Lecture 19: 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?

Investopedia / Nez Riaz

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
Case one: $\rho = 1, c(e) = \frac{1}{2}ce^2$					
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
Case two: $\rho = 2.5, c(e) = \frac{1}{2}ce^2$					
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
Case three: $\rho = 1, c(e) = \frac{1}{4}ce^4$					
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

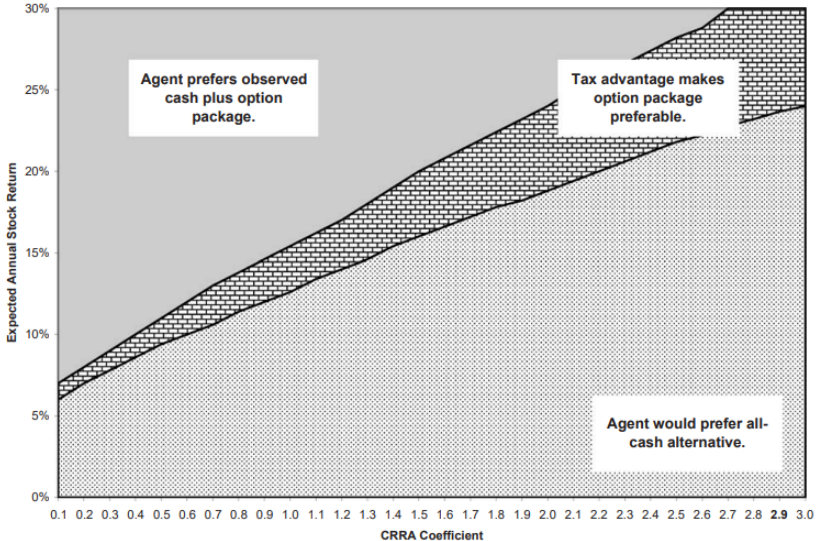

Fig. 2. Med-small firm employee's preferences over compensation plans for different values of r^* and ρ.

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.

Gong, Zhang, Zhou (2023)