

The Accounting and Economics of Executive Stock Options

Part I: How Risky are Executive Stock Options?

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This is the first of three articles that look at the financial and economic features of Executive Stock Options (ESOs) and their role in executive compensation packages. In this article we challenge the lack of discipline around discussions about equity awards such as ESOs and executive risk-taking behavior. In these discussions, seemingly logical arguments fuel concerns that ESOs encourage executives to expose their companies to excessive risks because the executives can reap potentially substantial rewards with little or no personal downside risk. We use two common approaches to analyze the risk and rewards of ESOs to show that ESOs can be perceived as riskier for executives than restricted stock units (RSUs). In follow-up articles we'll discuss ways to use the results of this analysis to determine the incentivizing and potentially risk-inducing role of ESOs in executive compensation arrangements.

THE PURPOSE OF ESOs

Companies use ESOs and traditional RSUs to provide executives and CEOs with incentives that are tied to company stock performance. In the case of ESOs, executives earn stock units only if the stock price is higher at the end of the option's vesting or exercise periods than it was on the day the options were granted. ESOs are meant to motivate executives to pursue business outcomes that lead to stock appreciation over time, thus creating shareholder value. An ESO's risk/return opportunity is strongly skewed toward positive stock returns, i.e. ESO payouts are typically very large when stock appreciates significantly but nothing if the stock falls.

An RSU, by comparison, awards the full value of a share of stock so it always delivers some value — even if the value of the stock drops — as long as the executive stays with the company through the vesting period or the period of time that the stock award is subject to forfeiture. In fact, critics say RSUs provide an executive with value even in situations where shareholders have lost value. This argument superficially is similar to the concern that options deliver value with no downside risk.

In effect, ESOs expose executives to substantial risk — the risk of not receiving any compensation unless the stock delivers positive returns. This is a significant penalty for poor performance and is the reason why shareholders, institutional investors, and investor rights organizations have considered ESOs a particularly efficient executive incentive. Since the recent market turmoil, however, these groups have begun to blame ESOs for encouraging executives to take excessive risks, as well as engage in potentially fraudulent actions. Furthermore, ESOs are believed to offer executives the potential to reap huge payouts with little or no downside risk. For example, the 2010 RiskMetrics/ISS Policy Update refers to ESOs as “mega equity grants with unlimited upside and no downside risk.”

To assess executives' risks from holding ESOs, we need to choose a formal definition of risk — a common practice when defining the risks of financial assets. We'll examine a couple of partially related definitions: first, the risk as measured by the asset's Volatility (i.e. the standard deviation of the percentage returns), which is the most common definition of financial risk; and second, the risk as measured by the Economic Opportunity Cost of holding ESOs under different scenarios¹. Both approaches support the conclusion that ESOs are riskier for executives to hold than RSUs.

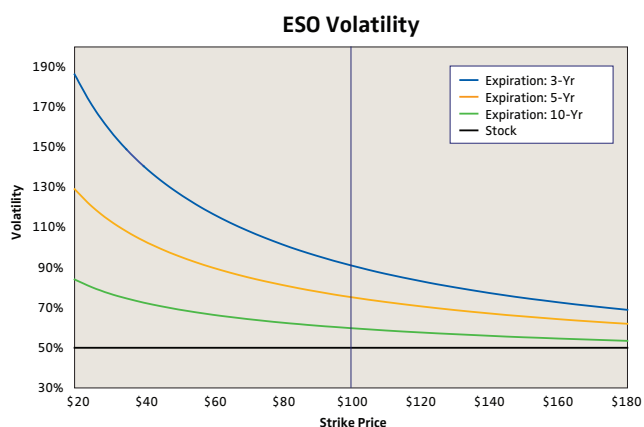
¹ The volatility-based risk measure requires some technical analysis of the Black-Scholes (B-S) pricing formula for stock options. It involves some mathematical elaboration and we are only going to state the results here. The Economic Opportunity Cost analysis does not rely on the B-S formula and it is possibly more intuitive.

VOLATILITY AS A MEASURE OF AN ESO'S RISK

The most common measure of risk in the financial world is Volatility, which is formally measured as the annualized standard deviation of an asset's percentage returns for a given period — daily, monthly, or other. For example, a stock with a price of \$100 at the beginning of the day and \$105 at the end of the day would show a daily percentage return of five percent. For ESOs, the percentage change in Fair Value due to the change in Stock Price is determined using Black-Scholes; according to B-S, the Volatility of an ESO is always higher than the Volatility of the corresponding stock (see the Technical Note).

The following figure shows in more detail how the Volatility of an ESO relates to the Volatility of the corresponding stock based on the B-S formula as the Stock Price moves with respect to the ESO's Exercise Price and as the option's Expiration Time changes as the option approaches maturity. The example assumes that the ESO was initially awarded with an Exercise Price of \$100, had an Expiration Time of ten years, a Volatility of 56 percent, and an interest rate of two percent.

Figure 1:



The ESO's Volatility changes as Stock Price moves, i.e. as the option's Intrinsic Value² changes and as the Expiration Time changes. However, the option's Volatility is always greater than the stock's. In summary:

- The option's Volatility is larger when the option is out of the money, i.e. when the option is underwater [left side of Figure 1: Stock Price below the Strike Price of \$100]

² An option's Intrinsic Value is the difference between the current Stock Price and the option's Exercise Price, when the Stock Price is greater than the Exercise Price, or zero in the opposite case. For example, if the option's Exercise Price is \$100, and the current Stock Price is \$150, then the Intrinsic Value is \$50. If the Stock Price were \$80 instead, the Intrinsic Value would be \$0.

Technical Note: The Volatility of ESOs

The Volatility measures the standard deviation of the daily percentage changes in the Stock Price or an option's Fair Value.

Percentage changes in the Fair Value of an ESO are related to changes in the Stock Price via the well-known Black-Scholes (B-S) option pricing formula. (Here we are accepting the notion that the B-S value is an accurate representation of the value of an executive's compensation, a notion that we'll challenge in subsequent articles).

To determine the percentage change in the option's Fair Value corresponding to a given change in Stock Price over one day, we need to compare the B-S value of the option based on the Stock Price at the beginning of the day, with the B-S value based on the Stock Price at the end of the day. Our example considers an ESO with five-year expiration, stock Volatility of 50 percent, and interest rate of two percent. The B-S valuation for the ESO would produce the following values:

	Beginning of Day	End of Day	Percentage Change
Stock	\$100.00	\$105	+ 5.0%
		\$95	- 5.0%
ESO	\$45.24	\$48.99	+ 8.3%
		\$41.60	- 8.1%

On a percentage basis, gains and losses in the ESO's Fair Value are larger than in the corresponding Stock Price. This is reflected in the ESO's measure of Volatility, which is larger than the stock's. This relationship is generally true and can be formally shown as:

$$\text{Option Volatility} \approx (\text{Option Delta} \times \text{Stock Price} / \text{Option Value}) \times \text{Stock Volatility}$$

Option Delta is the option's delta, one of the so-called "Greeks" from the B-S formula. The details of this relationship are not crucial; the key point is that the option's Volatility is related to the stock's Volatility via a coefficient that is always greater than one.

- The option's Volatility becomes close to the stock's Volatility when the option is deeply in the money, i.e. when the option has the most Intrinsic Value [Right side of Figure 1: Stock Price above the Strike Price of \$100]
- The option's Volatility increases as the option approaches maturity [curves for Expiration Time decrease from 10-Year to 5-Year and 3-Year].

Therefore, if we compare the riskiness of ESOs and stock based on their Volatilities, it is clear that ESOs are riskier under this measure of risk.

ECONOMIC OPPORTUNITY COST AS A MEASURE OF AN ESO'S RISK

Another characterization of risk, although possibly less formal, compares the Economic Opportunity Cost for holding ESOs and full value awards (e.g. RSUs) or cash under different scenarios of future Stock Prices. We'll use a portfolio, initially worth \$100, for an executive holding ESOs, an executive holding RSUs, and a shareholder holding stock.

A proper accounting of the economics requires us to compare the economic value of each arrangement with the alternative of receiving \$100 in cash compensation (for executives) or holding \$100 in a bank account (for shareholders). It is important to remember that an ESO award, just like stock, would be granted in-lieu of a certain amount of cash. So we assign \$100 worth of economic value to an ESO award even if the ESO's Intrinsic Value is zero when granted. Failing to do so would lead to incorrect conclusions that ESOs do not carry the downside risk of an economic loss.

For our analysis, we assume that the stock price on the award date is \$100, and that an executive is granted ESOs and/or RSUs. We also consider the case of a shareholder investing \$100 to buy one share of stock on the same date as the executives are granted their awards. We also assume, for simplicity, that the ESO, with an Exercise Price set to \$100, has an expiration time of five years, a Fair Value of \$50 and is granted in-lieu of \$50 cash compensation (In practice, the equivalent cash value of the ESO is determined on the base of the Fair Value used for expensing purposes under ASC Topic 718, former FAS 123R). Therefore, an ESO grant with the same economic value as one unit of a RSU grant would include two ESO units in this example (in practice, ESO units may not be granted in such precise ratio).

The following table summarizes the initial value of each position:

Initial Value	Units	Economic Value	Leverage
Share of Stock	1	\$100	1 X
RSU Grant	1	\$100	1 X
ESO Grant	2	\$100	2 X

The following table summarizes the economic value of each position at the end of five years under different stock scenarios:

Final Stock Value in 5-Years	\$60	\$100	\$150	\$200	\$300
Shareholders (1 Unit)	\$60	\$100	\$150	\$200	\$300
RSU Grant (1 Unit)	\$60	\$100	\$150	\$200	\$300
ESO Grant (2 Units)	\$0	\$0	\$100	\$200	\$400

In terms of relative returns, the outcomes would be:

Final Stock Value in 5-Years	\$60	\$100	\$150	\$200	\$300
Shareholders (1 Unit)	(40%)	0%	50%	100%	200%
RSU Grant (1 Unit)	(40%)	0%	50%	100%	200%
ESO Grant (2 Units)	(100%)	(100%)	0%	100%	300%

The Economic Opportunity Cost scenarios show the asymmetric nature of the payoff to the holder of an ESO. ESOs, because of their leveraged nature, do provide substantial upside potential for large stock price appreciation. However, the penalty for stock underperformance is quite significant in terms of Economic Opportunity Cost.

Note, for example, that an executive who is granted a RSU would still have a stock unit worth \$60 if the stock underperformed by negative 40 percent while an executive who is granted an ESO would have nothing at all. Everything else being the same, the holder of ESO units has lost more, in economic terms, than holders of RSUs and shareholders. As a

final note, remember that the economic value may be different from the values reported for accounting and expensing purposes.

CONCLUSION

Recent common opinions that ESOs expose executives to less downside risk than owning stock outright, or that ESOs are “mega equity grants with huge upside and no downside risk”, may not be well founded. We have demonstrated that, under two formal definitions of risk, ESOs expose executives to more risk than stocks, especially on the downside. Whether we look at the risk of ESOs in terms of the Volatility of the ESO's Fair Value or the Economic Opportunity Cost of a compensation arrangement, ESOs are riskier than RSUs for an executive. In particular, ESOs penalize executives significantly, from an economic standpoint, if the stock fails to appreciate, in exchange for the opportunity to be well rewarded if the stock out-performs.

In the next article of this series we'll examine how the value of ESOs may be perceived from the employer's perspective and from an executive's perspective. In the third and final article, we'll discuss a conceptual framework to show how our analysis of the perceived risks and values of ESOs can be applied to assess the circumstances when ESOs are likely to incentivize executives to operate in the best interest of their shareholders and when ESOs or other compensation arrangements may induce excessive risk-taking.

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