) slightly redefine earlier conclusions on the sorting and retention functions of firm-wide option grants. They question the incentivizing role of option-based compensation and support earlier findings that sorting and retention are the only factors. However, since non-executive employees have little effect on a firm's valuation, even a slight level of risk aversion would discourage these employees from accepting option-based compensation. This makes the sorting explanation of option grants counterintuitive. Oyer, Schaefer (2005) conclude that the firm can benefit by using stock options as a sorting mechanism to attract only the optimistic employees. However, Hochberg, Lindsey (2010) disagree that sorting and retention are the primary factors behind option grants. If performance-based incentives attract higher-quality employees, then a greater effort by these workers should lead to improved industry-adjusted performance for both small and large firms. Results of their study do not support this hypothesis, suggesting that sorting is not a factor behind broad option grants.

Core, Guay (2001) is one of the first studies that closely addresses the financing-constraints hypothesis by examining grants of broad-based stock option in public companies. Their study suggests that firms use non-executive stock options as incentives and as the source of internal financing. Firms use more non-executive options as a cash substitute in their compensation structures when they have lower cash flows and difficulties in obtaining external financing. Kedia, Mozumdar (2002) follow the work of Core, Guay (2001) and reach similar conclusions in their study on the factors affecting option grants to non-executive employees. The authors report a significant relationship between option grants and losses carried forward and conclude that financing constraints can be an important motivating factor behind firm-wide option grants. Holland, Elder (2006) take a different approach by considering the direct economic benefits to the companies resulting from broad-based option grants. They support the financing hypothesis regarding option-based compensation, and introduce an algorithm to determine the optimal option grant level under a given distribution of stock returns and the utility function of the representative non-executive employee.

Options literature does not universally support a positive relationship between financial constraints and option grants. Ittner et al. (2003) do not consider the financing-constraints hypothesis as a separate research question, but they find that cash flows and levels of option grants are positively related in "new economy" firms. Oyer, Schaefer (2005) do not reject the financing-constraints hypothesis, but they argue that the financing-constraints explanation can be supported only when employees are the cheapest source of financing and if employees are optimistic about firm's prospects. They conclude that the difficulty of separating the sorting and financing-constraints hypotheses is the likely explanation of inconsistencies in the outstanding empirical literature. Bergman, Jenter (2007) report that non-executive option grants are positively related to high cash levels and not related to leverage or interest payments. They continue the sorting argument of Oyer, Schaefer (2005) and conclude that option grants are related to the cash constraints proxies at firms with a high level of employee optimism. However, cash-constrained firms do not grant options when their employees are not likely to be optimistic.

II. Methodology

A. Broad-based Option Grants: Utility-based Approach with Simulated Returns

In issuing options to employees as a partial substitute for cash-only compensation, firms can benefit financially by preserving cash resources, if such substitution is cheaper than obtaining external financing. Lee et al. (1996) show that flotation costs were historically at the 7.1% average for SEOs with a possible range of 3-17%, depending on the size of the issue. As marginal costs of option grants remain below flotation costs, financially constrained firms may be motivated to utilize options in their compensation practices. They further suggest that undiversified employees placed less value on increasing option grants, due to the larger firm-specific risk exposure of their overall wealth. Hall, Murphy (2003) continue this argument, showing that undiversified, risk-averse employees place large discounts on option grants and value additional stock options less than their risk-neutral market value. This creates a tension between two forces: the firm with financial constraints is motivated to grant more options but it also has to increase the number of options granted to preserve employees' utility, as workers place higher discounts on the additional options due to increasing risks.

The methodology used in this study is a modified approach from the Holland, Elder (2006) study of stock option grants to non-executive employees. Holland-Elder is a utility-based model in which utility is based on the wealth allocation of a representative non-executive employee. As the first step, the "all-cash" compensation utility level of a typical employee is determined. The employee's wealth is allocated across three assets: company stock, investment in a market portfolio, and investment of the remaining portion in the risk-free asset. The power utility function of a typical employee has the following form (definitions of the model variables are provided in Table I):

$$\mathrm{U}(\mathrm{S}_{\mathrm{T}}, \mathrm{I}_{\mathrm{T}}) = \int_{S_T}\int_{I_T} \frac{\left[n_s S_T + \dfrac{\pi(\overline{C})W(\overline{C})I_T}{I_O} + (1-\pi(\overline{C}))W(\overline{C})e^{rt}\right]^{1-\alpha}}{1-\alpha} dI_T dS_T \qquad (1)$$

where $W(\overline{C}) = \overline{W} - n_s S_o + \overline{C}$ (2)

Table I. List of Variables for Equation 1-6

C	amount of cash compensation (when cash is used in combination with options)
$\overline{C}$	amount of cash pay (cash-only compensation)
n_o	number of options granted
$V(S_t)$	pay-off value of an option at the end of period T, this is defined as $MAX[(S_t - X), 0]$
S_t	spot price of stock at time T
X	exercise price of the option
n_s	number of stocks in possession by the employee
S_o	original market price of the stock
F	floatation costs (costs of issuing additional equity)
α	risk aversion factor
$\overline{W} - n_s S_o + C$	amount of free wealth (including cash salary) available for allocation between market portfolio and risk-free asset investment
$\overline{W}$	outside wealth of the employee

Since options can be substituted for a portion of the cash compensation, a new utility function can be defined in the form shown in Equation 3 below. New utility is based on wealth allocation into four assets: the firm's stock, options, market portfolio and a risk-free asset. To preserve the employee's utility, the use of options as partial replacement for cash payment should result in the same utility level from the new compensation structure, which is formally represented by a necessary constraint in Equation 5. This way, the employee remains equally satisfied with his or her compensation when a portion of the cash pay is replaced with a certain number of stock options:

$$U(n_o, S_T, I_T) = \int_{S_T}\int_{I_T} \frac{[n_o V(S_T) + n_s S_T + \frac{\pi(C)W(C)I_T}{I_O} + (1-\pi(C))W(C)e^{rt}]^{1-\alpha}}{1-\alpha} dI_T dS_T \quad (3)$$

where $W(C) = \overline{W} - n_s S_o + C$ (4)

with the following constraint:

$$U(S_t, I_t) = U(n_o, S_t, I_t) \quad (5)$$

Equation 5 is also a necessary participation constraint in maximizing the net benefit function of the company, presented in the following form:

$$\frac{(\overline{C} - C)}{1-F} - n_o \int_{S_T} [e^{-rt} V(S_T)] dS_T \quad (6)$$

The first term in Equation 6 represents the savings the company can achieve due to a lower requirement for external financing (since a portion of employees' cash compensation is replaced with options and the cash retained internally does not need to be raised on the external capital markets). The second term represents the company's costs in issuing options. Since employees place a discount on options as more options replace cash compensation, options are not granted at their fair market value.

The firm aims to choose a combination of C, amount of cash compensation, and n_o, number of options, for maximization of the benefit function in Equation 6 under participation constraint given in Equation 5. The utility level of an average employee in Equations 1 and 2 is determined with the power utility function in the following form:

$$U(\cdot) = \frac{(\cdot)^{1-\alpha}}{1-\alpha} \quad (7)$$

This is a utility function of a risk-averse employee with a level of relative risk aversion shown by the alpha coefficient, where higher alpha represents a higher level of risk aversion. Choice of the power function is consistent with the prior studies on compensation (Hall, Murphy (2003), Holland, Elder (2006)). The power utility function is the only class of the utility functions with a constant relative risk aversion. In economic models, this has an implication that decision-making is unaffected by scale. Prior literature suggests this is an important model property to describe decision making process of non-diversified, risk averse executives (Hall, Murphy (2002)). Arguably, constant risk aversion is even more applicable to compensation decision making of non-executive workers, who are non-diversified and typically have lower levels of compensation and wealth than executives.

Below is the summary of the model parameters used in the scenarios with normally distributed returns: a) the option value is determined with the Black, Scholes (1973) pricing formula, assuming a 10-year life for an option granted at the money with the underlying returns' standard deviation levels of 0.2, 0.3 or 0.4; b) twelve series of the stock and market returns are simulated using probabilities under bivariate lognormal distribution with the following parameters: stock standard deviations of 0.2, 0.3 and 0.4; index standard deviations of 0.2 and 0.3; correlation levels of 0.33 and 0.67, a risk-free rate of 6% and the market risk premium of 6.5%; c) the spot stock price, spot index value and exercise price of an option are each set at \$30; d) all-cash salary is set at \$50,000; e) risk aversion (alpha) equals 2; f) outside wealth is set at \$200,000 and there is no restriction for the firm's stock holding. It is possible that a typical employee does not have any company stock.

The main research objective is to determine whether option grants to non-executive employees can result in direct financial benefits to a firm and whether it can be done without deterioration of the compensation quality. Below is the algorithm of the actual steps of testing the models in Equations 1, 3 and 6:

1. Two series of the firm and market returns are simulated using the assumptions outlined above.
2. Returns are used in calculation of the beginning employee's utility, defined by Equation 1. This is a utility level based on outside wealth and all-cash compensation only. All of the resources available are optimally allocated across company stock, the market portfolio and the risk-free asset.
3. The new utility level, Equation 3, is recalculated on a new combination of assets: stock options and three assets as in Part 1 above. The proportions of company stock, market portfolio and risk-free asset differ from those in Part 1, since a portion of the cash-only pay is replaced with options. The new utility level has to be equal to the beginning employee's utility to preserve the quality of the overall compensation.
4. Equation 6 is solved simultaneously with Equation 5 for the optimal number of options, which is a quantity of options permitting maximum financial benefits for the company and preserving the quality of pay from the employee's perspective.

Following prior literature, the base model is tested on normally distributed returns. Alternatively, non-normal distributions for describing returns are also used as robustness tests. For instance, Smith (1981) proposes using logistic distribution for returns, while Gray, French (1990) consider series of the modified exponential distributions to describe returns. However, both studies suggest that non-normality is more pronounced for the higher frequencies of observed returns, while for monthly and annual returns, deviations from normality are less significant.

B. Broad-based Option Grants: Utility-based Approach with Actual Returns

The same utility-based approach is utilized to study firm-wide option grants and possible financing benefits to the company. Application of the actual returns has at least two important advantages: it is unnecessary to make any distributional assumptions regarding the firm-level and market returns; it is possible to study sub-samples of firms sorted by levels of financial constraint (for instance, by size or company age) and compare results across such firm groups. Empirical returns are also used to estimate volatilities and annualized returns for option pricing and calculation of compensation utility levels. The methodological steps in determining optimal option grants remain the same as in the previous section. Firstly, the employee's compensation utility level is determined for cash-only pay. Secondly, the company has to grant a number of options to satisfy simultaneously the following two requirements: the new compensation utility has to be equal to the utility level before restructuring of the compensation package, and the preservation of capital has to be greater than the cost of the option grants. Since actual returns are used in this part of the study, the following conditions are added to the methodology:

1. 5-year rolling returns volatilities for stocks, annual market returns are estimated and used in pricing stock options;
2. stock options are granted at the money and all options are priced with the Black, Scholes (1973) model;
3. end-of- year prices are used to determine the resulting moneyness of the options.

Use of empirically observed returns is arguably a major improvement over a simulated data approach. Remaining shortcoming of the utility-based methodology is an assumption on the homogeneity of the non-executive employees' preferences, levels of wealth and compensation and risk aversion. This study presents a methodology and gives an example of its practical application for a firm to measure any financial implications of the firm-wide option grants. The model can be easily calibrated for a specific needs of a particular firm to reflect more accurately any measurable relevant parameters.

III. Data

Lognormal bivariate returns series are simulated under various distributional parameter assumptions: three levels of stock returns volatility, two levels of market returns volatility and two levels of correlation between stock and market returns. This gives twelve possible combinations of parameters for different returns scenarios. Parameter combinations for the log-normal returns are summarized in Table II. Each scenario is tested on 10,000 simulated individual returns observations. Two additional tests are performed on the utility model using simulated returns that follow logistic and modified exponential distributions. Empirically observed returns for the individual firms' stocks and for the market were collected from the CRSP database and used in the utility models and benefits function – Equations 1, 3 and 6. Monthly data for the individual stocks, S&P 500 Index and Treasury bill rates are used over the period from 1992 to 2011.

The final sample includes annualized twelve trailing month returns series for the individual stocks and for the S&P 500 Index; annualized T-bill rates were collected directly from the CRSP database. Options are valued with the Black, Scholes (1973) pricing model using historical 5-year rolling returns volatilities for stocks and annualized T-bill rates as a risk-free rate of return. Options have a 10-year life, they are granted at the money with the exercise price is set equal to the stock market price on the date of the option grant. The ending value of the option is determined in one year's time as the positive difference between the new stock price and the strike price, or otherwise zero.

Table II. Scenarios Assumptions for the Bivariate Lognormal Returns Series

Scenario	Market Returns St. Dev.	Stock Returns St. Dev.	Stock-Market Correlation
1	0.2	0.2	0.67
2	0.3	0.2	0.67
3	0.2	0.3	0.67
4	0.3	0.3	0.67
5	0.2	0.4	0.67
6	0.3	0.4	0.67
7	0.2	0.2	0.33
8	0.3	0.2	0.33
9	0.2	0.3	0.33
10	0.3	0.3	0.33
11	0.2	0.4	0.33
12	0.3	0.4	0.33

IV. Results

A. Utility-Based Approach: Simulated Returns

The power utility function, describing the compensation utility of a representative non-executive employee, is a special case and represents the only class of the utility functions with a constant relative risk aversion. In economic models, this has an implication that decision-making is unaffected by scale. Given this model property, all the tests in this section are performed for the same level of risk aversion (measured by alpha set equal to two) and a standard substitution of options for $1000 of cash pay across all scenarios.

Table III presents a summary for all the parameter combinations in these twelve returns scenarios using lognormal returns series. Table IV summarizes results for these twelve combinations of the stock and market return volatilities and correlation levels. Series of returns are generated with the following assumptions: individual stock returns standard deviation of 20%, 30% and 40%; market returns standard deviation of 20% and 30%; and correlation levels of 0.33 and 0.67. In the scenarios where returns are normally distributed, benefits to the firm are not materially different for the different levels of returns volatilities and correlations between individual stock and market returns. Direct financial benefits are in the $37-$39 range per each $1000 dollars of cash pay for which stock options are substituted. This one thousand dollars represents cash preserved internally, and the company does not have to raise this amount on the external capital markets. Interestingly, the number of options granted and their market-value equivalent differ substantially across all twelve scenarios. This is a result of the volatilities and correlation parameters: depending on the input assumptions, options are priced differently and their resulting moneyness differs across all scenarios. Calculation of the option discount that employees place on option grants is beyond the scope of this study, while the net financial benefit to the company resulting from the option grants is the variable of interest.

Table III. Option Grants and Financial Benefits to the Firm Under Various Distributional Assumptions for Normally Distributed Returns Series

Scenario	Benefits to Firm	Number of Options	Cash Substitution	Options Value
1	38.44	1470	1000	9,897.00
2	38.79	577.4	1000	7,815.40
3	37.23	1526.5	1000	10,722.90
4	38.15	1081.3	1000	14,678.90
5	37.74	895.3	1000	12,687.60
6	38.17	394.7	1000	5,592.70
7	37.44	516.8	1000	6,995.50
8	37.31	433.6	1000	5,869.60
9	37.62	593.4	1000	8,056.00
10	38.07	465.4	1000	6,318.10
11	38.42	539.3	1000	7,641.90
12	38.81	612.9	1000	8,686.00

Financial savings of raising capital represent just under 4% of the cash retained internally due to the compensation restructuring. This approximates the lower bound of flotation costs firms are facing on the external capital markets according to Lee et al. (1996), who report that firms typically pay 3-17% of the amounts raised externally, depending on the source of capital, the amounts being raised, and firm-specific risk factors. It is known that normal distribution occasionally fails to describe the distribution of observed stock returns. Nonetheless, financial theory rests heavily on normality assumptions and many of the fundamental models critically rely on the normality assumption. At the same time, it is also known that significant departures from normality are increasing for the higher frequencies of the observed returns: daily and intra-day returns are more likely to be non-normally distributed than monthly or annual returns (see Peiro (1994)). This study is based on the annual and annualized stock and market returns, and distributional deviations from normality are, probably, not a major methodological concern. Nonetheless, additional examination of the utility-based models is done on the series that are not normally distributed.

Smith (1981) proposes logistic distribution for returns with the following density function:

$$f(x) = \frac{\exp(\frac{x-\mu}{\alpha})}{\alpha(1+\exp(\frac{x-\mu}{\alpha}))^2} \qquad (8)$$

where μ is the expectation and α is the scale parameter with the following relation to the standard deviation: $\alpha = (3)^{0.5}\sigma/\pi$. This distribution is similar to the normal, but it has bigger tails.

Gray, French (1990) consider modified exponential power distributions with the density function of the following form:

$$f(x) = \frac{\exp(-\frac{1}{2}(\frac{|x-\mu|}{\phi}))^{\frac{2}{1+\beta}}}{2^{\frac{3+\beta}{2}}\phi\Gamma(\frac{3+\beta}{2})} \quad (9)$$

where μ is the expectation of x and ϕ is the positive scale parameter. β is the kurtosis measure that shows a degree of "non-normality" of the distribution. When beta is zero, Equation 9 is reduced to the density function of the normal distribution; beta of one gives rise to double exponential distribution; and as beta tends to -1, Equation 9 converges to the uniform distribution.

Additional series of stock and market returns are generated under logistic, exponential and normal distributions for the three comparable returns scenarios. The characteristics of the resulting samples are reported in Table IV. A choice of the distributional parameters is made in such a way as to obtain three samples with somewhat similar characteristics – that is, with similar average returns, volatilities and correlations between market and individual stock returns. Utility functions in Equations 1 and 3 are re-run simultaneously with the benefit function in Equation 6 based on these additional returns series.

Table IV. Summary Statistics for the Returns Samples Under Three Various Distributions.

	Logistic	Exponential	Normal
Stock Returns	15.87%	16.01%	16.39%
Market Returns	11.19%	10.38%	10.69%
Risk-free Rate	6%	6%	6%
Stock Returns Volatility	0.1518	0.1497	0.1499
Market Returns Volatility	0.2052	0.2056	0.2085
Stock-Market Correlation	0.1779	0.195	0.2105
N	10,000	10,000	10,000

Results for the financial benefits are presented in Table V. Benefits to the firm are almost identical when returns are following logistic or normal distributions: benefits are $38.47 and $39.51 respectively per each $1000 of the cash pay replaced with options. When returns are exponentially distributed, the resulting benefits are slightly higher at $42.58 per each thousand dollars of the cash-pay substitution.

Table V. Option grants and resulting benefits to the firm under alternative distributional assumptions for the returns series.

	Logistic	Exponential	Normal
Benefits to Firm	38.47	42.58	39.51
Cash Substitution	1,000	1,000	1,000
Options Value	8,483.30	6,630.90	7,865.00
Number of Options	624.9	488.5	579.4

As can be seen from the results of this study, distributional assumptions for the returns of lower frequencies do not materially affect results. Under all returns scenarios in this study, benefits to the firm resulting from shifting all-cash pay into cash-plus-stock options are around 1.5-4% per each $1000 of the cash pay substituted with options. The main conclusion can be formulated as follows: firms may gain direct financial benefits from option grants to non-executive employees, while the utility level of the compensation to employees is fully preserved. However, it is unclear whether benefits can be universally considered as an economically significant factor by decision makers at all firms.

B. Utility-Based Approach: Empirical Returns

The main difference between using real and simulated returns is the necessity to value options individually for each company. Valuation is done with the Black, Scholes (1973) option pricing model, using five-year historical volatilities. This is reducing sample size substantially, as only firms with at least five years of price history on the CRSP database are included in the sample. It is assumed that options are granted at the money for ten years and that the T-bill rate on the grant date is used as the risk-free rate of return.

In Table VI, results over entire sample period are reported. Only benefits to the firm per $1000 cash substitution are reported in the table. The number and value of options granted are not shown, as the scale of the underlying stock prices and option values are different across the companies included in the test sample. Using twelve trailing months' annualized returns for the individual securities and for the market, we find that on average the substitution of options for $1000 of cash pay results in almost $27 of savings to the company. As the next logical step we examine sub-samples of firms, which can be potentially the most and least financially constrained and, respectively, more or less likely to utilize various forms of self-financing, including stock options. Based on the prior literature (see Hadlock, Pierce (2010)), size and age are robust exogenous characteristics of the firm that can proxy for a level of financial constraint that the firm is experiencing. They show younger and smaller firms to be relatively more financially constrained. Following the findings of Hadlock, Pierce (2010), we sort the test sample into deciles based on size, age and size-age combinations. Table VI reports the results on size sorting into deciles for the top and bottom firm groups (the largest and the smallest firms in the sample). The age and size-age combination results are qualitatively similar to the size-based sorting results and are not reported.

Table VI. Hypothetical Option Grants Using CRSP Returns: 1992-2011 Sample, 1st and 10th Size Deciles.

	Entire Sample	Large Firms	Small Firms
Benefits to Firm	26.91	26.7	27.35
Cash Substitution	1,000	1,000	1,000
N	336,512	33,645	33,644

Based on the size, age and size-age sorting benefits of substituting options for cash, pay remains approximately $27 per each thousand dollars of pay substitution, which approximately represents the bottom range of the average flotation costs firms are facing on the external capital markets. The differences between average benefits for entire sample and small, large firm sub-samples are statistically insignificant at the conventional significance levels. As the characteristics of the stock market are not stationary – volatilities and expected returns change over time – it is important to consider possible deviations in the underlying distribution of returns and test possible implications for the financial results of the option grants from the firms' perspective. For this purpose, the base study sample is divided into one-year sub-samples of returns and the benefits function is re-evaluated. Results are reported in Table VII: five years of twenty annual model re-evaluations are selected into the table.

Table VII. Hypothetical Option Grants Using CRSP Returns for Selected Sub-Periods

	Year 1992	Year 1995	Year 1999	Year 2003	Year 2007
Benefits to Firm	20.77	14.03	31.48	20.18	36.19
Cash Substitution	1,000	1,000	1,000	1,000	1,000
N	11,297	15,945	16,320	24,607	28,060

It appears that direct financial benefits to companies resulting from substituting options for cash pay are not static over time. Benefits vary in the range of $12-$40 per thousand dollars of the cash substitution. Some of the differences are statistically significant: for example, average benefits reported for 1995 are statistically different from average benefits for 1998. From the practical standpoint, however, it may be debated whether this difference is economically significant: the savings represent around 1-4% of the cash retained internally, and these savings might not be equally economically significant for all firms. Moreover, large-scale option grants are possible only if employees are optimistic about the company's future prospects and are therefore willing to accept more options instead of cash as a part of the compensation package.

V. Conclusions

We investigate whether financing motives may be among the factors in option grants to non-executive employees. Utility models of a representative employee are used jointly with the benefits function of a company to formally answer the question of whether firms can have direct financial benefits from restructuring cash-only into cash-plus-options compensation model.

Analysis shows that companies may be saving around 1-4% of the amounts of capital being raised internally in the form of substitution of stock options for cash payment. At the same time, the quality of pay for the representative non-executive employee can be fully preserved. It is further determined that distributional assumptions of the underlying stock returns do not have a material impact on the resulting benefits to the company.

The magnitude of the reported benefits raises two important concerns. Firstly, it is debatable whether benefits can be universally considered as economically significant, as under various returns scenarios a firm's direct savings are only $15-$40 per one thousand dollars of the cash-pay substitution. If a company does not have a large number of employees, how much scope is needed to bring the firm's total benefits to an economically meaningful level by substituting options for cash payment? Secondly, as prior compensation literature suggests, employees have to be optimistic about a firm's prospects to be willing to accept non-cash forms of pay, and financially successful firms might self-select into option granting. In general, results of this study show that broad-based option grants can lead to direct financial benefits to a company; however, it is unlikely that the financing motive is one of the primary factors in firm-wide option granting practices.

Employees are likely to have varying beliefs about the firm's prospects, varying levels of pay and accumulated wealth and to have varying preferences and risk aversion levels. Similarly, companies may have varying financial needs and flexibility in option granting, varying number of employees, they may be at various life-cycle stages and operate in different industries. All these factors may result in firms having different optimal levels of cash pay substitution with options. This leaves ample opportunities for future research: studying effect of various utility functions on sub-group of workers within the same firm, calibrating risk aversion levels and option valuation parameters to match actual personnel composition, firm-specific characteristics and market conditions.

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