GRG Remuneration Insight 172

by Denis Godfrey | February 2025

Option Valuation Models Simplified

Introduction

Over many years as an executive remuneration consultant, I have observed that most directors and executives do not understand option valuation models at a level necessary to make optimal decisions for equity design. While options should generally be replaced with Share Appreciation Rights (SARs), these same valuation models will apply to SARs, and to share purchase loan plans. Even a Right with a nil exercise price should generally be valued for remuneration purposes under one of these models. Ultimately these models will also form part of the process for determining the accounting cost of equity.

Several decades ago, I was lucky enough to come across a paper written by Mr Graef (Bud) Crystal who was a well-known executive compensation consultant in the USA. Although, I cannot now locate that paper I do recall that it provided a simple, clear explanation of option valuation models. In this GRG Remuneration Insight, I will do my best to recollect and recount the explanations presented in Bud's paper with the aim of supporting improved decision making and equity design.

Why Understand the Option Valuation Models

When a Board needs to determine the number of options to grant to an executive it needs to consider three main factors being:

a) The intended remuneration value of the grant e.g., 20% of Fixed Pay,
b) The value of the options,
c) The target level of vesting if performance vesting conditions are to apply to the option.

These may be combined in a formula along the following lines:

Number of Options	=	Intended Remuneration Value of Options ÷ Option Value ÷ Target Vesting%

By applying the forgoing formula, the Board will be able to logically defend their decision regarding the number of options granted should it be questioned by a stakeholder.

Understanding the option valuation model is also important when the Board is discussing the features (inputs to formula) of the proposed option. If a feature is changed it will impact the option value, but how and by how much? Of course, if a feature change increases the value of an option, then the number of options to be granted should be reduced.

Types of Option Valuation Models

There are at least three types of option pricing models being:

- Black-Scholes Model,
- Binomial Model, and
- Monte Carlo Model
- Each applies a different methodology to calculate a value for an option. However, they often produce similar outcomes.

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For the purposes of this Insight, we will focus on the Black-Scholes Model. What makes this model different is that it is arguably the simplest model to access and use in practice, it is probably the most commonly used model for valuing financial equity instruments, and it excludes performance conditions from the assessment. The latter is usually addressed by probability simulations (including Binomial or Monte Carlo) or simply by applying vesting scales to the Black-Scholes output.

Inputs

The inputs to a Black-Scholes Model are:

1. Share Price at the time of the calculation,
2. Exercise Price for the option i.e., the amount that must be paid when exercising the option,
3. The risk-free rate of return (RFR),
4. The Term of the option i.e., the maximum period before the end of which the option must be exercised or it will lapse,
5. Dividend yield i.e., the value of annual dividends as a percentage of the share price, and
6. The volatility of the share price i.e., a measure of the degree to which the share price varies (up and down) over time; this value can be calculated for listed stocks and applied to industry peers.

If an option were to be offered to an executive and the executive were to be required to pay an amount up front for the option, then the value of the options would be less than if no upfront amount were required. This aspect can be included in option valuation models but is not addressed further in this paper as it rarely arises under remuneration models in Australia (but would apply to say exchange traded options).

Investor Perspective

The Black-Scholes Model considers the value of an option from the perspective of an investor. To illustrate how this works, we will assume the investor has $100,000 to invest and is considering whether to:

a) buy 10,000 shares at $10.00 each, or
b) buy options (with an exercise price of $10.00 and a Term of 5 years) over 10,000 shares and invest the remainder of their money in a risk-free investment (the investor is seeking to minimise risk).

If the investor buys the shares, then at the end of 5 years they will hold shares with a value equal to, less than or more than the $100,000 paid for the shares. Thus, this alternative carries the usual risks for a shareholder.

If the investor chooses alternative b), then at the end of 5 years they will have the choice of:

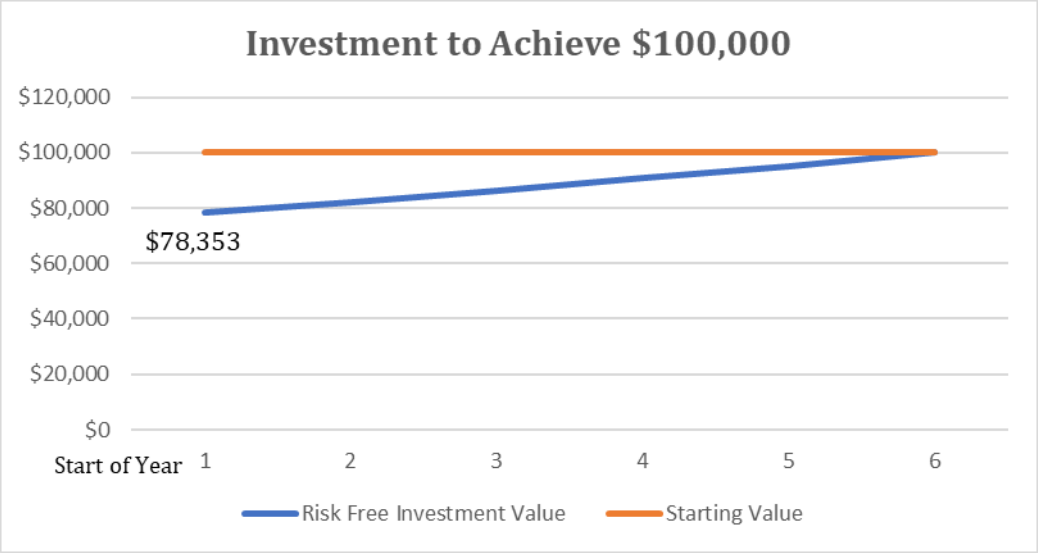
I. exercising the options which would be likely if the share price is higher than the exercise price because the investor could sell the shares and realise a profit,
II. exercise the options if they wish to hold the shares – this could be done at a break-even point i.e. no profit or loss, or
III. not exercise the options which means that the investor is left with the $100,000 cash but would have not achieved any growth on the initial $100,000. If the share price had fallen, this alternative would be preferable to exercising the options and thereby paying more for the shares than would need to be paid to acquire the same number of shares on the market. Exercising the options to acquire the shares would be a loss-making transaction.

The critical questions that have not been addressed in the above are:

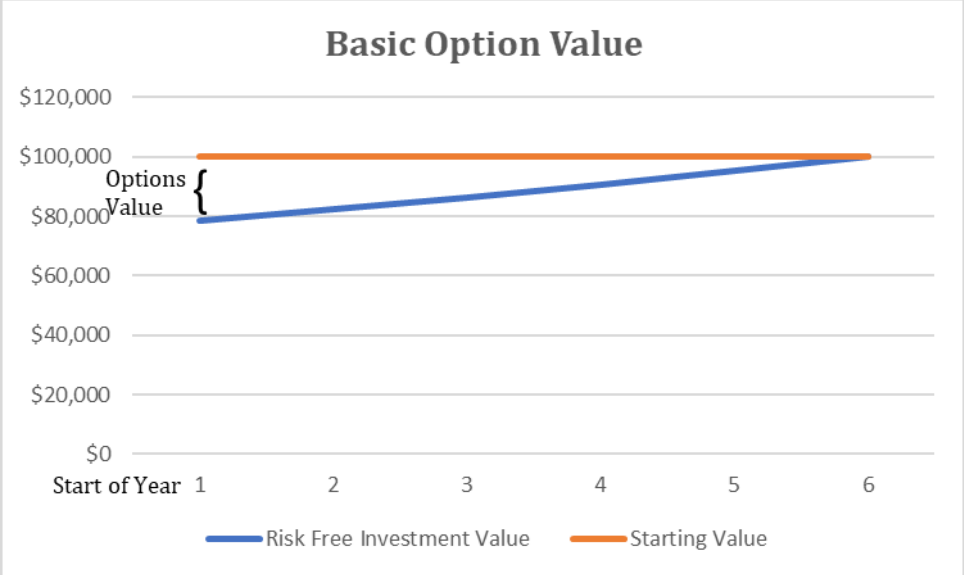
1. How much of the $100,000 available to the investor needs to be invested with no risk so that the investor ends up with $100,000 after 5 years, equivalent to the option break-even?
2. How much would the investor pay for the options?

Basic Option Value

To answer the above questions, we will consider the first three inputs to the Black-Scholes Model. Working out the amount to invest involves the application of a simple regression formula with three inputs which are: the end amount required being $100,000, the period of the investment which is 5 years and the risk-free interest rate which is assumed to be 5% per annum. The following graph illustrates that the amount to be invested needs to be $78,353 (rounded to nearest $).



As the investor has $100,000 available and needs to securely invest $78,353 it follows that they have $21,647 available to be used to purchase the options. Thus, the investor would be prepared to pay $2.1647 per option ($21,647 ÷ 10,000 options).

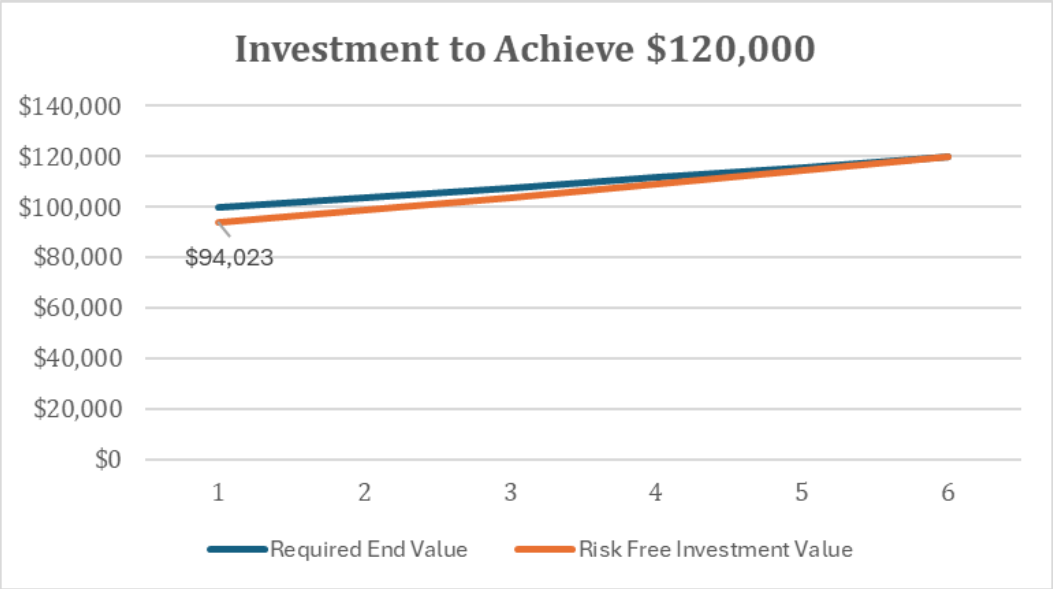


Taking Dividends into Account

Up to this point we have ignored dividends but if the options relate to shares which pay a dividend, then they need to be accounted for in the valuation formula. If the shares attracted an annual dividend of say

$0.40, then after 5 years the investor who purchases the option would be out of pocket by $2.00 per option ($0.40 x 5 years) or a total of $20,000 ($2.00 x 10,000 options), compared to having purchased the shares up-front. To ensure the investor is not out of pocket by purchasing options, the invested cash needs to be higher so that at the end of 5 years the investor has accumulated $120,000 ($100,000 + $20,000).

Now the investor still has $100,000 available and needs to securely invest $94,023 (rounded to nearest $) it follows that they have $5,977 available to be used to purchase the options. Thus, the investor would be prepared to pay $0.5977 per option ($5,977 ÷ 10,000 options).



Volatility of Options

The remaining factor in the Black-Scholes Model is volatility of the options. Volatility refers to the degree of variation of a trading price series over time, usually measured by the standard deviation of logarithmic returns. This is a complex aspect but suffice to say that volatility reflects the fact that an investor will generally be prepared to pay a little more for an option over a share whose price fluctuation is relatively high and will generally be prepared to pay a little less for an option over a share whose price fluctuation is relatively low. It can also be viewed as an indicator of the probability that the share price will exceed the exercise price during the Term.

Observations

When setting the design of an option, it is important to understand the impact that changes to the variable will have on the value of the option. The impact of change to the values of the key variables are discussed below.

Key Variable	Impact of Change to the Variable
Exercise Price	The higher the exercise price the lower the value of the option and vice versa.
Term	The longer the term the higher the value of the option and vice versa.
Risk Free Interest Rate (RFR)	The lower the RFR the higher the value of the option and vice versa.

Volatility	The higher the volatility the higher the value of the option and vice versa.
Dividend Yield	The lower the dividend yield the higher the value of the option and vice versa.

Most option values with an Exercise Price set at the share price at the time of grant and given a 5 year Term, fall between 20% (low volatility) and 50% (high volatility) of the face value of a share at the time of grant. The application of a scaled performance condition would typically halve this outcome.

Conclusion

Shareholders, boards and executives or employees participating in option or Share Appreciation Right plans need to understand the value that option and similar structures represent, and how that value changes over time or with adjustments to the variables. Without this understanding it is hard for a stakeholder to assess whether the option is valuable or reasonable. To that end, I trust that this paper has been useful and that if Mr Graef were still alive, he would approve of my effort.

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