

A StockOpter® *Insight* White Paper  
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## **Black-Scholes vs. Binomial Lattice for ESO Valuation**

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StockOpter Insight is designed to educate employee stock option (ESO) holders about this fabled form of compensation. A key part of understanding ESOs is understanding that an option of any kind (employee or market traded) has a value unique to the characteristics of the option. Fortunately, there are widely accepted algorithms for estimating this value. The two most common are the Black-Scholes-Merton model and the Cox-Ross-Rubenstein Binomial-Lattice model. Both models were created primarily for the purpose of valuing market-traded options. However, there are many, well documented, differences between ESOs and market traded options. We will not endeavor to regurgitate them all in this paper. The purpose of this paper is to explain why StockOpter Insight uses the Black-Scholes model in computing the full value of employee stock options.

In order to understand the use of Black-Scholes in StockOpter Insight, it is important to acknowledge one key difference that is integral to our use of the Black-Scholes model. ESOs cannot be sold or traded. Because of this key characteristic, a valuation method for purposes of establishing a market price is irrelevant from the individual option holder's perspective. Therefore, the accuracy of one model versus another is rendered academic in the context of and employee understanding the value of their employee stock options. Nonetheless, at least three reasons remain to value ESOs. The first is in the case of marital dissolution. In such circumstance, it is important to apply best-faith efforts to value ESOs as accurately as possible. Second, for purposes of financial reporting (whether they remain in the footnotes or fall directly on the Income Statement). Finally, to help an ESO holder better understand the full value of their ESOs and to establish a framework for making more informed decisions about when to exercise them. StockOpter Insight was created for the express purpose of addressing the later of the purpose. It is in this context that I will next discuss why Black-Scholes was chosen as the option valuation model for StockOpter Insight.

It is well accepted that an option whose strike price is equal to the fair market value (FMV) of the underlying stock is NOT worthless. Further, it is quite likely that the average executive or key employee does not understand

the key inputs of option valuation models and their impact on the valuation (i.e., Black-Scholes, Binomial-Lattice). The conundrum is bridging this knowledge gap in a way that engages the option holder in the learning process rather than causing them to disengage and disregard the topic as too esoteric or irrelevant. We concluded that the additional adjustments and assumptions required by the Binomial-Lattice approach unnecessarily complicated the option holders learning experience. Further, absent extensive and complex nodal adjustments, the outcomes generated by the Black-Scholes model are not materially different for an individual option grant from the Cox-Ross-Rubenstein Binomial-Lattice model. Therefore, due to its much less complex set of data inputs, and immaterially different outcomes, the Black-Scholes model was chosen for use in StockOpter Insight.