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PARTNERS BEYOND BOUNDARIES

Employee Stock Options

Part 2

Introduction

This newsletter is a sequel to the earlier newsletter published by us about Employee Stock Options (ESOPs) including the concept, the benefits, the accounting treatment and the valuation methods.

This newsletter provides additional insights into ESOPs. We dive deeper into valuation methods discussed and the inputs required, alternative valuation approach, and elucidate related concepts such as the difference between European and American options, the challenges in valuation of private companies and the advantages of having professional valuation support for the valuation of ESOPs.

To recapitulate, an ESOP is structured as an option on the equity shares of the company, which gives the employee a right but not an obligation to exercise the option upon the satisfaction of certain pre-determined conditions.

There are different methods of ESOP valuation, and among the most used are the Black Scholes option pricing model ("BSM") and the Lattice or Binomial models. The mechanism of both models is similar, and thus the inputs used for both models are mostly common, which are illustrated in the next section.

Inputs to the option pricing models

1. Exercise price of the option

The exercise price is the price at which an option may be exercised, sometimes called a "strike price". The exercise price is usually at par or below the fair market value of the underlying security as at the grant date of the option.

2. Fair market value of the underlying stock

In case of a listed company, the fair market value of the underlying stock is observable as it is traded in the active market. However, for a private company, the fair market value of the underlying stock needs to be valued using an appropriate valuation approach.

3. Expected term of the option

An assumption regarding the point when liquidity will be achieved must be made. It could be through dissolution, strategic sale, or an IPO. Reasonable estimates can generally be made by reference to the subject company's life cycle stage, funding needs, and strategic outlook while the actual time to expiration could not be known with certainty. The reference for an expected term of the options could be historical experience of the company. However, in cases where there is no historical experience or it is unreliable, expected term may be computed as ((vesting term + original contractual term)/2).

4. Expected stock price volatility for the expected term of the option

Volatility could not be directly observed. Volatility analysis starts with an examination of historical return volatility for a peer group of public companies. If reliable data is available, implied volatility from publicly traded options on the shares of such companies may also be obtained. Valuers adjust the observed peer volatility measures to take into account life cycle stage, remaining milestones, and other qualitative factors pertaining to the subject company.

5. Risk-free interest rate(s) for the expected term of the option

Interest rate in the BSM model is the implied rate on the grant date for a traded risk-free bond with a term equal to the option's expected term. Interest rates in Binomial Model are required for all potential times of exercise of the options which is obtained by using a grant-date yield curve.

However, it is important to remember that even with same inputs, the BSM values the option in continuous time, while Binomial Model values the option in discrete time.

Another distinguishing factor between BSM and Binomial Model is that BSM would normally be used to value European style options, while Binomial could accommodate for American style options as well. The difference between the two options is elaborated in the next section.

European and American options

The key difference between American and European options relates to when the options could be exercised: A European option may be exercised only at the expiration date of the option, i.e. at a single pre-defined point in time. However, it does not preclude the holder of the option from selling the option in the secondary market, subject to availability of liquidity in the options contract.

An American option on the other hand may be exercised at any time before the expiration date. American options are usually exercised when they are deep in the money, which means the asset's price is significantly higher than the strike price. American options normally attract higher premiums and are in higher demand since they provide for exercise of the option at any time. In terms of riskiness, the European Options have a lower risk since the expiration date is fixed, and the loss or profit could be estimated.

An alternative method of valuation that could be used to value both, American as well as European call options, is the Monte Carlo Simulation model.

Monte Carlo simulation model

A Monte Carlo Simulation builds a model of possible results by leveraging a probability distribution, such as a uniform or normal distribution, for any variable that has an inherent uncertainty. It then recalculates the results over and over, each time using a different set of random numbers between the predefined minimum and maximum values, for a predefined number of times. In a typical Monte Carlo experiment, this exercise could be repeated thousands of times to produce a large number of likely outcomes.

In the context of option pricing analysis, the model simulates the price of the underlying security and computes the option pay off for each possibility. The option value is concluded as an average payoff of all the calculated potential levels of prices. One of the foremost assumptions of the Monte Carlo model is that the underlying stock's price follows a Geometric Brownian Motion ("GBM"). This means that the equity value follows a random walk and is consistent with a form of the efficient market hypothesis: past value information is already incorporated, and the next value movement is "conditionally independent" of past value movements.

There are two components in a GBM model- a "drift" and a "shock". For each time period, our model assumes the stock price will "drift" up by the expected return. But the drift will be shocked (added or subtracted) by a random shock. The random shock will be the standard deviation multiplied by a random number.

The inputs to the Monte Carlo model are in line with the inputs required for other option pricing models such as fair market value of the stock, exercise price, volatility, expected term, risk free rate and dividend yield.

A key differentiator in this simulation is an additional input in the form of a probability distribution- whether that be lognormal, normal, uniform, etc.- that the variables to be simulated must follow. For option pricing model, the lognormal distribution is preferred as it is positively skewed, and thus is apt for representing value that do not go below zero and have unlimited potential upside, which aligns with the fact that share prices of a company have a floor value of zero.

This type of model is the preferred option pricing model when valuing ESOPs with complex market vesting conditions as well as performance conditions. It could also be used for valuing shares of public listed companies- although the binomial model captures both upward and downward trends in the stock price,

Monte Carlo model introduces a random factor that takes into account the impact of market shocks.

ESOP valuation for a private company, is more challenging due to the practical constraints in obtaining the fair market value of its shares which is readily available for public companies.

Challenges in valuing ESOPs for private companies

The computation of Fair Market Value ("FMV") of the underlying stock of a private company would be a more challenging task as compared with providing FMV for their public counterparts. Private companies may not have reliable management projections that may hinder the use of the income approach (such as discounted cash flow method). In cases of companies with niche service or product offerings, the market approach may not be a suitable fit due to lack of comparable public companies, and/or unavailability of similar transactions within the industry.

A private company must also be valued using appropriate valuation methodologies and involves accounting for discounts for lack of marketability ("DLOM"). ESOP valuation further entails the need for factoring in discount for lack of control ("DLOC"), as ESOPs result in a minority stock. Both these discounts are difficult to quantify and may involve deriving average of values obtained from multiple models, or using comparable transactions, which is a highly subjective exercise.

One of the inputs required in option pricing models, and for calculation of DLOM is volatility, a measurement of the amount by which the company's stock price changes have fluctuated in the past. Since privately held companies do not have a stock price, volatility is estimated based on the historical volatility of similar publicly traded companies.

Further, the requisite financial due diligence required by valuers, particularly the historical financial statements, of private companies are less likely to be as encompassing or pervasive as their public counterparts.

ESOPs with complex vesting conditions and structures also entail the use of complex, multivariate valuation models which may be difficult to simulate for a private company due to lack of resources or personnel.

It thus, may be prudent for a company to engage the services of a professional valuer for equity valuation for ESOP purposes, and help streamline the process. We enlist the advantages provided by professional valuation support in the next section.

Advantages of having professional valuation support

- Valuation services are not just limited to valuation at exercise dates, but also can be extended to the planning process, to arrive at the optimal ESOP structure (percentage of equity pool, option price, etc) and associated vesting conditions.

- The expertise of the professional valuer in the ESOP valuation will help the company choose the most appropriate valuation methodology and appropriate inputs in deriving the value of ESOPs to be in accordance with the relevant standards such as International Valuation Standards ("IVS").

- A professional valuer could conduct the valuation with the compliance of the relevant financial reporting standards including IFRS, which in turn will provide reasonable assurance to the regulators and auditors.

- A professional valuer will have access to various resources and relevant market data that may result in a faster turnaround for the valuation engagement.

- In cases of ESOPs with intricate vesting conditions and structure, a professional valuer could help to provide a more reliable option price by simulating a financial model which takes into account the complexities of the ESOP Plan.

  In light of the aforementioned points, hiring the services of an external professional valuer might be a more cost effective, and reliable alternative than the company carrying out the valuation exercise internally.

Case study 1 – Black Scholes Option pricing model ("BSM")

PARTICULARS	TERMS
Date of grant	January 1, 2022
Date of vesting	January 1, 2027
Options granted	354,000 options to purchase the company's common stock
Fair market value	$50 (on date of grant)
Exercise price	$30 (on date of grant)
Contractual term	8 years after date of grant
Remaining vesting	5 years

Description	Fair market value ('S')	Strike price ('K')	Expected term ('t')	Risk-free rate ('r')	Volatility ('σ')	d_1	d_2	Fair value of option
Call option on stocks	50	30	6.5	3%	30%	1.31	0.54	27.79

Computation of d1 and d2

$$d_1 = \frac{\ln\left(\frac{S}{K}\right) + t\left(r + \frac{\sigma^2}{2}\right)}{\sigma\sqrt{t}}$$

$$d_2 = d_1 - \sigma\sqrt{t}$$

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