

Lecture 17: Stock Options as Compensation

Compensation in Organizations

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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 stock options are equivalent to a partnership with many partners.
- ▶ Colloquially, this is referred to as giving employees a “stake” in 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 a typical partnership with 10 or fewer members.
- ▶ With the exception of the CEO, it is unclear if typical employees can influence stock price.

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

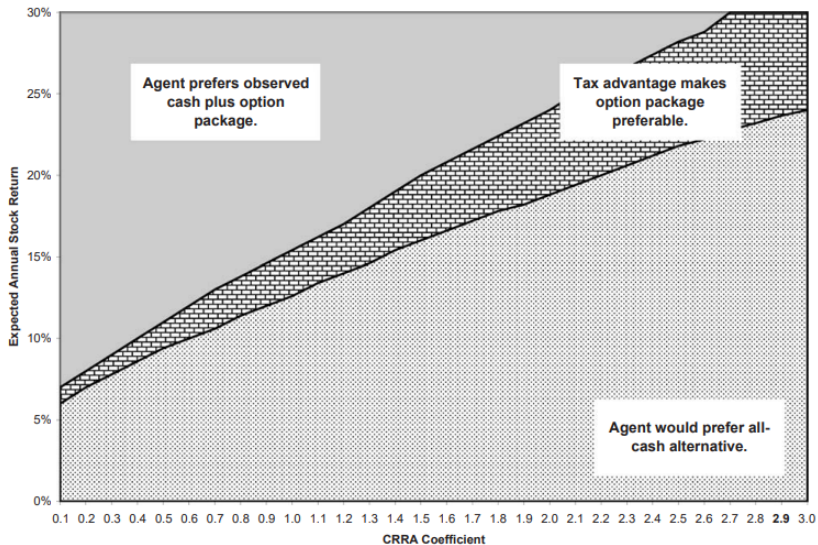


Fig. 2. Med-small firm employee's preferences over compensation plans for different values of r^* and ρ .

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)