Stock options worth more for women, senior managers, study finds

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A novel new way of determining the value of employee stock options has yielded some surprising insights: Options granted to woman and senior managers are worth more because they hold them longer. And

options that vest annually rather than monthly are worth more for the same reason.

The new valuation method, which combines standard option theory with real-world observations of what employees actually do with their grants, gets at a knotty problem: Even though stock options are one of the most common forms of compensation, companies don't really know how much granting options costs them.

"We've come up with a practical method of valuing stock options that takes into account actual behavior of employees," says Richard Stanton, a Berkeley Haas professor of finance and real estate who holds the Kingsford Capital Management Chair in Business.

The new approach is laid in "Employee Stock Option Exercise and Firm Cost," forthcoming in the *Journal of Finance* and co-authored by Berkeley Haas Prof. Nancy Wallace and New York University Assoc. Prof. Jennifer N. Carpenter. Their analysis also draws on behavioral economics, which considers the effects of psychology on financial decisions.

Among their original findings: Options awarded to women cost companies 2 to 4 percent more than those granted to men, who tend to exercise their options faster. And awards to the most senior employees cost 2 to 7 percent more than grants to their lower-ranking colleagues—again, because the execs hold onto them. In addition, options cost companies significantly more when they are set up to vest less frequently—that is, reach the threshold date when they become eligible to be exercised. A shift from an annual to a monthly vesting date reduces option value by as much as 16 percent because people exercise the options earlier and more often.

According to a recent survey by Meridian Compensation Partners, 42

percent of companies responding reported they awarded stock options to senior executives. And options represent more than 20 percent of CEO pay, according to one estimate. Options allow holders to buy a specific stock at a set price until a predetermined expiration date. The basic challenge in determining the cost of employee stock options is that their value depends on how long they are kept. In general, the longer they are held, the greater the cost to the company that issued them. Consequently, the key to valuing them is to accurately predict when they will be exercised. "How much the options are worth depends on what the employee is going to do with them," Stanton notes.

A vast literature examines how to determine the value of stock options traded on exchanges. But employee stock options are a special breed with their own special characteristics. For that reason, the valuation methods originally developed for exchange-traded options are imprecise when applied to the options companies award their employees.

Standard option theory takes into account several factors to forecast when options will be cashed in. But it was largely developed through studies of exchange-traded options, making it out of whack for employee stock options for several reasons. For one, employee stock options can't be traded on the market—the only way employees can dispose of them is to use them to buy the underlying stock. Second, they can only be used during a multi-year window that starts when they vest and ends when they expire. Third, employees can't easily protect themselves from the risk of having so much of their wealth tied to their employer's stock, since the only way to reduce the risk is to exercise the option, and that impacts its value.

To arrive at a more accurate way of estimating when employees would exercise stock options, Stanton, Carpenter, and Wallace, the Lisle and Roslyn Payne Chair in Real Estate Capital Markets, analyzed a unique set of data that included complete employee stock option histories

awarded to some 290,000 employees from 1981 to 2009 at 88 publicly traded corporations. The dataset gave them an unprecedented fine-grained look at option-exercise behavior. The authors then constructed a mathematical model of exercise rates that took relevant factors from standard theory and added factors related to the riskiness of the options, based on portfolio theory, along with some additional behavioral factors and information on the terms governing options grants, along with characteristics of issuing companies and option holders.

Their findings included some surprises. For example, vesting frequency had an especially powerful effect on option cost. The obvious reason is that employees are able to exercise options earlier when they vest more frequently. But something else may be at work—employees receive an email when options vest, which may prompt them to pull the trigger. "When people's attention is drawn to their holdings, they're more likely to make a decision," Stanton suggests. Similarly, men may exercise options earlier and more often than women because they are more confident making financial decisions. That finding is in line with influential work by Berkeley Haas Prof. Terrance Odean, who found that male investors trade more frequently than women—behavior that reduces their net returns.

But why do high-ranking employees hold their options longer than lower-ranking colleagues? One reason may simply be that they are wealthier and don't need a stock options windfall to pay for a home renovation or an expensive vacation.

Almost ten years in the making, the research was funded by the Society of Actuaries in response to regulatory calls for improved employee stock option evaluation methods.

More information: JENNIFER N. CARPENTER et al, Employee Stock Option Exercise and Firm Cost, *The Journal of Finance* (2018).

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