Employee Stock Option Plans

Valuation Guidance and Techniques

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The Growth of Employee Stock Option Plans (ESOPs)

- ESOPs in a way address the agency problems that afflict organizations where the shareholder and management interests are different
- ESOPs arguably tend to align these interests by converging the goals of the management with the shareholders
- In view of the customization possible, ESOPs are an effective tool to attract and retain identified employees in an organization
- Accounting practices in ESOPs were sketchy, but accounting regulators world over have hastened to put in place appropriate norms

Practices in ESOPs

Equity Settled

It is common for employers to issue equity-settled options. That is, an employee gets the right but not an obligation to buy her entitlement.

Cash Settled

Employers also can offer cash-settled ESOPs. That is, the employee is compensated in cash for the difference between the market price of the share on the exercise date and the strike price.

Both variants of ESOP are akin to call options.

The vesting of shares under an ESOP series can be staggered over a deferral period or could be immediate.

Accounting Standards Guidance - India

The Institute of Chartered Accountants of India has issued its Guidance Note # 18 in 2005, which describes the accounting treatment for ESOPs.

Equity Settled Options

In summary, the difference between the market price and the strike price on the date of issue is considered as cost and needs to be accounted on the 'grant date' over the vesting period of the ESOP. This difference is called as 'Intrinsic Value.'

Cash Settled Options

As the market price would change on each Balance Sheet date, the cost on an 'Intrinsic Value' basis needs to be estimated at every Balance Sheet date and amortized. That is, an annual estimation of costs is needed.

Suppliers Included

Accounting for share-based option costs is not restricted to options granted to employees. If a company grants share-based options to suppliers, the guidance kicks in.

Accounting Standards Guidance .. Contd.

Disclosure in 'Notes to the Accounts'

The guidance however requires companies to disclose the fair value of the ESOP (i.e. Intrinsic Value plus Time Value) and quantify the effect of accounting at fair value in the financial statements.

Modifications, Cancellations and Accelerations

Adjustments would be needed for such events whilst accounting costs between consecutive years

Comparison of Indian Accounting Standards with IFRS

On the other hand, IFRS 2 which deals with ESOPs mandates that the fair value needs to be accounted as cost over the vesting period.

Model Choice for Fair Value Calculation

Fair value is derived from Option-Pricing Models. IFRS 2 does not require the use of a specific option-pricing model to calculate fair value.

Popular Models

Even though many entities estimate the value of share options using the Black-Scholes-Merton formula, most valuation specialists agree that lattice models (e.g. binomial models) generally provide a better estimate of the fair value

Options may have certain features that might preclude the use of the Black-Scholes-Merton formula in estimating option fair value

But even though a lattice model is regarded as often producing a better estimate of an option's fair value, it can be considerably more complicated than using the Black-Scholes-Merton formula, and not many are familiar with how a lattice model works

Key Parameters for Option Valuation

Whilst IFRS 2 does not obligate any particular method, the option-pricing model used must take into account a minimum of six inputs.

These are:

1. current price of the underlying share
2. exercise price
3. expected volatility of the price of the underlying share
4. expected dividends on the underlying share
5. risk-free interest rate for the expected term
6. expected term of the option, taking into account both the contractual term of the option and the expected effects of employees' exercise and post-vesting behavior

Directional Impact of the change in assumptions

An increase in the …	Results in a fair value estimate that is
Current price of the underlying share	Higher
Exercise price of the option	Lower
Expected volatility of the stock	Higher
Expected dividends on the stock	Lower
Risk-free interest rate	Higher
Expected term of the option	Higher

It is important to understand all the terms and conditions of a share-based payment arrangement because this enables the issuer to choose the most appropriate option pricing model.

The lattice binomial model- An example

Consider the following share option :

Share price on the grant date= 10 units
Exercise Price = 10 units
Volatility=30%
Risk free rate=5%
Term of option=5 years
Period between nodes =6 months
No dividends

At t = 0 (the grant date), the lattice is started at the grant date share price (10 units in our example). At each node (a six month interval), two possible price changes are computed based on the share's volatility.

Lattice Example … Contd.

The two new stock prices are computed as follows:

- Upward movements are calculated as $u = e \wedge (\sigma\sqrt{t})$
- Downward movements are calculated as $d = 1/u$

Where, σ = annualised volatility

t = time between nodes (based on a fraction of a year)

Therefore, we calculate the upward movement as:

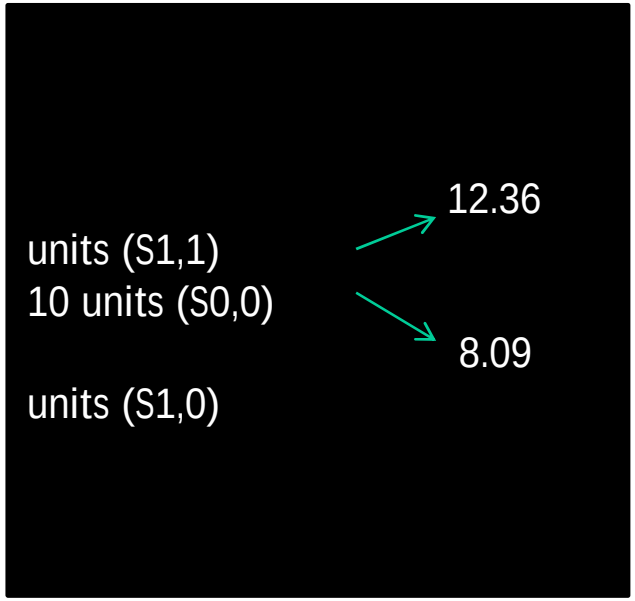
$u = e^{(0.3 * \sqrt{0.5})} = 1.236$

So the price at S1,1 = 10 units * 1.236 = 12.36 units

We calculate the downward movement as:

$d = 1/1.236 = 0.809$

So the price at S1,0 = 10 units * 0.809 = 8.09 units



This process of expanding the tree continues in the same fashion at each node, until the end of the contractual term is reached.

Black –Scholes- Merton Formula

The Black-Scholes-Merton formula is an example of a 'closed-form model' — i.e. one that uses an equation to produce an estimated fair value.

The Black-Scholes-Merton formula is:

$$c = S e^{-qT} N(d1) - K e^{-rT} N(d2)$$

where,

$$d1 = \frac{\ln(S/K) + (r - q + (\sigma^2)/2)T}{\sigma\sqrt{T}}$$

$$d2 = d1 - \sigma\sqrt{T}$$

c = price of a written call
S = price of the underlying share
N = the cumulative probability distribution function for a standardized normal distribution
q = dividend yield
K = call option exercise price
r = the continuously compounded risk-free rate
σ = Annualized volatility of the underlying share
T = time to expiration (in years)

Limitations of the Black-Scholes Model

Attributes of employee share options that render the Black-Scholes-Merton formula less effective as a valuation technique for employee share options are:

A) long term to expiration — An assumption of constant volatility, interest rates and dividends over the life of Employee share options that often have a long contractual term would be inappropriate.

B) non-transferable —IFRS 2 provides for the use of an 'expected term' in place of the contractual life to reflect the possibility of early exercise resulting from the non-transferability of employee share options.

Limitations of Black Scholes formula … Contd.

C) subject to vesting provisions — Employee share options often cannot be exercised prior to a specified vesting date. Vesting provisions therefore impact the valuation of share options because they affect the expected term of the options by, among other things, establishing a minimum expected term.

D) subject to term truncation — The term of an employee share option often is truncated upon termination of employment . Provisions regarding term truncation therefore will influence estimates of the expected term of the option.

E) subject to blackout periods — Black out periods during which certain employees are not allowed to trade are not readily incorporated in the Black scholes valuation

Lattice and Black Scholes Formulae - A comparison

Black Scholes Model	Lattice Model
Black-Scholes-Merton formula uses static assumptions and is not the best method to estimate the fair value of ESOPs	A lattice model can explicitly use dynamic assumptions regarding the term structure of volatility, dividend yields, and interest rates.
Black-Scholes-Merton formula cannot handle the additional complexity of a market based performance condition .	The lattice model, that takes into account employee exercise patterns based on the dynamics of an entity's share price may result in a better estimate of fair value.

The longer the term of the option and the higher the dividend yield, the larger the amount by which the binomial lattice model value may differ from the Black-Scholes-Merton value.

Expected term of the option

Vesting period — the option's expected term must be at least as long as its vesting period. The length of time employees hold options after they vest may vary inversely with the length of the vesting period

History of employee exercise and termination patterns for similar grants (adjusted for current expectations)

Price of the underlying shares — experience may indicate that employees tend to exercise options when the share price reaches a specified level above the exercise price

Employee's level within the organization — experience may indicate that higher level employees exercise options later than lower level employees

Expected volatility of the underlying share — on average, employees tend to exercise options on higher volatility stocks earlier

Expected volatility

Implied volatility from traded share options on the entity's shares, or other traded instruments of the entity that include option features (such as convertible debt), if any

Historical volatility of the share price over the most recent period that is generally commensurate with the expected term of the option

Length of time an entity's shares have been publicly traded — a newly listed entity might have a high historical volatility, compared with similar entities that have been listed longer

Tendency of volatility to revert to its mean (i.e., its long-term average level), and other factors indicating that expected future volatility might differ from volatility in the immediate past

appropriate and regular intervals for price observations

Expected Dividends:

Based on current expectations about an entity's anticipated dividend policy. If an entity has never paid a dividend, but has announced that it will begin paying a dividend yielding 2% of the current share price, then it is likely that an expected dividend yield of 2% would be assumed in estimating the fair value of its options. An emerging entity that never has paid dividends in the past may consider the dividend payments of a comparable peer group in developing its expected dividend assumption, weighted to reflect the period during which dividends are expected to be paid.

Risk free rate

The risk-free interest rate is the implied yield currently available on zero-coupon government issues denominated in the currency of the market in which the underlying shares primarily trade.

It may be necessary to use an appropriate substitute if no such government issues exist or if circumstances indicate that the implied yield on zero coupon government issues is not representative of the risk-free interest rate (e.g. in high inflation economies).

Monte Carlo Simulation

There are certain complexities that a Lattice model cannot handle

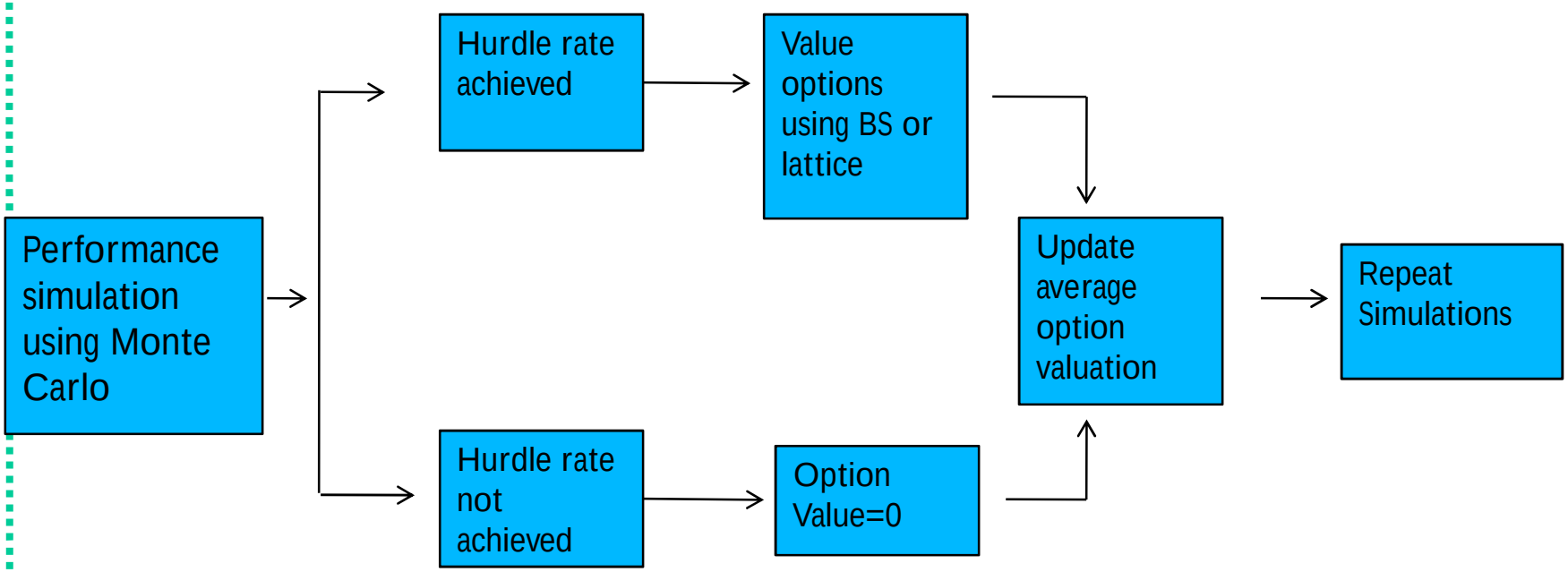
For example, certain options may contain a condition based on total shareholder return (TSR) and the option may vest only if the entity's TSR falls within a specified range of rankings amongst a large peer group

For options with more complex market conditions such as these, Monte Carlo simulation is required.

The probability of meeting the hurdle is modeled using Monte Carlo simulation, and then the option is valued using either the lattice model or Black-Scholes-Merton model.

In that sense, the Monte Carlo simulation can sit on either the Black-Scholes or the Lattice Model

Monte Carlo Simulation - Stylistically



Thank You