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How Do Employees View Their Underwater Stock Options?: Evidence from the Stock Option Exchange Program

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Abstract This paper examines the participation decisions of employees in a stock option exchange program aimed at restoring value to underwater options. The program invites employees to exchange their existing underwater options for new options, the value of which is determined by the company stock price in 6 months and 1 day. The participation turns out to vary cross-sectionally and, perhaps surprisingly, the employees do not surrender all their underwater options. We find that employees actively and rationally consider a variety of factors to make their participation decisions, rather than blindly surrendering their underwater options. The participation decisions of non-executive employees seem to be well anticipated by stock market investors, since no abnormal stock returns are related to the participation decisions.

Keywords Non-executive employees · Employee stock options · Stock option exchange program · 6&1 repricing · Participation decisions

JEL Classification G10 · G14 · G30

1 Introduction

Over the past several years, several firms invited their employees to tender their existing stock options in exchange for replacement options that will be granted after 6 months and

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1 day. The existing options targeted in this exchange offer are those that are severely out of the money. The exercise price on the new option is determined by the company stock price on the future re-grant date. These transactions are referred to as "6&1" repricing, and are intended to address underwater options. Although it is possible that the company stock price can skyrocket during the 6-month-and-1-day-long waiting period, thereby leaving the participating employees with a higher exercise price, the existing underwater options are expected to remain out-of-the-money for some time. In addition, as this offer is made mostly by small, Nasdaq-listed companies after the tech-bubble burst, this concern seems to be further minimized. If the invited employees take no action, then they simply keep their existing options. The participation rate in these programs is on average 58%, and is widely dispersed in cross-section between 3% and 100%.[1]

In this paper, we examine the participation decisions of employees in the exchange program to understand how employees view their underwater stock options. More specifically, we attempt to ascertain what determines employee participation in the exchange program and whether employees rationally consider various factors affecting the gains and losses associated with the exchange program. The stock option exchange program makes a good setting to investigate the behavior and decision-making by non-executive employees, since the participation decisions are made for economically significant stakes without conflicting with insider trading rules. Several other features of the program—including the immediate and separate announcements of the program *per se* and of the participation decisions and the varying degrees of managerial participation in the program—further facilitate this investigation.

Using a sample of 133 firms, we find that employees actively and rationally process relevant information to make their participation decisions. Most intuitively, we find that employees participate less in a program in which the existing options are more valuable and that they participate more when the company has good long-term prospects. We also find that the participation of management in the program plays a crucial role. Specifically, when higher-ranking managers are excluded from the program, the company stock return in the near past is negatively related to the participation rate, suggesting that non-executive employees use this measure to predict the company stock price in 6 months, and thus the new exercise price (Benartzi 2001; Cronqvist and Thaler 2004). In those programs, employees are also found to participate less when they are allowed to partially tender their existing options and when they are required to tender more existing options in return for one new option.

In sharp contrast, when management also joins the program, the overall participation level is significantly higher, but all the previously important variables (except for the value of existing options and the company's long-term prospects) are unrelated to the participation rate. These management-inclusive programs involve significantly more options than management-excluding programs, and only in the former group of programs, the size of the program is significantly and negatively related to participation.

We also find that, on average, the stock market barely responds to the announcement of the program, while there is a noticeable difference between the two groups of exchange programs. Specifically, the average announcement-period return for a program excluding management is about 2% (albeit insignificant), whereas the management-inclusive programs experience virtually no abnormal stock return. The different stock market

[1] The participation rate is defined as the ratio of the number of shares that *tendered* options can purchase to the number of shares that all eligible (i.e., *tenderable*) options can purchase. We provide detailed information about this variable in Section 4.1.

reactions appear to be consistent with a higher cost to the company when the exchange offer is extended to higher-ranking managers and thus more options are involved. However, the lack of a stock market reaction in absolute terms renders it implausible that managerial eligibility is a sign of future price declines.[2] The announcement-period return analysis thus suggests that stock market investors learn little from the program announcement. Consistent with this implication, on the cancellation date when employees finalize their participation decisions (to "cancel" the tendered options) and the actual participation rate is made public, there is no abnormal stock return attributable to the unexpected participation rate. We also find no evidence that stock market investors respond gradually to the unexpected participation decisions in the subsequent period.

In summary, our results show that employees attach some value to their underwater options and actively take their value into account when making participation decisions. In addition, the positive effect of the company's long-term prospects on program participation indicates that granting options to non-executive employees makes economic sense as a way to identify and retain optimistic employees (Oyer and Schaefer 2005). Taken together, our results show that employees, once the stakes are high, are capable of actively collecting and processing relevant information to make optimal decisions. This implication is particularly instructive given that prior studies document the seemingly irrational behavior of non-executive employees in a different setting (e.g., Degeorge *et al*. 2004). It is also noteworthy that stock market investors are able to anticipate the participation decisions of non-executive employees.

This paper proceeds as follows. In the following section, we provide the institutional details of the stock option exchange program. Section 3 describes the sample, and Section 4 reports the empirical results. Finally, Section 5 concludes the paper.

2 Experimental setting—stock option exchange program[3]

During the past decade or so, accounting rules have changed in such a way that modifying the terms of employee stock options, such as lowering or *repricing* their exercise prices, adversely affects the company's accounting earnings. The stock option exchange program arose in the early 2000s as a way to obviate such adverse accounting treatments.[4] In essence, the program modifies the exercise price of existing employee stock options by cancelling them in exchange for new options with a different exercise price.

What is unique about the program is that cancellation and re-grant are at least 6 months apart and that the exercise price of new options is determined by the company stock price on the re-grant date. In other words, at the time of cancellation, the new exercise price is

[2] It is also possible that managerial participation could result in a downward manipulation of the company stock price, since doing so can reduce the exercise price of new options. Coles et al. (2006) investigate this incentive and find evidence of earnings management through discretionary accruals. However, they find no evidence that stock market investors are misled, which is readily reconciled with our results and inferences.

[3] We stress that although there are several other studies using the exchange program as the experimental setting (e.g., Carter and Lynch 2003; Zheng 2003; Kalphathy 2004; Coles et al. 2006; and Lee 2007), our paper is clearly distinguished from them in terms of the research questions. Among others, our focus on non-executive employees is genuinely unique.

[4] The selection of this particular repricing method thus has to do with the accounting treatment of employee stock options. In this section, we focus only on the institutional details relevant to the stock option exchange program and the associated self-selection issues. A general account of the accounting treatment of employee stock options is confined to the Appendix.

uncertain and remains so until the re-grant date. The program is designed in this particular fashion because the accounting rule (Financial Accounting Standards Board Interpretation No. 44, *Accounting for Certain Transactions involving Stock Compensation*) considers any other combinations of cancellation and re-regrant (e.g., cancellation and re-grant within six months or determining the new exercise price at the time of cancellation) to be a single repricing event that will trigger the adverse accounting treatment.

Invited employees are typically given approximately one month to decide whether to participate. Immediately after the deadline for the participation decisions, the tendered options are cancelled and the typically 6-month-and-1-day-long waiting period begins. At the end of the waiting period, new options are granted with an exercise price either equal to or, in rare cases, slightly higher than the company stock price on that date.[5] As long as the participating employees remain employed, there is no uncertainty about receiving the replacement options.

These features of the stock option exchange program naturally induce self-selection and only those companies with certain characteristics consider this program. First of all, the program is considered by companies whose employee options are substantially underwater and are unlikely to rise in value against the current exercise price. To retain key employees, these companies need to reprice their options. In other words, the program is motivated only after the company stock price declines significantly, thereby making the existing employee options out of the money. In addition, since the adverse accounting treatment triggered by ordinary repricing methods affects the accounting numbers but not the underlying cash flows, companies that care more about their accounting earnings, such as small or growth firms, are more likely to use the exchange program (Carter and Lynch 2002). Finally, to minimize the risk associated with the program, companies introduce it only when the probability of the company stock price rising dramatically over the next six months and thus the new exercise price being higher than the old ones is small. For example, companies in an upcoming merger talk as a target will not extend such an exchange offer.

Still, the impact on the employee option holdings is, to some extent, uncertain. Although unlikely, it remains possible that the stock price may rise beyond the existing strike price, thus reducing the option value. More importantly, the new options will restart vesting and have limitations on exercisability. Consequently, the company actually *asks* its employees whether they are interested in participating in the exchange program, rather then simply enrolling all of them in the program. For example, one company is quoted as saying:

> We understand that the decision whether or not to exchange options will be a challenging one for many employees. The program does carry considerable risk, and there are no guarantees of our future stock performance. So, the decision to participate must be each individual employee's personal decision, and it will depend largely on each employee's assumptions about the future overall economic environment, the performance of the overall market and companies in our sector, and our own business and stock price.
>
> —SEC filing (form: 14D1) by Keynote Systems on April 11, 2001

In addition, the risks of the program, no matter how trivial they are in effect, prohibit management of the company from providing any advice or recommendations to the invited

[5] This particular way of determining the new exercise price is also related to the accounting rules that are explained in detail in the Appendix.

employees regarding the program. Below is the typical wording in the communication between the company and its employees:

> Although our board of directors has approved this offer, neither we nor our board of directors makes any recommendation as to whether or not you should tend your eligible options for exchange. You must make your own decision whether to tender your eligible options.
>
> —SEC filing (form: 14D1) by Extreme Networks on October 31, 2001

Invited employees thus need to consider various aspects of the exchange offer. The "default", or the consequence of no action, is to keep the existing options that are severely out of the money without any promise for another exchange offer in the future. That is, only by actively opting out of the default by tendering their options, the invited employees may be able to reduce the exercise price of their options. Consequently, employees are encouraged to make judicious use of all available information to make the participation decision, and in this setting, the insider trading rule is not binding at all.

However, as most exchange programs were offered following the tech-bubble burst in the early 2000s by small, Nasdaq-listed companies that were hardest hit by that market turbulence, the risk associated with the exchange program seems to be greatly minimized. In a nutshell, invited employees are expected to participate rather blindly in the exchange program. This prediction is at odds with the observed participation pattern. As mentioned earlier in the introduction, the mean participation rate is only 58% and the cross-sectional dispersion is as wide as from 3% to 100%. This apparent inconsistency motivates our investigation into how non-executive employees view their underwater stock options.

3 Sample

We identify firms that use the stock option exchange program by searching *Lexis/Nexis* for proxy statements and tender-offer schedules with the keyword "exchange program." The search period is from December 16, 1998, the first retrospectively effective day of the new accounting rule, to May 7, 2002.[6] This search scheme yields 2,433 citations and, after reading through them, we are left with 178 firms. Other studies that examine the stock option exchange program with different research questions employ samples of similar size, which indirectly indicates that our initial sample of 178 firms is fairly complete.[7]

To obtain the sample, we apply the following requirements. First, we require the program announcement date and the cancellation date to be identifiable. Second, we require stock trading data to be available for 120 days prior to and 120 days subsequent to the cancellation date. Finally, we require that the actual participation information of eligible

[6] The accounting rule became effective in July 2001 and was retrospectively applied to repricing events after December 15, 1998.

[7] One newspaper article reports that more than 100 firms have used this repricing method (Floyd Norris, "Option Absurdity: Hoping for Lower Prices," *The New York Times*, March 15, 2002). Other academic studies identify a similar number of firms that use the stock option exchange program. For example, Kalphathy (2004) finds 165 such firms, while Carter and Lynch (2003) and Zheng (2003) find 168 and 133 such firms, respectively. Coles et al. (2006) employ a sample of 155 firms in their analysis. However, none of them focus on non-executive employees. Their focus is on companies in which management is eligible for the program. Following our sample period, a number of firms decided to voluntarily expense stock options and the popularity of the exchange program declined until expensing employee stock options became mandatory (see Appendix for details).

employees, as well as the eligibility of higher-ranking executives for the program, are available.[8] After these requirements, our sample comprises 133 companies. Among them, 64 companies exclude their management from the program, which account for approximately 58% of the sample.[9] The other 69 companies allow their executives to join the program, and we confirm that at least one of the invited executives indeed participates, further distinguishing this group of 69 programs from the 64 programs. A run-down of the sample construction is provided in Table 1.

Table 2, Panels A through D, reports various characteristics of the sample that confirm some of the self-selection mechanisms discussed in Section 2—others will be confirmed in Section 4.2.2. By industry, most sample firms are from 2-digit SIC codes 36 (Electrical and Electronic Equipment) or 73 (Business Services), both of which are usually categorized as "new economy" industries. Approximately 87% of the sample firms are listed on Nasdaq, and they are mostly smaller than the median NYSE-listed firm in terms of market capitalization at the beginning of the month during which the program is announced. The announcement dates are spread from February 2001 to May 2002 while the cancellation dates range from March 2001 to July 2002, indicating that most of the exchange programs are offered immediately after the tech-bubble burst in the stock market. The particular timing of the sample exchange programs makes it unlikely that the company stock price will be restored to the level of the pre-bubble burst period during which most existing options were granted.

4 Empirical results

In this section, we first define the participation rate and then identify a variety of program and company characteristics that employees may potentially consider in making their participation decisions. Afterwards, we examine how well those variables explain the observed participation patterns. We also investigate the stock market response to the announcements of the program and of the participation decisions.

4.1 Participation rate

The most important information in our study is the participation rate. It is defined as the ratio of the number of shares that *actually tendered options* can purchase to the number of shares that *all tenderable options* can purchase. This information is obtained from the company filing documents with the Securities and Exchange Commission (SEC). When filing with the SEC at the time of the program offering, the company needs to specify the maximum size of the program, or specifically, the maximum number of shares that all tenderable or eligible options can purchase, in order to calculate the filing fee. Upon cancellation of actually tendered options, the company needs to file again immediately with the SEC and specify the number of shares that those actually tendered options can purchase.

[8] Higher-ranking executives are defined by Rule 16 of the Securities and Exchange Act of 1934, namely, "an issuer's president, principal financial officer, principal accounting officer (or, if there is no such accounting officer, the controller), any vice-president of the issuer in charge of a principal business unit, division or function (such as sales, administration or finance), any other officer who performs a policy-making function, or any other person who performs similar policy-making functions for the issuer."

[9] This attrition rate is consistent with other studies. Carter and Lynch (2003) report 62%, Zheng (2003) 58%, and Kalphathy (2004) 61%. As mentioned earlier, they focus on companies that do not exclude their management team.

Table 1 Main sample construction. This table reports the run-down of the sample construction. We identify firms that use the stock option exchange program by searching *Lexis/Nexis* for proxy statements and tender offer schedules with the keyword "exchange program." The search period is from December 16, 1998, the first effective day of the new accounting rule, to May 7, 2002. This search scheme yields 2,433 citations and, after reading through them, we are left with 178 firms. We further screen them with the following additional data requirements

Description	Number of firms
Initial sample	178
After requiring the announcement and cancellation dates to be identifiable	154
After requiring stock trading data to be available for 120 days prior to and 120 days subsequent to the cancellation date	144
After requiring the participation and management eligibility	133
Final sample	133
(Programs in which management cannot participate)	(64)
(Programs in which management can participate)	(69)

For example, 724 Solutions Inc. provides the following information in two separate filing documents:

> This amount assumes that options to purchase 1,787,151 common shares of 724 Solutions Inc. having an approximate aggregate value of US $3,892,594 as of January 23, 2002 will be exchanged pursuant to this offer.
>
> —SEC filing (form: SC 14D1) on January 24, 2002

> The offer expired at 11:59 p.m., eastern standard time, on February 21, 2002. We accepted for exchange options to purchase 1,376,203 shares of common stock, representing approximately 77% of the options that were eligible to be tendered in the Offer.
>
> —SEC filing (form: SC 14D1 A00) on February 22, 2002

In our participation rate calculation, the denominator is 1,787,151 (from the first filing document), the numerator is 1,376,203 (from the second filing document), and the participation rate is 77% (1,376,203/1,787,151), which is exactly the same as what the company says in its second SEC filing document. In rare cases, companies do not provide such detailed participation information in their exchange program-related filing documents. Then, we look for that information in other SEC filing documents such as quarterly or annual reports (i.e., 10-Q or 10-K).[10]

When the company excludes its management team from the program, our participation rate will reflect precisely the decisions of non-executive employees. However, when management is also permitted to join the program, our measure aggregates the decisions of non-executives with those of higher-ranking managers. To minimize the concerns regarding

[10] One such example is Apropos Technology Inc. whose management can participates in the program and thus belongs to our benchmark group. It is quoted as saying: "As of May 21, 2001, options to purchase 2,095,415 of our shares were issued and outstanding, of which options to purchase approximately 1,800,000 of our shares are eligible to participate in this offer (SC 14D1 Exhibit 99. Additional Exhibits; on May 29, 2001)." Later, it says: "On May 29, 2001, the Company commenced a voluntary tender offer to provide eligible employees in the United States and the United Kingdom the opportunity to exchange outstanding options for new options, six months and one day after cancellation of such options. At the close of the tender offer period, 73 of the 252 eligible employees tendered options to purchase 639,000 Common Shares, which were then cancelled on June 26, 2001 (10-Q; on November 13, 2001)." The participation rate for the program is therefore 35.5 percent (639,000/1,800,000).

Table 2 Sample characteristics of 133 sample firms. This table reports various characteristics of the sample of 133 firms. Sample construction is detailed in Table 1

Characteristics	Number of firms	Characteristics	Number of firms
Panel A. by industry (2-digit SIC)			
35	8	28, 38, 82 (respectively)	2
36	22		
48	12	23, 37, 39, 49, 51, 58, 59,	1
73	68	64, 70, 80, 83 (respectively)	
87	6		
Panel B. by listed exchange			
NYSE/AMEX	17	Nasdaq	116
Panel C. by market-cap at the start of the announcement month (relative to the NYSE quartiles)			
<1st quartile	86	2nd~3rd quartiles	16
1st~2nd quartiles	23	>3rd quartile	8
Panel D. by the announcement date (cancellation date)			
200102	1 (0)	200111	15 (11)
200103	2 (1)	200112	8 (15)
200104	14 (0)	200201	9 (9)
200105	20 (10)	200202	5 (8)
200106	13 (22)	200203	3 (8)
200107	11 (15)	200204	7 (1)
200108	4 (11)	200205	1 (4)
200109	8 (4)	200206	0 (4)
200110	12 (9)	200207	0 (1)

this aggregation, the following empirical analysis examines the two groups of exchange program users separately as well as analyzing them altogether as one full sample (see Chidambaran and Prabhala (2003) for this approach).

4.2 Explanatory variables for participation rate

In this sub-section, we first identify the variables that can potentially explain the participation rate, and then provide their summary statistics separately for the 64 management-excluded programs and for the 69 programs in which management is allowed to participate.

4.2.1 List of explanatory variables

Program-specific variables

Moneyness

It is the difference between the current stock price and the exercise price of the eligible or tenderable options. We include this variable since more severely out-of-the-money options are more likely to be tendered. Specifically, we use the log difference between the stock price averaged over the [−20, −3] window relative to the cancellation date and the minimum exercise price among the eligible options. Since eligible options have been issued at various points in time with different exercise prices, an ideal measure of their moneyness

would be the one based on their weighted average exercise price. Unfortunately, we cannot obtain this information. Instead, we construct the moneyness measure based on the minimum exercise price, which is specified by 78 of the 133 sample firms. In case that the company explicitly makes all outstanding options eligible or does not mention the exercise price at all, we treat the eligible options to be at the money. This treatment is on the grounds that employees are not provided any reference price from management and are left to their own discretion. Although some companies are found to have a positive moneyness value, it is probably because we use the minimum exercise price.

Exchange ratio

It is the number of existing options that need to be tendered in order to obtain one replacement option. Most companies set this ratio equal to one, making the exchange program a lot more attractive—recall that the existing options are severely out of the money and new options will be granted at the money. However, some other companies come up with an exchange ratio that is greater than unity. Multiple exchange ratios are also used when eligible options have a wide range of exercise prices. The rationale is that options with a higher exercise price (i.e., with a lower value) must be tendered more in exchange for one replacement option. When multiple exchange ratios are used, we calculate their average. We expect employees to be reluctant to tender their existing options when the exchange ratio is high.[11]

Vesting restart

It is a dummy variable for the programs in which new options do not inherit the vesting schedule of the tendered options and instead begin their own vesting schedule. In general, the vesting schedule has to do with the measurement date, and when the vesting period is modified, the affected options are re-expensed as of the date when the vesting period is modified (i.e., as of the new measurement date). However, if the vesting period of new options is in accordance with the original term of the old options, then there is no change in the measurement date. Since most companies grant at-the-money options that incur no compensation expenses under the accounting regime at the time when the exchange programs are offered (see Appendix for details), the vesting period modification is less of an issue. Approximately half of the companies vest new options based on their own vesting schedules. Employees may be reluctant to participate in a program whose new options do not continue to vest on the vesting of the old options.

Partial tendering

This particular term of the exchange program is best explained by examples. Below are two examples of the typical tendering policy:

> We are not accepting partial tenders of options. However, you may tender the remaining portion of an option that you have partially exercised. Accordingly, you may tender one or more of your option grants, but you must tender all of the unexercised shares subject to each grant or none of the shares for that particular grant.
> —SEC filing (form: SC 14D1) by Evolve Software Inc. on December 5, 2001

[11] This variable may also represent that employees have to make their decisions with multiple choices, which is known to be distracting rather than informative (Iyengar and Lepper 2000; Iyengar et al. 2004).

> You must tender a full option grant. We are not accepting partial tenders of an individual option grant. For example, if you hold an option to purchase 3,000 shares of Common Stock at an exercise price of $35.00 per share, you must either tender all or none of such options; you cannot tender only part of the option and retain the remainder of the option. On the other hand, if you have multiple option grants, you may choose not to tender all of your grants.
> —SEC filing (form: SC 14D1) by Mercator Software Inc. on October 9, 2001

Deviating from this baseline case, some companies allow for partial tendering even within a particular option grant. We use a dummy variable representing the program in which partial tendering within a given option grant is allowed, since such programs will have a low participation rate if employees take advantage of this option.

Excluding recently granted options (Look-back period)

A company considering an exchange program must check whether there have been any option grants for the past 6 months, besides planning not to grant any new options over the next 6 months. It is because the accounting rule combines any cancellations and re-grants within 6 month regardless of their order, and considers them to be a single repricing event. As a consequence, virtually all companies with (just a few exceptions) require those recently granted options, if any, to be tendered and cancelled automatically, along with other options that are tendered voluntarily. Below is one example of such a policy:

> You will, however, be subject to a "6 month look-back" that will require you to tender all option grants that you received during the 6 months immediately prior to the date we accept tendered options for exchange if those grants were made subsequent to, and have an exercise price lower than the exercise price of, the grant(s) that you tender.
> —SEC filing (form: SC 14D1) by Mercator Software Inc. on October 9, 2001

As the few exceptions, some companies exclude from the program either the employees who received options granted for the past 6 months, or those options themselves. By doing so, companies eliminate any issues associated with a look-back period. We thus use a dummy variable to represent these companies.

Program size

It is measured as the ratio of the number of shares that all eligible options can purchase to the total number of shares outstanding. We include this variable to control for the economic significance of the program. Assuming that there are not many out-of-the-money options that are ineligible for the program, this variable can represent the percentage of underwater options within a company.

Company-wide variables

Company long-term prospect

Since employee stock options are a type of deferred compensation, the long-term prospect of the company is particularly relevant to the participation decisions. Specifically, the company prospect is expected to positively affect the participation decisions. We consider two empirical proxies. One is Tobin's average q as measured by the ratio of the market value of total assets to their book value. The market value of total assets is calculated by deducting the book value of equity from the book value of the total assets and then adding back the average market value of equity over the [−20, −3] window relative to the cancellation date. Book value information is

from the previous fiscal year relative to the cancellation date. Since the q ratio is likely to be correlated with firm size (which is also measured by the average market capitalization over the [−20, −3] window relative to the cancellation date), we introduce another proxy for the company long-term prospect, namely, the analyst EPS forecast.

Firm size

We use the average market capitalization of the company over the period of [−20, −3] relative to the cancellation date. As in many corporate finance studies, this variable is supposed to capture unidentified firm characteristics.

Past stock returns

Option moneyness is determined by the prior stock returns of the firm. Since the 6&1 programs are offered when options are underwater, the prior returns are negative for firms offering a 6&1 exchange. However, prior stock returns may contain information that participant could use in making the decision to participate. That is, stock prices can show certain secular patterns such as mid-term momentum and long-term reversal (DeBondt and Thaler 1985; Jegadeesh and Titman 1993). Perhaps consistent with these patterns, prior studies show that employees tend to extrapolate the past stock returns to predict future returns (Benartzi 2001; Cronqvist and Thaler 2004). To take this behavior into account, we use three measures of the company stock return covering the 6 months prior to the cancellation date. Specifically, we calculate the company stock returns for the [−120, −61], [−60, −21], and [−20, −3] windows.

Stock return volatility

Stock return volatility can be associated with a much lower stock price as well as with a much higher stock price in 6 months. Given that the program is offered after the company stock price falls significantly, greater volatility may be interpreted as greater likelihood of the company stock price being higher in 6 months. However, the opposite scenario is also possible. Since the horizon in question is six months, we proxy for the stock return volatility during the waiting period by the one estimated over the [−240, −121] window relative to the cancellation date. This particular estimation window is selected to mitigate the concern that the recent stock price drop skews the volatility estimate.

Leverage

Leverage (the ratio of total debt to total assets from the previous fiscal year) has two different information contents relevant to the participation decisions. One is about the corporate liquidity or solvency, which will discourage participation in the program, and the other is about the volatility of corporate cash flows, which makes the option more valuable and thus encourages participation.

In addition, we consider whether the exchange program has any tax consequences for participating employees, and find that there is no tax consideration that discourages employees from participating in the exchange program, as is evidenced in the quotation from one company's SEC filing document:

> If you exchange your current options for the right to receive a New Option, you will not be required under current law to recognize income for federal income tax purposes at the time of the exchange. We believe that the exchange will be treated as a non-taxable exchange. Further, upon your receipt of the New Option, you will not be required under current law to recognize income for federal income tax purposes.
> —SEC filing (form: SC 14D1 Exhibit 99.) by AHL Services Inc. on November 30, 2001

4.2.2 Summary statistics of the explanatory variables

Table 3 reports the summary statistics of the above explanatory variables as well as the participation rate. Panel A starts with the 64 management-excluded programs: we refer to them as the *Non-Management* group. The participation rate in the first line shows the two observations mentioned earlier. First, the participation rate is low on average: both the mean and median participation rates are only 52%. Second, the participation rate shows a broad cross-sectional range from 3% to 97%.

The moneyness value of existing options is negative on average, consistent with the notion that the exchange program is introduced after the company stock price falls and existing employee options lose their value. Although some companies have a positive moneyness value, we again stress that it is due to the fact that we use the minimum exercise price among all eligible options. A typical exchange ratio is unity, but some programs require more than one option to be tendered, since new options are likely to be more valuable with a lower exercise price. In our sample, the average exchange ratio is greater than one and can be as high as 7.9.

Of the 64 programs, 29 offer the replacement options that do not honor the vesting schedule of the cancelled options, and only one program allows for partial tendering. Three of the sample programs exclude the options that were granted in the 6 months prior to the cancellation date, or the employees who received such options. Finally, the exchange program size ranges from less than 1% to slightly more than 23%. As an illustration, 46 of the 64 companies offer a program that is greater than 5%.

Turning to company-wide characteristics, we first report the company stock return during 1 year prior to the program initiation (i.e., [−250, −3] window relative to the announcement date). Consistent with the self-selection discussed in Section 2, most companies experienced a significant drop in their stock prices prior to the introduction of the exchange program. In an unreported result, we verified that the past 1-year stock return is highly correlated with our moneyness measure that is based on the actual minimum exercise price (37 of the 64 sample companies). The correlation coefficient is 0.41 with a *p*-value of 0.011. With all 64 companies, the correlation coefficient between the past 1-year stock return and moneyness is insignificant at 0.12, because our moneyness measure is zero when the company makes eligible all outstanding options (i.e., when no minimum exercise price is specified).[12]

In addition to the company stock return prior to the announcement date, we calculate three stock returns covering 6 months prior to the cancellation date. We do so because employees will, if ever, refer to the company stock return up to the point when they make a decision. The three stock return measures are generally negative while not as severe as the 1-year return prior to the program initiation. As one exception, the company stock return over the immediate past ([−20, −3] window) shows a small but positive return on average. In the next row, market capitalization confirms the small size of our sample firms. The average daily return volatility is as high as 8%, again reflecting that our sample consists of small, high-tech companies. Tobin's q ratio for the previous fiscal year relative to the

[12] While some may think that the value of eligible options in those programs is *smaller* and thus moneyness measure has a more *negative* value, we choose to set it to zero on the grounds that the explicitly specified minimum exercise price serves as a reference point. There should be a reason why the company chooses a particular number as the minimum exercise price. From the perspective of employees, this particular stock price level may well imply that management expects the company stock price in 6 months to remain at least below this level. This reasoning is similar to our earlier conjecture that the program is likely to be well timed so that the company stock price will not rise dramatically at least until the re-grant date.

Table 3 Participation rate and related program/company characteristics. This table reports the summary statistics of the participation rate and some of the program/company characteristics that are likely to be related to the participation rate. Panel A is for the sub-sample of 64 firms in which management cannot participate in the exchange program (Non-Management). Participation rate is defined as the ratio of the number of shares that tendered options can purchase to the number of shares that all eligible options can purchase. Moneyness is the log difference between the stock price—averaged over the [−20, −3] window relative to the cancellation date—and the minimum exercise price of the eligible options. It is zero when the minimum exercise price is not specified. Exchange ratio is the number of old shares (or options) that need to be tendered in order to obtain one new share (or option). In case that the company simply mentions that various ratios will be used, we set it to the sample maximum ratio. When the ratio information is not available, it is set to the sample median (i.e., one). Vesting restart is a dummy variable for programs whose new options start their own vesting schedule. Partial tendering is a dummy variable for programs that allow for partial tendering. Excluding recent grants is a dummy variable for programs that exclude options that are granted six months prior to the program. For all three dummy variables, no information is treated to be the baseline case of zero value for the dummy. Program size is the ratio of the number of shares that all eligible options can purchase to the total number of shares outstanding. ReturnD [t1, t2] is the cumulated daily log return over the [t1, t2] window relative to the D date (either Announcement or **C**ancellation date). Market-cap is the average market capitalization over the [−20, −3] window relative to the cancellation date. Daily volatility is the volatility of daily log return over the [−240, −121] window relative to the cancellation date. Average q is the ratio of the market value of total assets to the book value of total assets. The market value of total assets is: book value of total assets + market value of equity—book value of equity. The market value is the average over the [−20, −3] window relative to the cancellation date, and the book value is from the previous fiscal year financial statement. Leverage is the ratio of total debt to total assets. EPS forecast is the mean EPS forecast for next fiscal year. Participation rate and related program/company characteristics. Panel B reports the summary statistics of the participation rate and some of the program/company characteristics for the sub-sample of 69 firms in which management is allowed to participate in the program (Management). The difference from Non-Management sub-sample is also tested here. Finally, the last column report the statistical significance of the logit regressions of the 0/1 dummy variable for Management sub-sample on some of the program/company characteristics that are available at the time of the program announcement. In the logit regression, program size, market-cap, and average q are re-calculated based on the announcement date, and are in log; Other variables are defined as in Panel A. **, and * represent the significance at the 1%, and 10% level, respectively

Panel A. Non-management sub-sample

Variable	Parameter (n)	Mean	SD	Median	Min	Max
Participation rate	64	0.52	0.25	0.52	0.03	0.97
Moneyness	64	−0.38	0.58	−0.02	−2.20	0.44
Exchange ratio	64	1.38	0.99	1.00	0.83	7.90
Vesting restart (29)	64	0.45	0.50	0.00	0.00	1.00
Partial tendering (1)	64	0.02	0.13	0.00	0.00	1.00
Excluding recent grants (3)	64	0.05	0.21	0.00	0.00	1.00
Program size	64	0.08	0.05	0.08	0.01	0.23
$return_A$ [−250, −3]	64	−1.42	0.95	−1.30	−3.33	0.12
$return_C$ [−120, −61]	64	−0.46	0.47	−0.44	−1.72	0.62
$return_C$ [−60, −21]	64	−0.13	0.39	−0.14	−1.20	0.69
$return_C$ [−20, −3]	64	0.01	0.29	−0.01	−0.65	0.93
Market-cap	64	1,646	4,600	297	12	26,667
Daily volatility	64	0.08	0.03	0.08	0.02	0.14
Average q	64	1.45	1.30	1.05	0.23	8.41
Leverage	64	0.12	0.18	0.01	0.00	0.65
EPS forecast	60	−1.59	5.96	−0.34	−41.60	2.18

Table 3 (continued)

Panel B. Management sub-sample in comparison with Non-Management sub-sample

Variable	Summary statistics for *Management* sub-sample						Difference from *Non-Management*		Logit
	N	Mean	SD	Med	Min	Max	*t*-stat	*z*-stat	
Participation rate	69	0.64	0.23	0.64	0.15	1.00	2.96	2.77	
Moneyness	69	−0.41	0.60	−0.23	−2.20	0.86	−0.29	−0.41	
Exchange ratio	69	1.56	1.39	1.00	1.00	7.90	0.83	0.58	
Vesting restart (33)	69	0.48	0.50	0.00	0.00	1.00	0.29	0.29	
Partial tendering (5)	69	0.07	0.26	0.00	0.00	1.00	1.62	1.57	
Excluding recent grants (7)	69	0.10	0.30	0.00	0.00	1.00	1.21	1.18	
Program size	69	0.13	0.10	0.11	0.02	0.63	3.43	2.96	**
$return_A$ [−250, −3]	69	−1.27	0.91	−1.17	−4.45	0.57	0.96	0.96	*
$return_C$ [−120, −61]	69	−0.39	0.48	−0.41	−1.53	0.66	0.85	0.77	n.a.
$return_C$ [−60, −21]	69	0.02	0.46	−0.01	−1.33	1.79	1.95	1.84	n.a.
$return_C$ [−20, −3]	69	0.02	0.23	0.04	−0.53	0.69	0.17	0.32	n.a.
Market-cap	69	595	1,371	100	4	7,630	−1.76	−2.74	*
Daily volatility	69	0.08	0.03	0.07	0.02	0.18	0.83	−0.65	
Average q	69	1.34	1.08	1.01	0.17	7.63	−0.55	−0.15	
Leverage	69	0.08	0.19	0.01	0.00	0.98	−1.07	−0.47	
EPS forecast	67	−1.28	3.91	−0.41	−25.12	1.60	0.34	−0.62	

cancellation date ranges from 0.23 to 8.41. Leverage is quite low at 12% on average and its median is remarkably lower at 1%, indicating the limited debt capacity of the sample firms due to their industry and firm size.

Finally, the EPS forecast is widely dispersed from less than −41 dollars to more than 2 dollars. Both the mean and median EPS forecasts are negative, indicating a dismal business outlook for most of the sample firms. Although we consider this variable to be one of the key firm characteristics affecting employee participation, we report it at the end due to its missing values in some of our sample firms. For this reason, the later empirical analysis employs this variable in the last regression specification. This treatment is not meant to play down its importance.

Panel B of Table 3 reports the summary statistics of the program/company characteristics for the 69 management-inclusive programs called the *Management* group. It also reports the mean and median tests for the difference between the *Management* and *Non-Management* groups. Finally, the last column in the table reports the logit regression results for including management in the program (only statistical significance). The most notable finding in this table is that the *Management* group has a significantly higher participation rate than the *Non-Management* group. Whereas the participation rate for the *Non-Management* group is 52% on average, the mean participation rate for the *Management* group is 64%. The difference in the mean is also statistically significant. (Their medians are also significantly different.) Additionally, the *Management* group offers a significantly larger program probably because the options held by management are part of the program.

Another noteworthy observation is that, except for participation rate and program size, the two groups of exchange program users are remarkably similar. For example, the value of eligible options, as measured by our moneyness variable, is similar between the two groups, and they offer the program after stock price decreases of similar magnitudes.

Although there is some suggestion that smaller companies include their managers in the program and that their stock return before the cancellation date is somewhat higher, those differences are not statistically reliable. In an unreported result, we also confirmed that industry composition and the timing of the program offering are also virtually identical.

In the spirit of a multivariate analysis, we estimate the logit regression for the managerial eligibility using the available information at the time of the program announcement—hence, the three stock return measures prior to the cancellation date are inapplicable and other variables (program size, market capitalization, and q ratio) are re-calculated based on the announcement date. Consistent with the univariate results, program size enters the regression significantly. However, firm size and the past stock return are only marginally significant, and other variables are not useful in explaining whether the company includes its management team in the exchange program.

4.3 Regression of participation rate on explanatory variables

We now estimate the regressions of the participation rate on the above explanatory variables. As the dependent variable, we use either the raw participation rate or its log transformation. The log participation rate is used on the grounds that the dispersion among the low participation rates can potentially be more informative because participation is *ex ante* expected to be high. Some of the explanatory variables are also transformed to be better suited for the regression analysis. Specifically, firm size, program size, and the EPS forecast are in log to mitigate the extreme skewness. As for the EPS forecasts, most of them are negative in our sample, so we use -*ln* (sample maximum + 0.0001—EPS forecast). As mentioned previously, we estimate the regressions separately for the *Non-Management* and *Management* groups, as well as for the whole sample with a dummy variable for the *Management* group.

In the regression analysis, we need to be careful about the correlation between the explanatory variables. We thus report their correlation coefficients in Table 4. The two proxies for the company prospect—namely, Tobin's q and the EPS forecast—are respectively highly correlated with other variables, as well as with each other. For example, firm size and the q ratio have a correlation coefficient of 0.33 with a *p*-value less than 0.01%. The q ratio is also significantly correlated with the stock return measures, raising concerns about multicollinearity. The EPS forecast is also subject to this problem, albeit to a lesser extent. We will thus always exclude Tobin's q ratio, and add other variables to regression in stages, with the EPS forecast included at the end because of its missing values.

Table 5 reports the regression results. Panel A contains the results for the raw participation rate, whereas Panel B shows the log participation rate results. We first interpret the results in Panel A and later discuss any noteworthy differences in Panel B. The first specification (Model (1)) regresses the participation rate on the moneyness measure. As might be expected, this measure is highly significant with a negative coefficient, indicating that more valuable options are less likely to be surrendered. This is the case regardless of whether or not management participates in the program. However, it is also interesting to note that the management-inclusive programs have a higher participation rate even after controlling for the moneyness measure.

Model (2) augments the moneyness measure with the three measures for the company stock return during the 6 months prior to the cancellation date. This specification is designed to see whether a recent price change affects the participation decisions over and above the moneyness of existing options. We find that the company stock return over the

Table 4 Correlation between program/company characteristics – using the full sample of 133 firms. This table reports the correlation coefficients between the program and company characteristics that are numbered as follows: (1) Moneyness; (2) Exchange ratio; (3) Vesting restart; (4) Partial tendering; (5) Excluding recent grants; (6) *ln* (Program size); (7) *ln* (Market-cap); (8) $Return_C$ [-120, -61]; (9) $Return_C$ [-60, -21]; (10) $Return_C$ [-20, -3]; (11) Daily volatility; (12) *ln* (q); (13) leverage; and (14) -*ln* (sample maximum +0.0001–EPS forecast). Descriptions of the variables are provided in Table 3. Numbers in parentheses are *p*-values

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(2)	−0.09												
	(0.279)												
(3)	−0.11	0.18											
	(0.226)	(0.034)											
(4)	0.10	−0.07	0.01										
	(0.267)	(0.405)	(0.866)										
(5)	−0.01	0.12	0.02	0.08									
	(0.941)	(0.168)	(0.825)	(0.388)									
(6)	0.23	0.07	−0.11	0.02	−0.05								
	(0.009)	(0.451)	(0.229)	(0.848)	(0.572)								
(7)	0.27	0.02	−0.02	−0.17	−0.08	−0.04							
	(0.002)	(0.860)	(0.831)	(0.054)	(0.382)	(0.647)							
(8)	−0.07	0.23	0.07	0.00	0.23	0.03	−0.09						
	(0.433)	(0.007)	(0.414)	(0.993)	(0.007)	(0.697)	(0.315)						
(9)	0.00	0.14	0.09	0.09	0.15	−0.13	−0.13	0.02					
	(0.996)	(0.100)	(0.328)	(0.290)	(0.094)	(0.126)	(0.125)	(0.784)					
(10)	0.19	−0.02	0.12	0.04	0.05	0.09	−0.09	0.02	−0.11				
	(0.027)	(0.784)	(0.183)	(0.678)	(0.534)	(0.280)	(0.311)	(0.804)	(0.222)				
(11)	−0.18	−0.11	−0.08	−0.04	0.03	0.12	−0.33	0.01	0.01	0.01			
	(0.039)	(0.213)	(0.343)	(0.615)	(0.721)	(0.172)	(0.000)	(0.926)	(0.932)	(0.905)			
(12)	0.23	−0.03	−0.14	−0.06	0.00	0.03	0.33	0.14	0.31	0.02	−0.03		
	(0.008)	(0.709)	(0.097)	(0.519)	(0.998)	(0.733)	(0.000)	(0.097)	(0.000)	(0.841)	(0.715)		
(13)	−0.02	−0.01	0.11	−0.01	0.06	−0.22	0.07	0.08	0.05	0.00	−0.14	0.06	
	(0.791)	(0.874)	(0.200)	(0.895)	(0.487)	(0.011)	(0.444)	(0.344)	(0.604)	(0.976)	(0.097)	(0.515)	
(14)	0.13	0.11	−0.16	−0.04	−0.06	−0.01	0.31	0.15	0.05	−0.05	−0.29	0.21	0.03
	(0.143)	(0.233)	(0.075)	(0.642)	(0.510)	(0.943)	(0.000)	(0.088)	(0.569)	(0.553)	(0.001)	(0.017)	(0.727)

[−60, −21] window relative to the cancellation date is highly significant and negative for the *Non-Management* group but insignificant at all for the *Management* group. In the full sample, it is significant at the 10% level. These results imply that non-executive employees, only when making the participation decisions independent of higher-ranking executives, use this measure to predict the company stock price in six months and 1 day by extrapolating its past return patterns (Benartzi 2001; Cronqvist and Thaler 2004). Moneyness remains highly significant and negative in both sub-samples as well as in the full sample. Again, the management-inclusive programs have a significantly higher participation rate after controlling for moneyness and the past company stock return.

Model (3) includes more program characteristics. Specifically, it contains the exchange ratio and three dummy variables representing, respectively, programs that vest new options differently than cancelled options, programs that allow for partial tendering, and programs that exclude the options granted 6 months prior to the cancellation date (or the employees who received such options). This specification also employs program size, firm size, company stock return volatility, and leverage. With this specification, we first find that moneyness and the stock return over the [60, 21] window show virtually the same pattern. Besides, the dummy variable for the programs allowing for partial tendering has a significantly negative coefficient for the *Non-Management* group. We have only one such program, so drawing any inference from this result needs some caution. However, the negative coefficient is consistent with employees taking advantage of their opportunity to selectively tender their options. In contrast, the *Management* group with five programs allowing for partial tendering exhibits no such pattern.[13] Rather, the *Management* group experiences a higher participation level in a smaller program, suggesting that employees participate more when there are fewer underwater options within the company.

Finally, Model (4) includes the EPS forecast in the regression. It is worth noting that the EPS forecast enters the regression with a significant and positive coefficient, meaning that employees participate more when the company has a good business outlook. This finding thus lends support to the role of options as a way to sort and retain employees (Oyer and Schaefer 2005). As in other models, moneyness always remains significant, whereas the past stock return, the dummy for partial tendering, and the program size are significant only in one of the two sub-samples. Finally, the dummy variable for the management-inclusive programs enters the regression with a significantly positive coefficient.

The R^2 indicates that our regression specifications fit the data quite well. Specifically, the explanatory variables together explain more than 30% of the variation in the participation rates. Consistent with this assessment, an F-test always rejects the joint hypothesis of zero coefficients across all the explanatory variables.

In Panel B, we observe results very similar to those in Panel A, except that the exchange ratio has a significantly negative coefficient for the *Non-Management* group. This implies that the reluctance of non-executive employees to tender more options explains the dispersion among the low participation rates. Leverage is significantly positive in the regressions for the *Non-Management* group, but is marginally significant only after controlling for the EPS forecast. Although the result is consistent with leverage representing the volatility of corporate cash flows (which increases the value of options), we do not draw a strong inference from this result due to the lack of robustness.

[13] The mean moneyness of those six programs is −0.13, which is higher than the rest of sample programs (−0.41). Accordingly, the mean exchange ratio of the six programs is lower than the rest (1.07 vs. 1.49). In both groups, about half of the programs restart the vesting period for replacement options.

Table 5 Cross-sectional regression of (log) participation rate on program/company characteristics. This table reports the coefficients of the regression of the (log) participation rate on various program and company characteristics. Descriptions of the variables are provided in Table 3. We use the White (1980) covariance estimator to determine the *p*-value in parentheses

Panel A. Using RAW participation rate as dependent variable

Variable	(1)			(2)			(3)			(4)		
	Non	*Mgt*	*All*	*Non*	*Mgt*	*All*	*Non*	*Mgt*	*All*	*Non*	*Mgt*	*All*
Intercept	0.458 (0.000)	0.589 (0.000)	0.464 (0.000)	0.437 (0.000)	0.596 (0.000)	0.462 (0.000)	0.308 (0.244)	0.545 (0.002)	0.340 (0.026)	0.381 (0.172)	0.637 (0.001)	0.380 (0.014)
Dummy (management)			0.120 (0.003)			0.132 (0.001)			0.171 (0.000)			0.166 (0.000)
Moneyness	−0.164 (0.000)	−0.135 (0.000)	−0.148 (0.000)	−0.129 (0.002)	−0.137 (0.001)	−0.141 (0.000)	−0.126 (0.014)	−0.114 (0.029)	−0.129 (0.000)	−0.154 (0.006)	−0.126 (0.011)	−0.142 (0.000)
Return [−120, −61]				−0.024 (0.697)	0.025 (0.623)	0.011 (0.774)	−0.022 (0.731)	0.006 (0.922)	0.017 (0.681)	−0.036 (0.624)	−0.045 (0.477)	−0.002 (0.956)
Return [−60, −21]				−0.202 (0.010)	0.004 (0.925)	−0.083 (0.060)	−0.213 (0.024)	−0.023 (0.656)	−0.103 (0.035)	−0.194 (0.063)	−0.049 (0.392)	−0.101 (0.042)
Return [−20, −3]				−0.190 (0.140)	0.101 (0.398)	−0.075 (0.403)	−0.202 (0.180)	0.108 (0.352)	−0.063 (0.490)	−0.222 (0.200)	0.104 (0.362)	−0.061 (0.506)
Exchange ratio							−0.027 (0.263)	−0.007 (0.738)	−0.012 (0.492)	−0.035 (0.130)	−0.037 (0.144)	−0.031 (0.020)
Dummy (new vesting)							0.052 (0.399)	−0.015 (0.783)	−0.019 (0.626)	0.114 (0.102)	0.037 (0.523)	0.009 (0.825)
Dummy (partial tender)							−0.330 (0.000)	0.002 (0.982)	−0.001 (0.988)	−0.370 (0.000)	0.013 (0.917)	0.002 (0.983)
Dummy (no recent grant)							0.039 (0.511)	0.033 (0.702)	0.020 (0.711)	0.006 (0.925)	0.112 (0.285)	0.050 (0.405)
ln (program size)							−0.029 (0.637)	−0.087 (0.043)	−0.076 (0.027)	−0.019 (0.761)	−0.076 (0.073)	−0.066 (0.063)
Daily volatility							−0.042 (0.978)	−1.106 (0.257)	−0.777 (0.347)	0.932 (0.581)	−0.365 (0.725)	−0.014 (0.987)
ln (market-cap)							0.012 (0.613)	−0.011 (0.411)	−0.001 (0.967)	−0.009 (0.754)	−0.015 (0.358)	−0.007 (0.632)
Leverage							0.032 (0.823)	0.135 (0.290)	0.071 (0.531)	0.107 (0.436)	0.114 (0.393)	0.092 (0.400)
-*ln* (max–EPS forecast)										0.047 (0.001)	0.121 (0.080)	0.050 (0.000)
R-squared	14.0%	12.5%	18.6%	27.0%	13.8%	21.0%	33.4%	27.1%	27.6%	36.5%	33.5%	32.1%

F-statistics	10.1	9.55	14.85	5.47	2.57	6.75	2.13	1.73	3.48	2.03	2.05	3.78
(*p*-value)	(0.002)	(0.003)	(0.000)	(0.001)	(0.046)	(0.000)	(0.031)	(0.084)	(0.000)	(0.039)	(0.034)	(0.000)
# of observations	64	69	133	64	69	133	64	69	133	60	67	127
Panel B. Using LOG participation rate as dependent variable												
Intercept	−1.016	−0.614	−0.975	−1.050	−0.624	−0.985	−0.833	−0.767	−1.095	−0.613	−0.558	−1.019
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.249)	(0.030)	(0.005)	(0.426)	(0.111)	(0.009)
Dummy (management)			0.324			0.357			0.433			0.427
			(0.002)			(0.001)			(0.000)			(0.000)
Moneyness	−0.428	−0.229	−0.321	−0.320	−0.240	−0.295	−0.352	−0.199	−0.291	−0.427	−0.219	−0.319
	(0.000)	(0.000)	(0.000)	(0.004)	(0.000)	(0.000)	(0.018)	(0.025)	(0.001)	(0.009)	(0.008)	(0.000)
Return [−120, −61]				−0.034	0.003	0.006	−0.089	−0.035	0.017	−0.138	−0.150	−0.021
				(0.827)	(0.972)	(0.938)	(0.597)	(0.740)	(0.867)	(0.488)	(0.230)	(0.842)
Return [−60, −21]				−0.535	0.050	−0.208	−0.581	0.006	−0.234	−0.551	−0.053	−0.234
				(0.030)	(0.564)	(0.084)	(0.032)	(0.954)	(0.065)	(0.066)	(0.630)	(0.067)
Return [−20, −3]				−0.632	0.260	−0.293	−0.800	0.273	−0.282	−0.863	0.265	−0.269
				(0.140)	(0.243)	(0.276)	(0.119)	(0.227)	(0.303)	(0.138)	(0.225)	(0.332)
Exchange ratio							−0.172	−0.008	−0.062	−0.190	−0.065	−0.108
							(0.036)	(0.846)	(0.321)	(0.016)	(0.194)	(0.080)
Dummy (new vesting)							0.303	−0.020	0.004	0.457	0.095	0.053
							(0.124)	(0.851)	(0.969)	(0.049)	(0.416)	(0.596)
Dummy (partial tender)							−0.930	−0.029	−0.080	−1.024	−0.009	−0.065
							(0.000)	(0.869)	(0.713)	(0.000)	(0.969)	(0.783)
Dummy (no recent grant)							0.247	0.082	0.140	0.190	0.249	0.212
							(0.166)	(0.609)	(0.152)	(0.383)	(0.208)	(0.050)
ln (program size)							0.042	−0.142	−0.108	0.068	−0.121	−0.083
							(0.798)	(0.054)	(0.183)	(0.695)	(0.096)	(0.326)
Daily volatility							−2.509	−1.419	−2.112	−0.826	0.085	−0.566
							(0.602)	(0.471)	(0.362)	(0.884)	(0.967)	(0.816)
ln (market-cap)							0.014	−0.015	0.004	−0.037	−0.026	−0.004
							(0.830)	(0.555)	(0.881)	(0.622)	(0.416)	(0.903)
Leverage							0.587	0.279	0.340	0.727	0.233	0.381
							(0.135)	(0.138)	(0.130)	(0.065)	(0.225)	(0.085)
-*ln* (max–EPS forecast)										0.103	0.268	0.105
										(0.016)	(0.066)	(0.002)
R-squared	11%	10%	16%	23%	12%	19%	35.3%	21.7%	24.8%	37.0%	30.1%	28.4%
F-statistics	7.45	7.42	12.27	4.37	2.16	5.92	2.32	1.29	3.01	2.08	1.75	3.17
(*p*-value)	(0.008)	(0.008)	(0.000)	(0.004)	(0.083)	(0.000)	(0.019)	(0.249)	(0.001)	(0.034)	(0.077)	(0.000)
# of observations	64	69	133	64	69	133	64	69	133	60	67	127

4.4 How do stock market investors respond to the exchange program?

Thus far, we have documented that the participation decision of employees is in fact the outcome of their rational consideration of various factors affecting the gains and losses of the program. Hence, a natural question arises as to how stock market investors respond to the participation decisions. Since the program and the participation decisions are immediately and separately announced, two separate event studies are warranted. We hence estimate the abnormal return on the company stock over the [−1, +1] windows surrounding the announcement and cancellation dates. Specifically, we estimate the OLS market model against the value-weighted CRSP index over the [−120, −3] window relative to the event date in question to obtain the regression parameter estimates.

Panel A of Table 6 reports our abnormal return estimates. We find that stock market investors do not respond to the exchange program on average, since we find no statistically reliable abnormal return associated with the announcement of the program. We also find no stock market response on the cancellation date, suggesting that stock market investors correctly anticipate not only the exchange program but also the participation decisions.

Panel B of Table 6 investigates the information contents of the participation decisions by associating the abnormal stock return with the participation rate. We first regress the abnormal stock return around the announcement date on the raw participation rate (along with an intercept and a dummy variable for the program announcements around which earnings are also announced) and find no relation between them in each of the two sub-samples.

When we estimate the regression using the full sample with a dummy for *Management* group (Model (1)), we find a noticeable difference in the announcement-period return between the two groups. Model (2), however, shows that this difference is not attributable to their different participation patterns, as the participation rate itself does not enter the regression significantly. Note that the *Management* group dummy also loses its statistical significance in Model (2). However, it maintains a coefficient of similar size (−0.040 vs −0.035) with a p-value of 0.121. Given that there is no meaningful stock price reaction to the program announcement in absolute terms, the differing stock market reactions appear to indicate a higher cost to the company when the exchange offer is extended to higher-ranking managers and thus more options are involved, rather than a lower company stock price in the future.

The abnormal stock return around the cancellation date is instructive in gauging the precision of the stock market response to the program announcement. In other words, it helps us examine whether stock market investors learn additionally from unexpected participation decisions on the cancellation. To this end, we first estimate Model (3) in Table 5 separately for the two groups, and then use the residuals as a measure of the unexpected participation decisions. We find no evidence that the abnormal stock return on the cancellation date is associated with the unexpected participation rate, further confirming that stock market investors correctly anticipate the participation decisions. As a robustness check, we obtained the unexpected participation rate from Model (4), which includes the long-term prospect but reduces the number of observations, and found virtually identical results.

In an unreported result, we also investigated the long-run abnormal stock return during the period subsequent to the cancellation date, since it is possible that investors respond gradually to the information in the announced participation decisions. Specifically, we estimated the abnormal stock return over the 120-trading day period subsequent to the cancellation date using the calendar-time portfolio method with the Fama-French three factors (1993) and the momentum factor by Carhart (1997). We also took into account the possible model

Table 6 Stock market response to the exchange program. Panel A of this table reports the abnormal stock return around the events associated with the stock option exchange program. Specifically, the abnormal returns around the announcement and cancellation dates are estimated via the OLS market model against the value-weighted CRSP index over the [−120, −3] window relative to the event date in question. The statistical significance (*p*-value) of the abnormal returns is based on the *Z*-statistic for the mean and the Wilcoxon Rank-Sum test for the median. Stock market response to the exchange program. Panel B reports the regression of the abnormal return on the participation rate (either raw or the unexpected one from Model (3) in Table 5) and other variables. The White (1980) covariance estimator is used to determine the *p*-value in parentheses

Panel A. Abnormal stock return

Parameter (*n*)	Mean (*p*-value)	Median (*p*-value)
CAR [–1, +1] around the announcement date		
64	2.4% (0.171)	2.2% (0.096)
69	−1.2% (0.552)	0.2% (0.564)
133	0.5% (0.602)	1.1% (0.477)
CAR [–1, +1] around the cancellation date		
64	0.3% (0.816)	0.4% (0.776)
69	0.5% (0.875)	−1.1% (0.880)
133	0.4% (0.783)	0.1% (0.999)

Panel B. Regression of CAR on participation decision

	Non	Mgt	All	
			(1)	(2)
Dependent variable: CAR [–1, +1] around the announcement date				
Intercept	0.073 (0.036)	−0.002 (0.976)	0.035 (0.024)	0.054 (0.048)
dummy(management)			−0.040 (0.063)	−0.035 (0.121)
participation rate	−0.084 (0.191)	−0.001 (0.991)		−0.037 (0.399)
dummy(confounding)	−0.031 (0.515)	−0.080 (0.176)	−0.060 (0.096)	−0.059 (0.105)
R-squared	4.9%	4.6%	5.2%	5.7%
# of observations	64	69	133	133
Dependent variable: CAR [–1, +1] around the cancellation date				
Intercept	−0.001 (0.910)	0.006 (0.631)	0.002 (0.858)	0.002 (0.859)
dummy(management)			0.002 (0.894)	0.002 (0.894)
unexpected participation rate	−0.039 (0.350)	0.040 (0.550)		0.000 (0.995)
dummy(confounding)	0.066 (0.000)	−0.019 (0.622)	0.024 (0.347)	0.024 (0.359)
R-squared	6.1%	0.7%	0.4%	0.4%
# of observations	64	69	133	133

misspecification problems as in Mitchell and Stafford (2000) and Hertzel et al. (2002). We, however, found no evidence that the long-term abnormal returns differ significantly between companies with low participation rates and companies with high participation rates.[14] In other words, outside investors do not appear to respond even gradually to the unexpected participation level of non-executive employees. We thus conclude that the unexpected portion of the participation decisions by non-executive employees is more of a noise rather than of their private information about the company stock.

[14] These results were tabulated in the previous version of the paper. They are available upon request.

5 Conclusions

This paper examines the participation decisions of employees in the stock option exchange program. The exchange program makes a good setting to better understand their decision-making process, since employees make their participation decisions for enormous stakes with no constraints. We find that employees actively and rationally consider a variety of factors to make their participation decisions. Our results thus suggest that employees, once well motivated, are capable of processing relevant information to make an informed decision. We also find that employees' participation decisions are anticipated by stock market investors, since no abnormal returns are associated with the unexpected participation decisions.

Appendix. Background of the stock option exchange program—accounting treatments of employee stock options

Stock options can be divided into two categories: *fixed* stock options and *variable* stock options. As the name implies, fixed stock options are those that have all their terms fixed on the grant date, whereas variable stock options allow some of their terms to change in accordance with certain future events. For both types of stock options, the compensation expense is generally recognized by the amount of their intrinsic value on the measurement date. That is, the expense is the difference between the stock price and the exercise price on the date when both the exercise price and the number of options are known, as suggested by the Accounting Principles Board (APB) No. 25, *Accounting for Stock Issued to Employees*. For fixed stock options, the measurement date is the grant date, so the compensation expense is recognized only when stock options are granted in the money. For variable stock options, the measurement date is the exercise date. As a result, all incremental changes to the intrinsic value due to an increase in the stock price from the grant date to the exercise date should be recognized as a compensation expense. Not surprisingly, most firms grant fixed stock options with the exercise price equal to the stock price on the grant date.

Statement of Financial Accounting Standards (SFAS) No. 123, *Accounting for Stock-Based Compensation*, was issued in 1995 to encourage firms to recognize as a compensation expense the fair value of stock options on the measurement date. However, prior to its revisions in December 2004 and April 2005, which eventually require public companies to expense options at their fair value for the annual reporting period beginning after June 15, 2005, firms were allowed to apply the intrinsic-value method based on APB No. 25. They needed only disclose, in the footnotes, the effect of the fair value of their stock options on reported earnings.

Financial Accounting Standards Board (FASB) Interpretation No. 44, *Accounting for Certain Transactions involving Stock Compensation*, was then released in March 2000 to clarify some applications of APB No. 25. The main purpose of FASB Interpretation No. 44 is to force fixed stock options to be re-categorized as variable stock options if there are any modifications to the terms of the fixed options. Once stock options are recharacterized as variable stock options due to a change in the exercise price, or *repricing*, all future increases in the stock price in excess of the new exercise price should be recognized as a compensation expense in each future accounting period during the life of the options (a.k.a. the variable accounting treatment). This rule is costly to repricing firms because accounting earnings are adversely affected during the life of the repriced stock options, which can be as long as ten years [paragraphs 38–41].

Stock options can also be repriced by canceling existing options and granting replacement options with a lower exercise price. The new accounting rule is very specific about this alternative way of repricing. Any cancellations and re-grants made within a period of up to 6 months would be combined and treated as a repricing event, leading to the variable accounting treatment [paragraphs 45–46].

Such non-simultaneous cancellations and re-grants create a period during which there are no stock options, and any increase in the stock price during this *waiting* period would mean forgone benefits to the holders of the cancelled stock options. Consequently, firms that reprice their stock options using non-simultaneous cancellations and re-grants might want to compensate for any forgone benefits. Whenever there exist any agreements or promises to compensate for a stock price increase during the waiting period, the two events will be bundled together, whether they are within the 6-month period or are more than 6 months apart. The consequence will again be the variable accounting treatment for the replacement stock options [paragraph 47].

Similarly, when options are granted with some implicit link to future cancellation of existing options, they will be combined to constitute a repreicing event even if they are more than 6 months apart—Note that in this case, the two prices are already known; the exercise price of the granted options and the exercise price of will-be-cancelled options.

Those specifications of FASB Interpretation No. 44 give rise to a new way of repricing stock options without re-characterizing them as variable stock options. If a firm has a waiting period of *more than* 6 months between the cancellation of existing stock options and the grant of replacement stock options *without* any compensation for a stock price increase during the waiting period, the replacement options will still be fixed options. To recognize a minimum compensation expense required of fixed stock options, the firm can then set the exercise price of the replacement stock options equal to or slightly higher than the stock price on the grant date. This seemingly complicated repricing method is the stock option exchange program, and has become popular since it was first used by Sprint in October 2000.

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