

Lecture 18: Stock Options as Compensation

Compensation in Organizations

Jacob Kohlhepp

February 13, 2024

Beyond Salaries

- ▶ Salaries and bonuses are only one component of compensation.
- ▶ When people in the HR industry refer to total compensation they refer to salary, bonus and usually **stock options**.
- ▶ An estimated 9 million US workers hold stock options.
- ▶ The lecture today will focus on stock options.

What Are Stock Options?



Stock Option

['stāk 'äp-shən]

A financial instrument that gives its owner the right, but not the obligation, to purchase a given asset at an agreed-upon price and date.

What Are Employee Stock Options?

- ▶ Employees are allowed to buy company stock at a specified price (or at a specified discount) for a specified period of time.
- ▶ An employee's stock options are **vested** if the employee can exercise the option.
- ▶ Typically, this occurs after being with the company for a certain period of time.
- ▶ Employee stock options will often vest gradually.
- ▶ Stock options have 0 value unless the company stock rises above the specified price.

Oyer and Schaefer (2005)

Oyer and Schaefer (2005): How Large Were Stock Options in 1999

- ▶ Using BLS data, among firms that give out stock options, the average value granted was \$3,331
 - ▶ The BLS data are more representative of US firms/workers
- ▶ Using a sample of 1000 firms with SEC filings, among firms that give out stock options, the average value granted was \$36,982.
 - ▶ The median is \$6,551 (so there is a big right tail)
 - ▶ These data are biased towards larger, more established firms

Oyer and Schaefer (2005): Three Reasons for Stock Options

1. Incentives: linking employee compensation to firm performance
2. Sorting: encourage people to join who have a favorable assessment of the firm.
3. Retention: make it costly for employees to leave.

Incentives

- ▶ Consider our original moral hazard model with the effort-risk trade-off
- ▶ Oyer and Schaefer take this model and ask: how large must the return to effort be to justify using stock options as pay for performance?
- ▶ They account for various levels of risk aversion and different effort costs.
- ▶ If the return to effort is reasonable relative to the cost of effort, then incentives is a plausible story.
- ▶ If the return to effort is enormous relative to the cost of effort, then incentives are not a plausible story.

Incentives

Table 3
Calibration—incentives

	Small firm (1)	Med-small firm (2)	Med-large firm (3)	Large firm (4)	Medians (5)
Employees	< 50	< 100	~ 300	10,000 +	180
Middle manager salary	\$38	\$100	\$90	\$90	90
Employee share (b) (%)	0.015	0.052	0.009	0.00011	0.0404
Firm value (April 2000—\$millions)	< \$100	~ \$200	~ \$300	> \$50,000	\$230
Stock volatility (σ) (%)	> 75	> 75	< 75	> 50	72
Black-Scholes value	\$52	\$95	\$11	\$272	\$92
<i>Case one: $\rho = 1, c(e) = \frac{1}{2}ce^2$</i>					
Effort (e)	\$10.2	\$9.3	\$0.18	\$63.5	\$8.71
Cost of effort ($c(e)$)	\$0.0026	\$0.0014	\$0.000005	\$0.000023	\$0.0010
Risk premium	\$4.6	\$4.3	\$0.088	\$22.6	\$2.76
<i>Case two: $\rho = 2.5, c(e) = \frac{1}{2}ce^2$</i>					
Effort (e)	\$50.6	\$35.9	\$0.457	\$1,511.5	\$148.5
Cost of effort ($c(e)$)	\$0.011	\$0.0054	\$0.000012	\$0.0005	\$0.011
Risk premium	\$11.5	\$10.9	\$0.22	\$56.5	\$6.92
<i>Case three: $\rho = 1, c(e) = \frac{1}{4}ce^4$</i>					
Effort (e)	\$31.7	\$29.1	\$0.683	\$223.5	\$28.5
Cost of effort ($c(e)$)	\$0.0040	\$0.0023	\$0.000010	\$0.0004	\$0.0019
Risk premium	\$4.6	\$4.3	\$0.088	\$22.6	\$2.76

Note: all numbers are in thousands.

Incentives: A Teamwork Perspective

- ▶ We can also think about stock options from a teamwork perspective.
- ▶ Suppose the stock price reflects total production of the firm.
- ▶ Stock represent ownership of a fraction of profit.
- ▶ So using stock options is like tryign to motivate teamwork via a partnership.
- ▶ This is why they may be discussed as giving employees a "stake" in the success of the company.

Incentives: A Teamwork Perspective

- ▶ But remember partnerships don't work in the teamwork context!
- ▶ Because people bare effort costs but have to share the benefits.
- ▶ So they free ride!
- ▶ Further, free riding is actually worse as the size of the team gets bigger.
- ▶ So stock options should be even worse than typical partnerships.
- ▶ With the exception of the CEO, it is also unclear if middle managers can even influence the stock price at all.

Sorting

- ▶ The value of stock options depends on the rate of return of the stock.
- ▶ If different people are more or less optimistic about the company's future, there will be different values.
- ▶ If people that are optimistic about the firm are more productive, stock options will sort in more productive workers.
- ▶ We can compare cash compensation to stock option compensation to measure this, but we need to account for risk aversion again.
- ▶ Oyer and Schaefer ask how much more productive do optimistic people need to be to justify using stock options?
- ▶ If the gap is reasonable, this is a reasonable justification for stock options.

Sorting

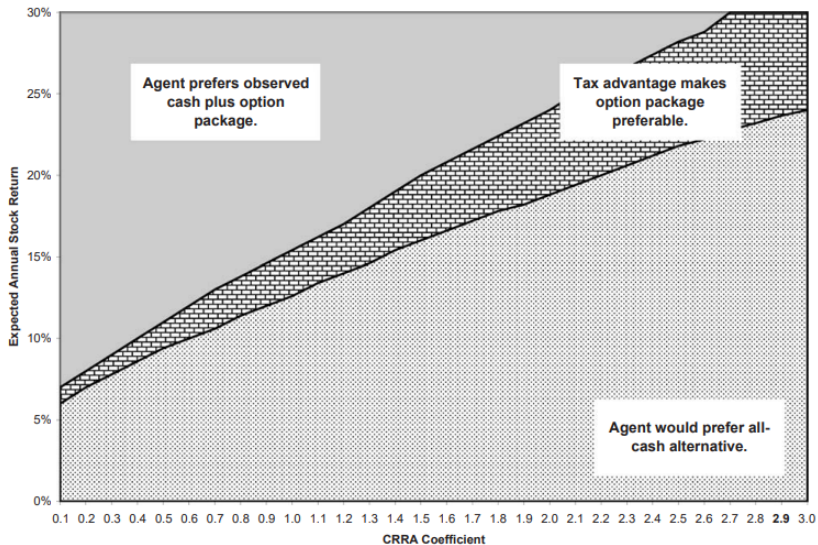


Fig. 2. Med-small firm employee's preferences over compensation plans for different values of r^* and ρ .

Sorting

- ▶ Need employees to expect a rate of return of 25% for employees at most firms to prefer option package.
- ▶ Oyer and Schaefer point out that in 1999 this was actually below the average return of these companies.
- ▶ using an expected return of 10%, we need optimistic employees to be \$100 to \$50,000 more productive.
- ▶ The larger numbers are at larger firms.
- ▶ At the median firm the productivity differences are reasonable.
- ▶ Thus sorting might be part of the story!

Retention

- ▶ Because stock options have a vesting date, they encourage the worker to stay with the firm.
- ▶ Oyer and Schaefer analyze two benefits for the firm from retention:
 - ▶ Reduced turnover costs (like HR)
 - ▶ Reduced wage costs of matching outside offers
- ▶ They also account for the need to compensate workers for the risk from stock options.
- ▶ Under high risk aversion, they find turnover costs need to be \$45,000 to justify observed stock grants
- ▶ Under low risk aversion, turnover costs can be close to \$0 and we can still justify observed stock grants.
- ▶ They conclude retention is a reasonable explanation for using stock options.

Retention - Continued

- ▶ Professor Gong (UNC Econ) has studied the retention effects of stock options.
- ▶ She will present her paper in a guest lecture next class.
- ▶ We will briefly discuss her paper now in preparation.
- ▶ The content from her lecture is considered testable for the final exam!

Gong, Zhang, Zhou (2023)