

## Stock Volatility and Valuation

Volatility in the stock market has been hitting the headlines these past few months with a common measure being the VIX (the ticker symbol for the Chicago Board Options Exchange Volatility Index), which measures the implied volatility of the S&P 500 index options, hitting 37 on February 5th. Considering that for the whole of 2017 the VIX never rose above 16, research analysts have cautioned that given the various regulatory policy changes, stock volatility could be expected to remain high in the coming months.

In light of the renewed focus on volatility, we wanted to gauge the movements in beta of stocks during periods of high volatility. We studied the relationship between the beta of stocks before and after high volatility periods specifically during these two periods:

<b>Time Period</b>	<b>Change in VIX (%)</b>
Q2 2011 to Q3 2011	75%
Q4 2017 to Q1 2018	68%

During these periods market volatility increased 75% between the second quarter 2011 to the third quarter 2011 and 68% from the 4<sup>th</sup> quarter of 2017 to the 1<sup>st</sup> quarter of 2018.

Volatility can impact a valuation in several different areas: the discount rate used in the income methods of valuation by the effect on beta, the price of the stock in the Guideline Publicly-Traded Method; and in theoretical models (option models) in determining the implied discount for lack of marketability.

### **Beta**

A commonly used method in determining the cost of capital is the Capital Asset Pricing Model that utilizes beta, a statistical measure of how a stock moves with an index, and the expected market return of the index.

In order to assess the movements in stock betas during these periods, we picked a sample of 25 stocks from across industries. We noted that for both these time periods, the betas of 10 out of 25 stocks showed a tendency of a mean reversion of beta to 1 with the stock price moving in-line with the index. Only 4 and 2 stocks in 2011 and 2018 time periods respectively showed a movement in beta away from the market beta of 1.0. The remaining stocks in the selected sample either showed indeterminable trend (wide swings) or had insignificant changes in beta values during these time periods.

Based on the above analysis, it appears that during high volatility periods, the stock betas have a general tendency towards mean reversion. If the high volatility period is only for a few months, then over a five year horizon (most analysts use this period) the change in beta would be immaterial. However, if the heightened volatility should last more than a few months then a valuation analyst may want to consider computing beta over a longer period.

### **Stock Prices**

When volatility increases, so does the movement in stock prices. Depending on when the valuation date is relative to share price swings, increased volatility may result in material differences in the value indications derived from the Guideline Publicly-Traded Method.

### **Discount for Lack of Marketability**

An approach commonly used to determine the discounts for lack of marketability are theoretical models, or the use of option analysis to determine the magnitude of discount. A key component of any option valuation model is the stock price volatility. As volatility increases so will the discount for lack of marketability.