FE620 Pricing and Hedging

Lecture 8: Employee Stock Options

Instructor: Dragos Bozdog
Email: dbozdog@stevens.edu
Office: Babbio 429A

Nature of Employee Stock Options

- Employee stock options are call options issued by a company on its own stock
- They are often at-the-money at the time of issue
- They often last as long as 10 years

Typical Features of Employee Stock Options (page 353)

- There is a vesting period during which options cannot be exercised
- When employees leave during the vesting period options are forfeited
- When employees leave after the vesting period in-the-money options are exercised immediately and out of the money options are forfeited
- Employees are not permitted to sell options
- When options are exercised the company issues new shares

Exercise Decision

- To realize cash from an employee stock option the employee must exercise the options and sell the underlying shares
- Even when the underlying stock pays no dividend an employee stock option (unlike a regular call option) is often exercised early

Drawbacks of Employee Stock Options

- Gain to executives from good performance is much greater than the penalty for bad performance
- Executives do very well when the stock market as a whole goes up, even if their firm does relatively poorly
- Executives are encouraged to focus on short-term performance at the expense of long-term performance
- Executives are tempted to time announcements or take other decisions that maximize the value of the options

Accounting for Employee Stock Options

- Prior to 1995 the cost of an employee stock option on the income statement was its intrinsic value on the issue date
- After 1995 a "fair value" had to be reported in the notes (but expensing fair value on the income statement was optional)
- Since 2005 both FASB and IASB have required the fair value of options to be charged against income at the time of issue

Traditional At-the-Money Call Options

- The attraction of at-the-money call options used to be that they led to no expense on the income statement because they had zero intrinsic value on the exercise date
- Other plans were liable to lead an expense
- Now that the accounting rules have changed some companies are considering other types of plans

Nontraditional Plans page 356

- Strike price is linked to stock index so that the company's stock price has to outperform the index for options to move in the money
- Strike price increases in a predetermined way
- Options vest only if specified profit targets are met

Valuation of Employee Stock Options

- Most common approach is to use Black-Scholes-Merton with time to maturity equal to an estimate of expected life
- There is no theoretical justification for this but it seems to give reasonable results in most circumstances

Example (Example 16.1, page 357)

- A company issues one million10-year ATM options
  - stock price is \$30.
  - It estimates the long term volatility using historical data to be 25% and the average time to exercise to be 4.5 years
  - The 4.5 year interest rate is 5% and dividends during the next 4.5 years are estimated to have a PV of \$4
- Using BSM with $S_0 = 30$, $K=30$, $r=5\%$, $\sigma=25\%$, and $T=4.5$ years gives value of each option equal to \$6.31
- The income statement expense would be \$6.31 million

Other Approaches

- Estimate the probability of exercise as a function of the stock price and remaining life. Use a binomial tree with roll back rules reflecting the probabilities
  - A simple version of this is to assume that the option is exercised when the ratio of the stock price to the strike price reaches some multiple
- Use an auction to determine the market prices of securities whose payoffs mirror the payoffs from the options
  - This is an approach used by Zions Bancorp in 2007

Dilution

- Employee stock options are liable to dilute the interests of shareholders because new shares are bought at below market price
- However this dilution takes place at the time the market hears that the options have been granted (Business Snapshot 15.3)
- It does not take place at the time the options are exercised

Backdating

- Backdating appears to have been a widespread (illegal) practice in the United States. It was uncovered by academic researchers (Yermack, Lie, Heron)
- A company might issue at-the-money options on April 30 when the stock price is $50 and then backdate the grant date to April 3 when the stock price is $42
- Why would they do this?