

Valuation of Employee Stock Options

Algofin AG provides a range of services in the area of valuation and hedging of complex financial derivatives. A particular strength is the field of employee compensation plans, where we have advised and supported numerous listed firms. Our services take place before, at, and post grant (see Figure 1).

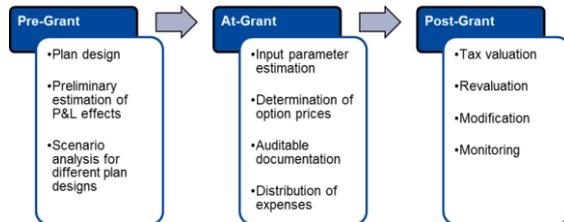


Figure 1: Algofin Employee Stock Option Valuation

The EA-Model®

The share-based payment standards IFRS 2 and FASB 123 require employee stock options to be recognized as an expense. This expense is measured at the fair value of the employee stock option at grant date.

The Standard Boards have not decided on a particular option pricing paradigm, but instead provide guidance on the selection of the most appropriate model. Employee stock options have a number of characteristics that might prevent their valuation by standard option pricing models. Two common restrictions include vesting periods and the non-transferability of granted options, both of which reduce the fair value relative to plain vanilla American options.

The **Enhanced American Model (EA-Model®)** developed by Manuel Ammann and Ralf Seiz is an **IFRS 2 and ASC 718 compatible** valuation model that has been designed to cope with the special features of employee stock options. In particular, it accommodates the effects of early exercise and post-vesting employment termination. As such, it produces more accurate estimates of employee stock options' fair values.

Key Features of the EA-Model®

The EA-Model® is a sophisticated lattice model that accounts for three distinct features of employee stock options.

- > **Vesting Period:** Employee stock options can only be exercised after the vesting period.
- > **Post-vesting Exit:** Employees may be forced to early exercise as a result of employment termination.
- > **Non-Transferability:** Because employees are not allowed to transfer their employee stock options, premature exercise is often the only way of raising cash from the options.

The early exercise behaviour of grant participants is captured by calibrating the model to an estimated expected lifetime (EL). Further factors in the valuation include: Exercise price (X), contractual life (T), vesting period (v), stock price at grant date (S), expected stock price volatility (σ), expected dividend yield (D), risk-free interest rate (r) and the post-vesting exit rate (w2).

Example

Figure 2 shows the fair value of an employee stock option with respect to the maturity and vesting period, given a strike price of 50\$. The parameters at grant date are as follows:

- > Stock price at grant date 50\$
- > Volatility 40%
- > Risk-free interest rate 1%
- > Expected dividend yield 0.5%
- > Post-vesting exit rate 2%
- > Contractual life 7 years

The fair value obtained from the EA-Model® is consistently lower than the Black-Scholes fair value.

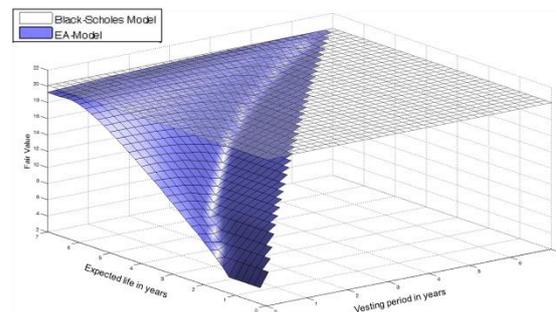


Figure 2: Valuation with EA-Model® and Black-Scholes Model

Next Steps

We're looking forward to offering our services to a competitive price. For further information on our services, competences and references, please visit our homepage, www.algofin.ch. For individual requests, please use our e-mail address, info@algofin.ch, or our phone number, +41 71 558 53 30.

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