

A StockOpter[®] Insight White Paper

Use of Dividend Yield in Calculating the Insight Ratio[®]

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Introduction:

When using StockOpter[®] Insight the question often arises as to whether the dividend yield should be used to calculate the Black-Scholes and time value. This question is often asked with regard to the Insight Ratio[®] (time value divided by Black-Scholes value). This paper explores the ramifications of using the dividend yield for purposes of calculating the Insight Ratio[®]. We also present an analysis of the sensitivity of including the dividend yield under several scenarios.

Summary:

Under any set of circumstances, it is advisable for the user of StockOpter[®] Insight to create a Personal Equity Compensation Profile with and without inclusion of the dividend yield. This way the differences in Insight Ratio[®] can be observed with the specific set of assumptions pertinent to the specific option holder.

Generally, the inclusion of the dividend is not relevant unless holding the shares for a significant amount of time following exercise is under consideration. If the executive is required or expected to hold shares long in the company stock, then an analysis with the dividend included should be run. On the other hand, if the executive plans to exercise and immediately sell the shares (i.e., cashless exercise) then the dividend benefit will never exist and is probably irrelevant to the Insight Ratio[®] analysis.

The impact of including the dividend in the Insight Ratio[®] calculation is substantially affected by the following factors:

- The assumed stock price volatility
- The amount of the dividend (yield)
- The time to expiration
- The In-the-money value of the option relative to the strike price
- The risk-free rate of return

All other things being equal:

- Lower volatility results in a lower Insight Ratio[®]
- Lower dividend yield results in a higher Insight Ratio[®]
- Longer time to expiration results in a higher Insight Ratio[®]
- Higher In-the-money value results in a lower Insight Ratio[®]
- Higher risk-free rate of return results in a higher Insight Ratio[®]

Analysis:

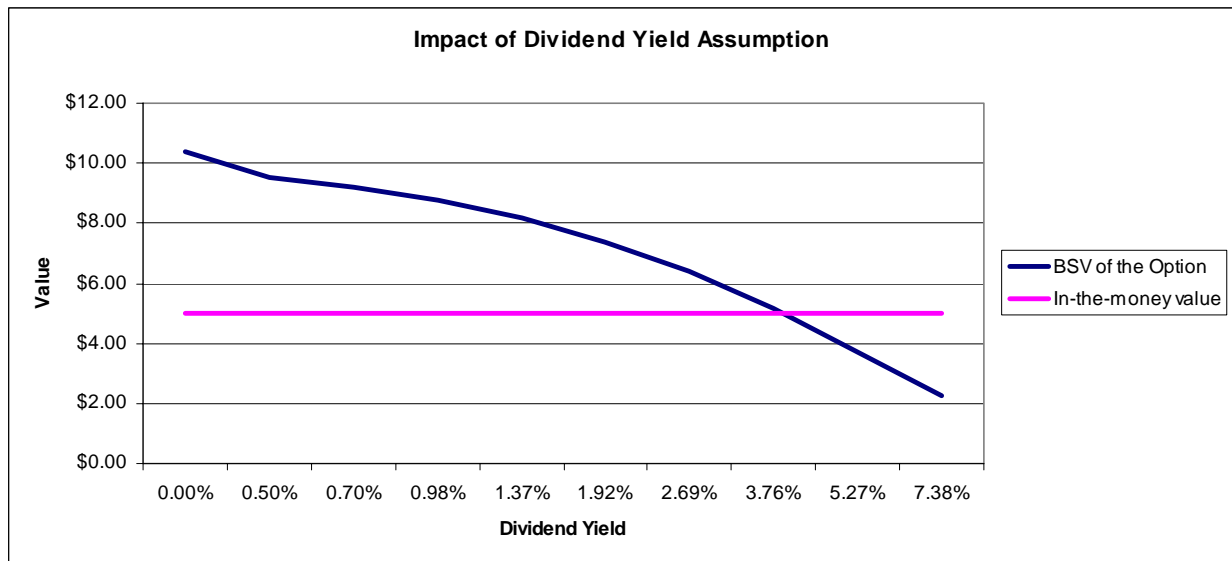
As can be seen in the following table, as the dividend rate increased from 0.00% to 7.38% (all other factor inputs remaining steady) the Time Value of the option went from \$5.39 to -\$2.74. This led to the "Actual" Insight Ratio[®] going from 51.88% to -121.12% (StockOpter[®] Insight reports negative ratios as zero). What this means is that if you ignore taxes, the value of exercising the option and receiving the dividend on held shares begins to exceed the value of holding the option for the remaining potential upside over the remaining life of the option. Again, however, if you plan to sell the shares after exercise, it would be inappropriate to include the dividend in the calculation as it would not be received after exercise and thus would not be a benefit of exercising the option. If some of the shares would be sold and some retained, such as in a sell-to-cover strategy, you can pro-rate the dividend rate by the percentage of shares anticipated to be held.

In addition, the potential income tax impact on the exercise would have to be factored into the analysis as the calculation only factors in the cost of capital of paying the exercise price, but not the taxes. This tax effect could be dramatically different depending upon the type of option to be exercised and the client's projected tax result. Therefore, the benefit of holding the shares and receiving the dividend would be much less if the tax effect of the exercise to the client was substantial.

StockOpter Insight® White Paper: Dividend Yield Assumption

Scenario	1	2	3	4	5	6	7	8	9	10
Current stock price	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00
Per share dividend	\$0.00	\$0.10	\$0.14	\$0.20	\$0.27	\$0.38	\$0.54	\$0.75	\$1.05	\$1.48
Estimated Volatility	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%
Risk Free Rate	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
Dividend Yield	0.00%	0.50%	0.70%	0.98%	1.37%	1.92%	2.69%	3.76%	5.27%	7.38%
Years to Expiration	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Strike Price	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00
BSV of the Option	\$10.38	\$9.53	\$9.20	\$8.76	\$8.16	\$7.38	\$6.38	\$5.14	\$3.73	\$2.27
In-the-money value	\$5.00	\$5.00	\$5.00	\$5.00	\$5.00	\$5.00	\$5.00	\$5.00	\$5.00	\$5.00
Time Value	\$5.38	\$4.53	\$4.20	\$3.76	\$3.16	\$2.38	\$1.38	\$0.14	-\$1.27	-\$2.73
Actual Insight Ratio®	51.82%	47.51%	45.65%	42.89%	38.73%	32.23%	21.58%	2.80%	-34.13%	-120.58%
Displayed Insight Ratio®	51.82%	47.51%	45.65%	42.89%	38.73%	32.23%	21.58%	2.80%	0.00%	0.00%

The following chart shows how the Black-Scholes value is affected as the dividend rate on the stock increases. The In-the-money value is shown as a reference to see at what point the time value of holding the option is completely offset by the potential dividend to be received on the stock. The break-even point in this example where the time value is exactly zero is a dividend yield of 3.90%. Please note that StockOpter® Insight converts negative insight ratios to zero to avoid the confusion of large negative ratios.



Conclusion:

Several factors must be weighed to determine if the dividend should be included when using StockOpter® Insight for your client. You must determine whether your client will hold all of the shares after exercise, hold some of the shares, or sell all of the shares after exercise. In addition, the tax effect of any exercise would need to be projected for your client to determine how much of the dividend benefit would be offset by the tax impact. Therefore, it may be beneficial to run multiple reports, one with the dividend rate, one without it, and perhaps one with a pro-rated dividend rate.