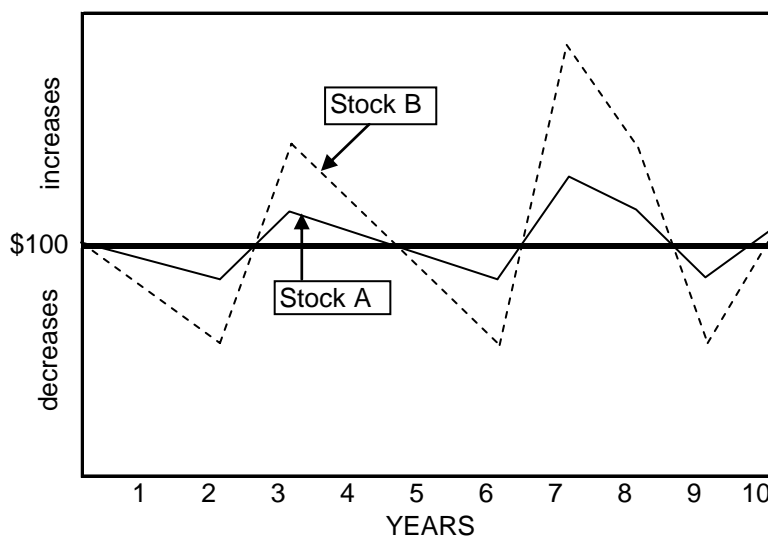


GENERAL DEFINITIONS

- Stock option:** An option to buy a firm's stock for a fixed price during a future time period.
- Restricted stock:** Stock granted to an employee that cannot be sold until the employee satisfies a vesting requirement. Most often, the vesting requirement is continued employment with the firm for a predetermined period of time. Restricted stock does not expire, nor does it have an exercise price.
- Grant date:** Date on which a stock option or a share of restricted stock is granted (i.e., given) to the employee.
- Vesting date:** Date on which the employee may first exercise a stock option or first sell a share of restricted stock.
- Expiration date:** Date on which the right to exercise a stock option expires.
- Exercise price:** Price stated in the stock option contract at which the employee can purchase the underlying stock by using the option.
- Risk-free interest rate:** The theoretical interest rate earned on an investment that is completely free of risk.
- Stock price volatility:** The up-and-down movement of a firm's stock price over time, measured as a percent. The following chart helps illustrate the effect of volatility using a hypothetical share price of \$100. The two stocks have identical average price changes over the ten year period. The volatility of Stock B, however, is three times the volatility of Stock A.



- Fair value:** The amount that an option or share of restricted stock could be bought or sold for between independent parties in an active market. The fair value of a stock option on the grant date is often estimated using the issuing firm's stock price, the option's exercise price, the risk-free interest rate, the option's time to expiration, and the firm's stock price volatility.

VALUING STOCK OPTIONS

Computing the fair value of a stock option requires an option pricing model and several inputs. The most common option pricing model in use today is called the “Black-Scholes” option pricing model. The inputs required to use this model are:

- The firm’s current stock price
- The stock option’s exercise price
- The risk-free interest rate
- The options time to expiration
- The firm’s stock price volatility

Black-Scholes option pricing calculators are readily available on the Internet (for an example visit www.eri.com/scripts23/blackscholes/blackscholes.exe/main). It is important to note that the quality of the model’s output (i.e., an option’s value) is only as good as the quality of the model’s inputs. This is especially true with respect to a firm’s stock price volatility, where it is common to use a firm’s historical stock price volatility to proxy for its future stock price volatility.

It is also important to note that most option pricing models (including the Black-Scholes model) were constructed to value “tradeable” options, not employee stock options (which are non-tradeable). Academic research argues that, from an employee’s perspective, the Black-Scholes value for a tradeable option should be discounted by approximately 30 percent to account for (i) employees’ inability to diversify their stock option holdings; and (ii) employees’ inherent risk-aversion.

Valuation rules of thumb:

- The fair value of an option is never negative. If the current stock price is below the exercise price an employee would simply not exercise the option.
- “Under water” options (exercise price < current stock price) have value. There is some non-zero probability that the stock price will recover to above the exercise price.
- The further the current stock price is above the exercise price the more valuable an option.
- As the risk-free interest rate increases, the value of an option increases. In basic terms, the value of an option is a firm’s expected future stock price less the present value of the option’s exercise price. A higher risk-free interest rate reduces the present value of the option’s exercise price.
- As the time to expiration increases, the value of an option increases. The longer the time period before exercise, the lower the present value of the option’s exercise price.
- As a firm’s stock price volatility increases, the value of an option increases. As stock price volatility increases the probability of a firm’s stock price increasing goes up. The probability of a firm’s stock price decreasing also goes up, but because the value of an option cannot be negative, this probability does not affect the value of the option.

Options also have tax implications for employees. For a more detailed discussion of these implications and other issues related to employee stock options we recommend *Stock Options for Dummies*, by Alan Simon; an excellent reference written for individuals with little to no experience with stock options.

VALUING RESTRICTED STOCK

Computing the fair value of a share of restricted stock is quite simple: the fair value is equal to the firm’s current stock price. The fair value of a share of restricted stock changes (on a one-to-one basis) whenever the firm’s stock price changes. From an employee’s perspective, the “restricted” part of a share of restricted stock also deserves a discount. The appropriate magnitude of the discount, however, is unclear and remains a matter of academic debate.