

Google Employee Stock Options: A Case Study

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Employee stock option grants are available to roughly 15% of white collar worker in companies with 100 or more employees. What is striking in discussions that I have had with employees who have stock options and advisors who have clients with substantial stock options holdings is that very few of these employees or their advisors are confident about how to manage these options. I have written about this issue before, but a recent discussion that I had with a tech worker about Google's (GOOG) new approach to employee stock option grants got me interested in writing an article:

<http://googleblog.blogspot.com/2006/12/about-transferable-stock-options.html>

http://216.239.57.110/blog_resources/TSO_Mkt_Mech_doc.pdf

Google's new program (called Transferable Stock Options (TSO) or Goptions) allows employees with vested stock options to sell those options to the highest bidder in a 'market', where the set of bidders is limited to a select number of approved financial institutions. While employee stock options typically have long expiration periods, the expiration date of the options sold into the auction will be cut back to two years if the expiration of the employee's option is longer than two years. I do not know the expiration periods for Google's employee stock options, but these periods are often 6-10 years for tech firms. This program has been approved by the SEC.

The argument that Google has provided for why it is offering its new program is that they are giving employees greater flexibility to manage their options by allowing employees to get the cash value out of their options without having to exercise the options early and selling the stock. While there have been a number of article on this new idea, it seems to me that they have missed some of the key issues. A discussion of these issues should be of interest to all holders of employee stock options, as well as to investors in companies that offer options to their employees.

Okay, let's start with the basics. You are an employee of Google and the stock is trading at \$471 per share. You have a stock option that has just vested with a strike price of \$470 and the option has an expiration date of 1/18/2012—it has almost five years left to run before it expires. Your option gives you the right to purchase a share of Google stock for a price of \$470 at any time between today and 1/18/2012. Your option is a *call option*.

You could exercise the option, purchase a share of Google for \$470 today and have a share that is trading at \$471. Whoopee. The real value of this option is that there is a very good chance that the price of Google will soar far above \$471 between today and 1/18/2012. If it does, you can exercise later and realize the gains on that share without having to shell out the cash to purchase the share today. If the price of Google is \$600 in four years, you can exercise then, sell the shares, and realize a gain of \$130 ($\$600 - \470) without having tied up the \$470 required to buy a share today. If the price of Google stock drops to \$300 in four years, the holder of the option simply does not exercise, while the person who exercises today and buys the share at \$470 will be out \$170 ($\$300 - \470) in four years. This is the real value of holding the option—you get all the upside potential. What is fair value of this option? This is the question that you should be asking.

In option pricing, there are two components of value called *intrinsic* and *extrinsic* value. The *intrinsic* value is what you will make if you immediately exercise the option and then sell the stock. In this case, the intrinsic value is \$1. If the price of Google drops below \$470, the intrinsic value is zero. The other source of value, *extrinsic* value, is the potential future value of the option if you hold onto it. Intrinsic value is easy to calculate—all you need to know is the difference between the option strike price and the stock price. The extrinsic value requires that you calculate the probability of future price movements, and that is harder—but actually very simple.

Fortunately, there is a well-developed theory of option valuation and there are also publicly traded options that can help us to determine the value of the option that expires on 1/18/2012—even though that particular option does not trade in the market. Every MBA student learns about basic option pricing in his or her first year. The value of an option depends on six variables:

1. Current price of the stock
2. Strike price of the option
3. Volatility of the stock

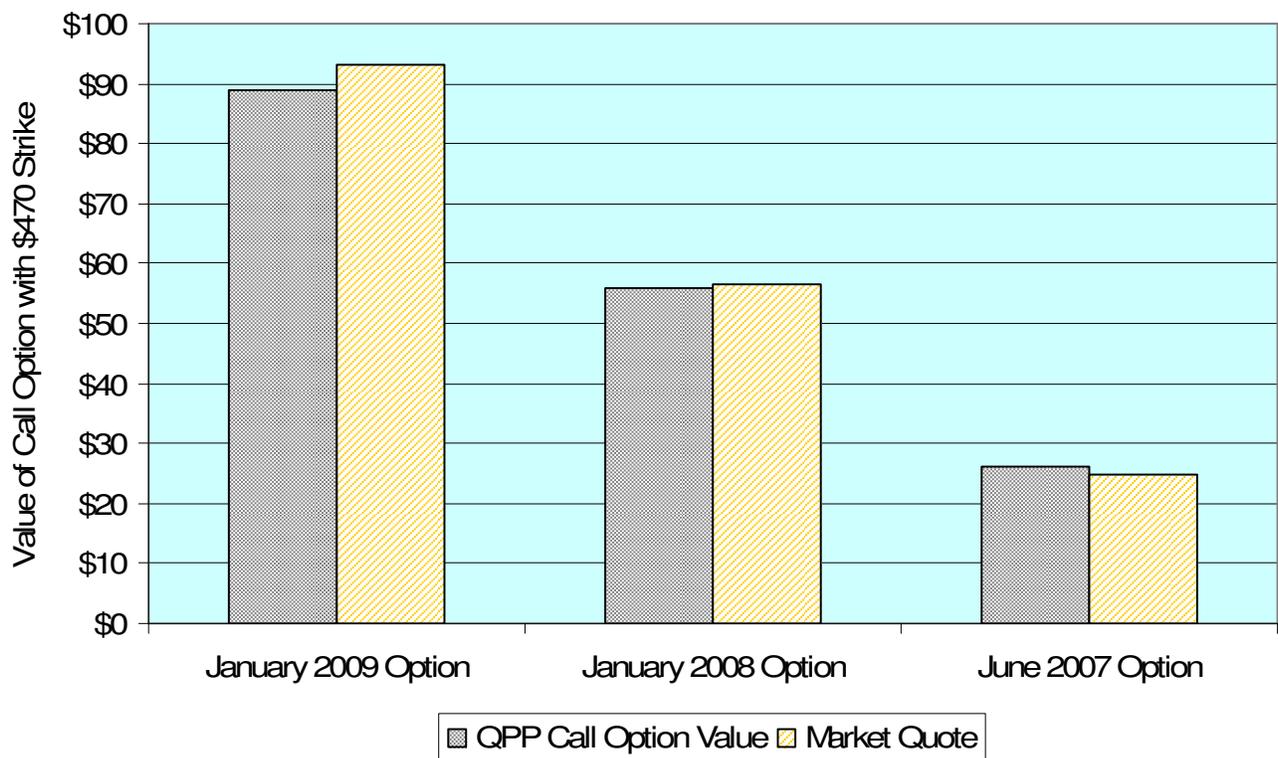
4. Time to expiration
5. Risk-free rate of return
6. Dividend yield

Because Google does not pay a dividend, we don't need to worry about number six—so it comes down to five factors. The risk-free rate of return is easy to get—you can use short-term T-bill yield. We all know the current stock price and the employee knows the strike price of his/her option and the expiration date. Now comes the hard part. Since a great deal of the value of a call option is the probability that the price will go up, the future volatility of the stock is very important in valuing the option.

There is a standard way to get a projection of the future volatility in a stock. What you do is to look at the prices at which options are trading in the public market:

<http://finance.yahoo.com/q/op?s=GOOG&m=2009-01>

In this case, the link is to options on Google that expire in January 2009—on January 16, 2009, to be exact. You can take these options prices (their current market value) at a range of strikes and we know all of the items in the list above except for the volatility. Then we can simply calculate the volatility that allows our option pricing model to match the options prices in the market. You are essentially backing the volatility out of the market data—and this is called the *implied volatility*. This is a standard variable that anyone who has ever taken a finance course will learn. There are financial calculators that will spit out implied volatility and E*Trade even has tools that will calculate implied volatility for you. How hard is this? Actually it's easy. Quantext Portfolio Planner (QPP) makes this functionality simple. I grabbed call option quotes for three expiration dates and calibrated QPP to provide similar option values:



QPP-calculated value of call options vs. market quote on April 3, 2007.

QPP uses a single value of volatility over time. Even given that strong assumption, QPP matches the market prices of the call options very closely. Let's focus on the January 2009 option. As stated, this option actually expires on January 16, 2009. The current market value for this option is about \$93. The intrinsic value is only \$1 ($\$471 - 470$) but the total value is about \$93, so the extrinsic value is \$92. The time until expiration is about 1.9 years—close to the maximum that options will index to if you sell the option in the Google auction. The QPP option valuation matches the current market quotes very closely for these three time periods, which tells us that we have calibrated our volatility estimate to be in line with the market. We have calculated the implied volatility in the options market for Google stock, so we can now look at varying other parameters.

You can now vary things like the strike price and time to expiration to value your specific options. I have read that Google expects that the average lifetime of its options grants to employees is about four years. Let's say that you are Joe average and you are likely to

leave the company or exercise early for some other reason in four years, or that your options expire in four years. What is the true value of your four-year option (again with a strike at \$470? An option that expires in four years (4/3/2011) is calculated to be worth \$143. How about if that option expired in two years (4/3/2009)? Using our model, we get a value of \$95 (close to the January 2009 value). Now, if you sell your four-year expiration date option in the auction, you will be paid for an option with a two-year expiration, because that is what all options with expiration dates greater than two years are adjusted down to—I quote:

“...options with a duration of greater than two years will be shortened to two years..”

http://216.239.57.110/blog_resources/TSO_FAQ.pdf

This means that you hold an option worth \$143 and you will get paid \$95 if the market participants providing the bids are willing to pay the fair market price for a two-year option. But, they won't because these options have the additional limitation that they cannot be re-sold by the purchaser—so the buyers will expect a discount (and reasonably so). I don't know what the discount will be, but we can just ignore it for now. Let's say that they offer you 'fair value' for the two-year option that they receive. You, the employee, are selling a four-year option for the price of a two-year option—you are losing 34% of the fair value of your stock option by selling it in this market. It can get a lot worse, of course, if you have longer expiration dates. It also gets worse as the option value goes 'out of the money.' The difference in value between four-year expiration and two year expiration for an option with a strike (exercise price) of \$500 is 37% of the value of the four-year option.

So what does all of this mean to you as a Google employee? First, you need to educate yourself about the fair underlying price of the stock options that you hold. If you hold options with expiration dates beyond two years, you need to understand how much of a discount you are selling your options for---it may be a lot. Are you really willing to give up a high fraction of the extrinsic value just to get cash out today?

When I first read about Google's new program to allow employees to sell their options, I did not have the details about the two-year expiration cutoff and I asked myself why such a program would make sense for Google. Giving employees stock options gives employees an incentive to work to increase the stock price. Allowing employees to prematurely monetize these options in this program removes this motivational factor. I have read that this program is being touted as a boon to recruitment and employee retention because employees will view this ability to cash out options as a perk. I have also read that this program is of value to employees because it allows them to have a better grasp of option values. While the first may be true, the second is weak. If the options all get adjusted down to two-year expiration, employees can get a pretty close estimate of value from the public options markets—they don't need this new program. Once I really read in detail about this program, I see an obvious and strong incentive for Google to develop this program. If Google issues a four-year option to an employee, the company must now account for the fair value of this option as a component of compensation. If Google provides that program in which they 'allow' employees to sell the option and the option gets adjusted to a two-year expiration date, Google has just made back the spread between the value of the four-year option and the two-year option. In other words, Google's bottom line improves every time a Google employee sells an option with an expiration date greater than two years via this program. It is almost as if the employee is simply handing a portion of their compensation straight back to the company.

I found it notable that Google does not mention the issue of expiration date at all in its 'scenario' provided to show employees how they might decide whether or not to sell their options into this program:

http://216.239.57.110/blog_resources/TSO_Scenario.pdf

This example would never pass muster in even an undergraduate finance class because it does not mention standard practice for valuing the options.

Shareholders of Google stock should be pleased with this program. The cost of employee compensation goes down for every option with expiration greater than two years that is sold via this program.

What are the lessons here? First and foremost, all employees who receive options as part of their compensation will do well to understand the true value of these options. There is a well-established set of methods for option valuation and holders of employee stock options should understand the basics. Second, I got my information on this stock option program directly from Google (via links above). This is widely available information, yet I have only seen one article that mentions this issue of the large component of value that Google employees may be giving up via the adjustment of all options down to a two-year period in this program:

<http://internet.seekingalpha.com/article/22491>

This highlights that there is a generally low level of understanding of how to value stock options.

Finally, there may be cases in which it makes sense for an employee to sell his/her long-dated options at a discount in this program. This situation requires far more detailed analysis of an employee's situation than the level provided in Google's 'scenario' linked above. This is where more complex tools like Monte Carlo simulation become necessary. With a Monte Carlo tool like QPP, users can calculate the portfolio risk-return tradeoffs inherent in holding options or cashing them in early and investing in other assets.

In closing, I will state that the information that I have gathered on this stock option program comes from Google documents available directly from Google via the links in this article. I have interpreted this information to the best of my abilities. If I have misunderstood how this program works, I ask that readers please let me know and I will correct the article.

Quantext Portfolio Planner is a Monte Carlo portfolio management tool. Extensive case studies, as well as access to a free extended trial, are available at <http://www.quantext.com/gpage3.html>