

# Stock options may cost shareholders much less than previously thought

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Controversial stock options for company executives may be much less costly to shareholders than current mathematical models suggest, according to research presented Jan. 5 by Tim Leung of Princeton's Department of Operations Research and Financial Engineering.

At the annual meeting of the American Mathematical Society, Leung demonstrated that, in one scenario, stock options were worth about half of what they would be valued if one were to calculate their worth using a conventional method.

Nearly half of compensation for chief executives comes in the form of stock options. Out of concern that such options might be overly burdensome on shareholders, the U.S. Financial Accounting Standards Board since 2004 has required firms to estimate and report their cost.

One model commonly used by firms to calculate the cost of options is known as the Black-Scholes model. But this model and others are not nearly as nuanced as they should be, particularly in accounting for the psychology driving employees' behavior, according to Leung, a graduate student who collaborated with Associate Professor Ronnie Sircar.

Leung and Sircar found that other models don't take into account a number of important factors, including the following:

- employees have to weigh the risk that their stock option might lose value; since most people are risk-averse, they tend to exercise their

options very early, preferring to take a tiny gain rather risk losing any profit – even though it is more likely that their options will increase greatly in value down the road;

- employees who are hoping to leave or fear that they might be fired tend to exercise their options earlier than they would if they felt secure in their employment;
- employees have to forfeit their options if they leave or are fired before their options have vested.

"Taking into account these factors has a significant bearing on how employee stock options are valued," said Leung.

Leung and Sircar submitted a paper on this research to the journal *Social Science Research Network*, where an abstract is published [online](#).

Source: Princeton University

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