

Employee stock option grants are available to roughly 15% of white collar workers in the U.S. For many of these people, stock options represent a large fraction of their total wealth. Stock options have made many a millionaire, but they have also left many people without much wealth at all. Google (GOOG) has launched a new program that allows employees with vested stock options to sell these options via an unusual internal market:

<http://internet.seekingalpha.com/article/31606>

While this is an interesting approach to allowing employees to cash some fraction of their wealth out of Google stock, I demonstrated in the article above that employees wishing to sell options might receive only a fraction of the fair value of their options. I got many interesting responses to my article. One of the comments—from a user of our portfolio management software—was the following:

For many employees at Google, options, even at the money options, are 99% of their net worth. Without this program, there is no opportunity to diversify...An example could be - you are a new college graduate who got hired by Google, who joined in Jan06, got 5,000 options at 470. You have no other assets. Should I sell my Google and diversify vs. keep Google for the high volatility ride? For some people, especially people with most of their net worth in Google options, giving up the time value (10 years down to 2 years) is worth it to get the diversification benefit - at least for part of their Google holdings.

This is a very good point and speaks to the big picture issue of portfolio management for people with a substantial amount of their wealth in stock options. If you have to sell some fraction of your options at a discount via the Google option in order to get some diversification in your portfolio, perhaps that's okay. The question, of course, is how much it is worth giving up in terms of the 'fair value' of your options in order to be able to diversify. This question is answerable using standard financial techniques.

I am going to present a simple case in which a holder of Google employee stock options wishes to assess the relative tradeoff of selling some or all of her options (via the new Google program) in order to be able to diversify into other holdings. Let's imagine that we have a Google employee (named Jane) who has 1,000 options on Google stock with a strike price of \$470 that will expire on 4/13/2015, eight years from now (as of the writing of this article). We first need to be able to value these options. At the time this is being

written, Google stock is trading at \$466. I explained in this recent article how to value long-dated options:

<http://internet.seekingalpha.com/article/31606>

First, you test your option valuation model on listed options (i.e. options that are currently trading in the market) to make sure that your model agrees with the market prices. The longest-dated call options for Google expire in January 2009:

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

I have calibrated my valuation model to agree with the listed values to within 5%. In order to value options with longer expiration dates (such as the options owned by Jane), we can now simply move out the expiration date on our valuation model. My calculations suggest that Jane's options are worth \$217 each, so that Jane's total portfolio of 1000 options is worth \$217,000. All of the value of her options is in the extrinsic value (the value derived from the probability of future price increases)—these options are worth nothing if she exercised them today. When I calculate the fair value of an option with this strike price but with an expiration of 4/13/2009 (i.e. two years from this writing), the 'fair value' is \$99.50. Google's new program allows Jane to sell her options with a fair value of \$217 per share for \$99.50—assuming that the potential buyers bidding for these options are going to pay her that much. In reality, they won't pay her this much—why would they pay Jane full price when they can buy the same thing with less hassle in the open market? For the sake of argument, let's assume that the potential buyers will pay her this value, though. Jane can choose to sell some or all of her portfolio of options, with a fair value of \$217 per share for a \$99.5 per share. What she gets in return is the ability to invest some of her portfolio in other holdings.

How much, if any, of Jane's options should she sell in order to be able to diversify into other holdings? To address this issue, let's examine the risk/return profile of Jane's options. This is an interesting exercise. Let's say that Jane is 30 years old and wants to look forward ten years, to age 40. Investing is all about balancing risk and return, so we have to look at statistics of performance. In our analysis, Google is projected to generate an average annual return of 19.7% per year. The volatility (the risk) associated with Google is quite high—determined by calibrating our model to the options quotes in the

market. Since our outlook period is ten years and Jane’s options expire in eight years, we need to decide what Jane will do with the proceeds of her options when they expire. We will assume that Jane holds her options, exercises the options just before they expire, and immediately sells most of her shares in Google in order to invest in a balanced portfolio of equities---maintaining 10% of the portfolio in Google stock:

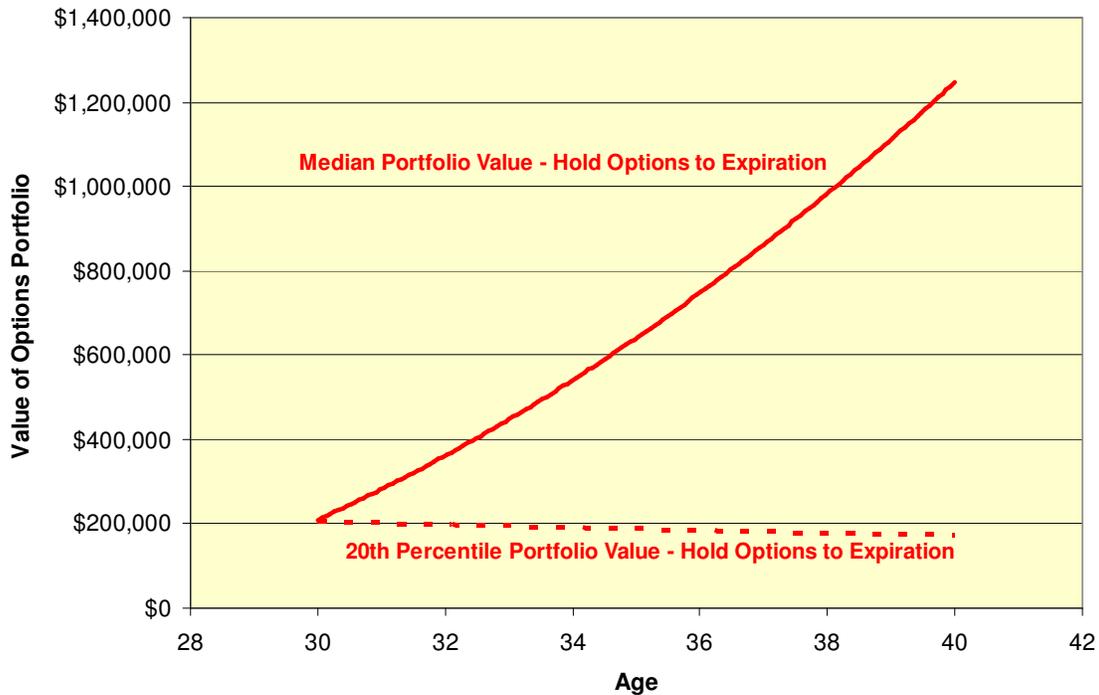
Fund Name	Percentage of Funds
GOOG	10.0%
IVV	30.0%
EFA	20.0%
ADRE	10.0%
ICF	10.0%
IDU	10.0%
TIP	10.0%

Jane’s targeted allocation to equities

This is a fairly generic portfolio that consists of 10% Google stock, with the rest allocated to a set of exchange traded funds. We have 30% of the portfolio in an S&P500 fund (IVV), 20% in foreign developed markets fund (EFA), 10% in an emerging market fund (ADRE), 10% in a real estate index fund (ICF), 10% in utilities (IDU), and 10% in inflation-indexed bonds (TIP).

To perform this analysis, we will use Quantext Retirement Planner (QRP). QRP is a portfolio management application. We will ignore taxes for the moment—although that will ultimately be an important consideration.

We can calculate the risk and return associated with Jane’s options (below). Her median portfolio value is projected to be over \$1.2M when she turns 40 if she holds her options until expiration and then invests the proceeds in her balanced equity portfolio.

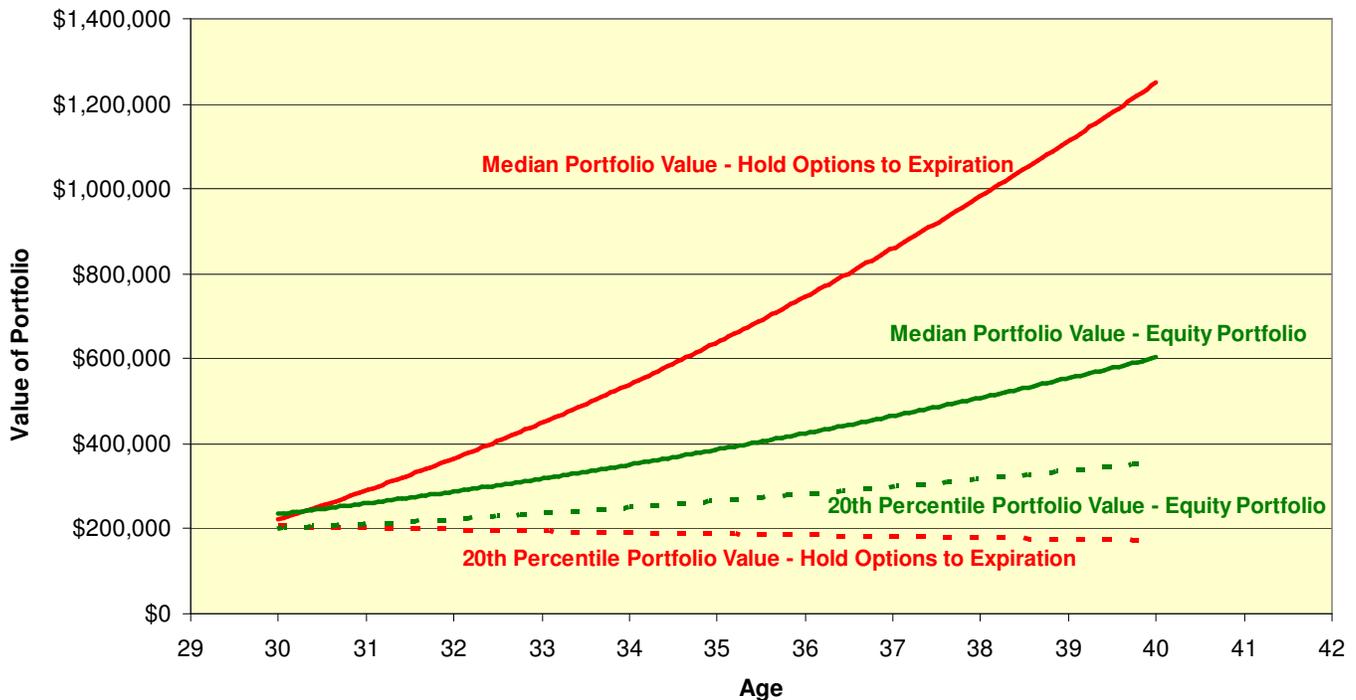


Jane's median and 20th percentile options portfolio value with age

Jane's median outcome looks great. On the other hand, things look a bit grim when we look at Jane's 20th percentile outcome. The 20th percentile is the value that her portfolio will be at or below in the worst 20% of possible futures. Put another way, Jane has a 1-in-5 chance that her portfolio value will be as low or lower than the 20th percentile level. If she simply keeps her options until expiration and then invests the proceeds in her equity portfolio, she has a 1-in-5 chance of have a portfolio that is below the current value of the options. We project the 20th percentile for this portfolio to be \$176K when Jane is 40. Her absolute worst case is that she holds the options until expiration and the price of Google stock is below \$470 in ten years and her options expire worthless. In this case, her options portfolio is worth zero.

Now, let's consider an alternative portfolio. If Jane could sell all of her options for their current fair value (not reducing the expiration down to two years), she would have \$217K in cash. If she invested this \$217K in her balanced equity portfolio, how would her portfolio look over the next ten years? I have labeled this scenario as 'Equity Portfolio'

in the chart below. *Note: the output curves on the charts have been slightly smoothed for purposes of illustration.*



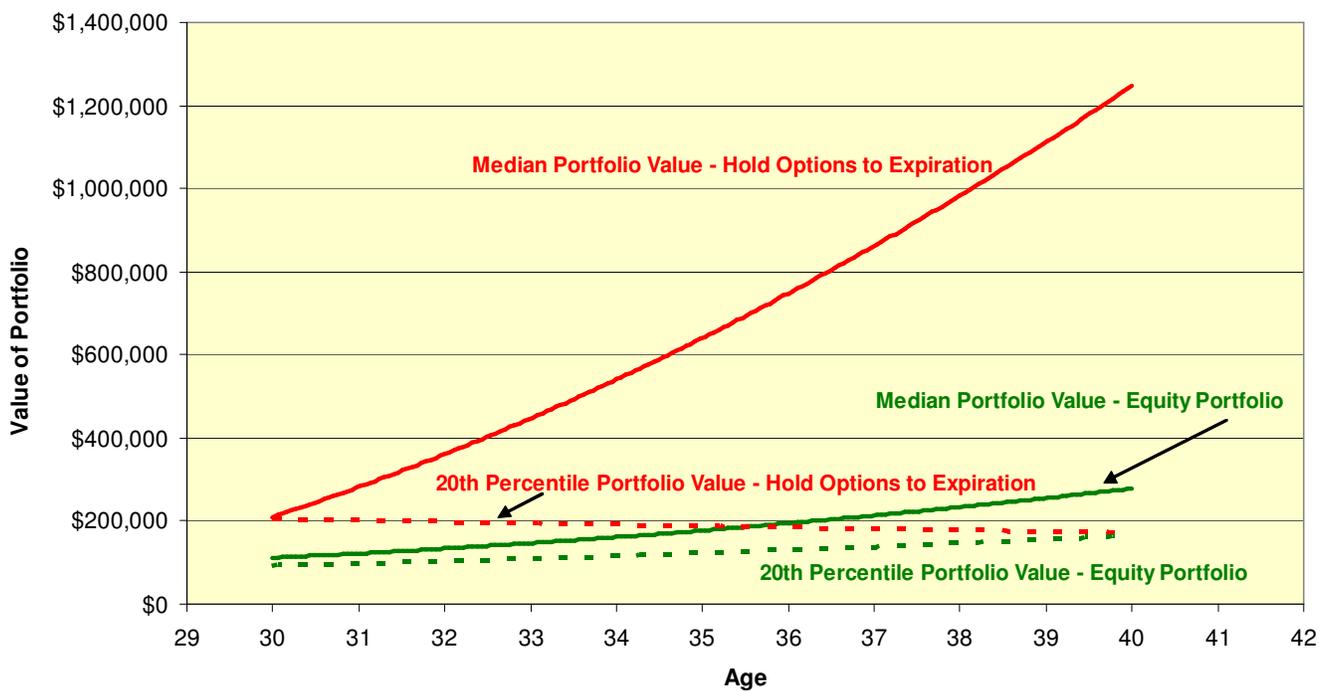
Jane's median and 20th percentile portfolio value with age: options portfolio vs. equity portfolio

If Jane can get her money out of Google options (at fair value) and invest in the sample equity portfolio shown earlier, she has a lot less excitement from age thirty to forty. Her median portfolio value is around \$600K at age 40, and her 20th percentile portfolio value is \$353K. This is precisely what we would expect. Having all of your money in Google stock options is a (very) high risk / high return situation. If you could invest the same funds into a reasonably balanced equity portfolio, you would have lower median returns but your downside would be much improved (i.e. 20th percentile value of \$353K vs. \$176K is she held onto her options).

It is worth pointing out that there is no way to prove which of these portfolio choices is better. If you are willing to bet big, you might choose to stick with your Google options. If you prefer to have less risk and you are willing to accept a portfolio with half the

median value in ten years, you would prefer the diversified equity portfolio. It is, of course, possible to build portfolios with risk/return profiles that fall between these two—based on a sale of some fraction of Jane’s options.

But let’s get back on track. Jane does not have the choice between these two portfolios. She can only sell her stock options for about half of their fair value in this Google plan—so she is really looking a portfolio worth about \$100K if she sells her options into the Google auction. When we examine that scenario, the choice looks less attractive (below).



Jane’s median and 20th percentile portfolio value with age: options portfolio vs. equity portfolio (funded with discounted sale of options)

When Jane loses 50% of the value of her options portfolio off the top (by selling her options in the Google auction), it is very hard to recover this loss by investing in the equity portfolio. In other words, Jane is able to get rid of a lot of risk by giving up half of the value of her initial assets—and this is too expensive a price to pay for the risk reduction.

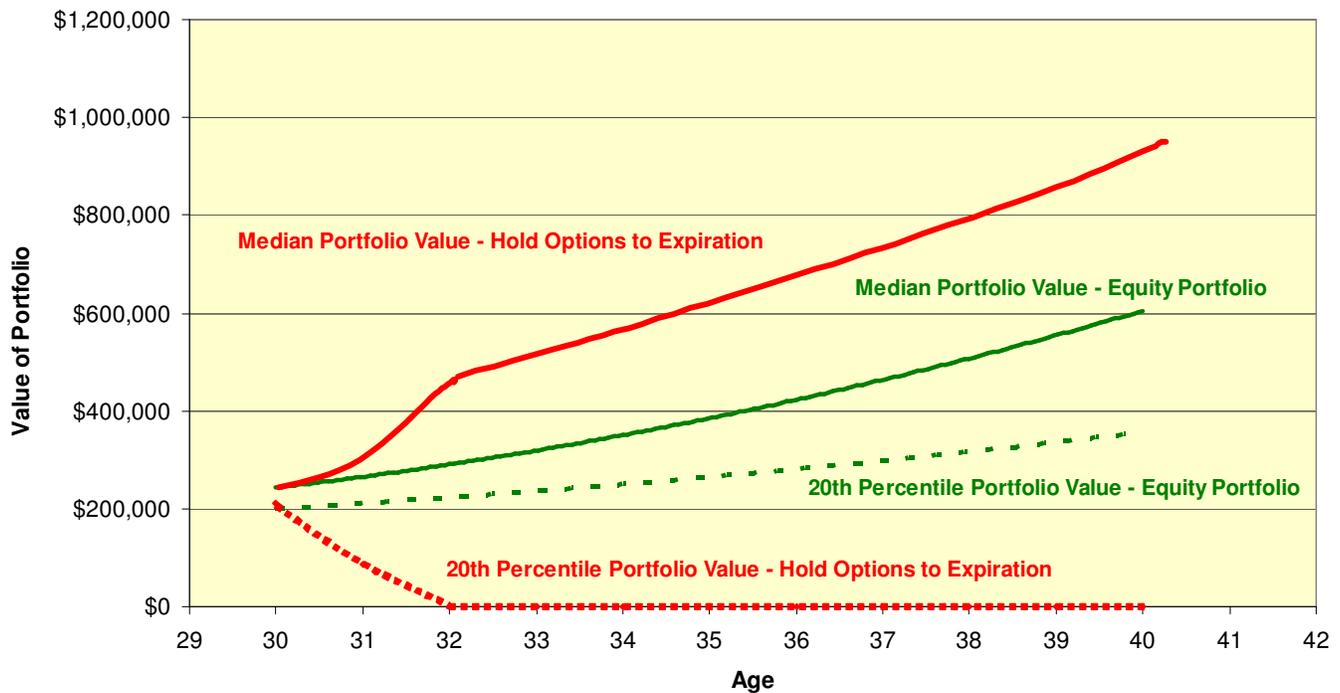
Jane has a very volatile portfolio in that she owns a leveraged position in a highly volatile stock. Her position is leveraged because she controls 1000 shares of Google (in her options) with a portfolio that is worth far less than the 1000 options that she controls.

The results shown here suggest that selling her options at the very high discount that occurs when the expiration date of her eight year options is reduced to two years is simply not a good investment choice. It is true that she has a lot more at risk in a single company, of course, if she keeps the options. This is called default risk. If Google does an Enron, she is in trouble. There is a far lower probability that the diversified equity portfolio will go zero value—that would require the collapse of our entire financial system. These cases are the very low probability cases that we can only assess with great uncertainty---and this is why we are sticking with the 20th percentile outcome for planning purposes. Could Google have a stock price collapse like Sun Microsystems (SUNW)? Sun was trading at \$40 at the start of 2000 and it is currently at about \$6. A Sun employee given an 8-year option with a strike at \$40 back then is out of luck. There are plenty of Sun employees who would be far better off if they could have exchanged their stock options for a diverse market portfolio—even if they had to take fifty cents on the dollar to cash out of their options.

We have examined a case in which Jane has options with the following features:

- 1) \$470 strike price
- 2) Eight years until expiration

As either of these two variables changes, the value proposition will be different. Now let's examine a different scenario. If Jane had the same value in options with a strike at \$470, but with expiration on 1/16/2009, and she could sell at fair value, selling her options is far more attractive.



Jane's median and 20th percentile portfolio value with age: options portfolio (1/16/09 expiration) vs. equity portfolio (funded with sale of options)

With options expiring in less than two years, Jane's options have a 20% chance of expiring worthless (see chart above). If Jane holds her options until expiration, however, she will end up with substantially more money in the median case than if she sells her options today and invests in the diversified equity portfolio. On the other hand, it is very clear why Jane might prefer to sell her options and invest in the diversified equity portfolio. There are probably quite a few Google employees who would make this risk/return tradeoff with at least part of their options.

People with large concentrated holdings need to understand the risk/return implications of their holdings. I recently analyzed a portfolio with 14% allocated to Procter and Gamble (PG) that the owner wished to maintain:

<http://seekingalpha.com/article/28934>

Many investors have this type of concentrated holding due to employment at a firm or simply a family legacy that they feel honor-bound not to sell. It is possible to effectively manage around this type of concentration through the choice of other holdings. This is,

however, very different from a person with all or most of their net worth tied up in options on a single volatile stock. In many cases, these people are simply strapped in for the ride, but Google's new Transferable Stock Options program (TSO) provides an ability to opt out.

A Google employee who is considering whether or not to sell vested options via the TSO program must carefully consider the total value proposition. The first step is to value the stock options in terms of their fair value and in terms of how much can be obtained from a sale of the options. The second step is to examine how the total risk/return performance of your portfolio changes under various strategies. I have shown two cases in which Jane looks at either keeping all of her options or selling them all. For many people, selling a fraction of the options is going to be more attractive than an all-or-nothing approach. It is worth noting that an employee weighing this kind of decision will need to have a good sense of the risk and return characteristics of both Google stock and the potential investment alternative available for deploying the funds obtained from selling his/her options.

All of the results discussed in this article have been generated by Quantext Retirement Planner, a mathematical model that combines standard option pricing models with Monte Carlo simulation. The results obtained from using this tool for long-dated options reflect a series of assumptions that may or may not match the way that Google prices options when it is accounting for the value of options grants to employees.

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>