INNOVATIVE QUANT SOLUTIONS, LLC

Beta – What is it?

We are in the midst of creating and publishing an IQS Brief series on Beta, discussing everything from the calculation of Beta to the interpretation of Beta. There is definitely a lot of misunderstanding in the popular media and investment community, about the calculation and meaning.

Below is a brief discussion of a few items of confusion.

Beta – How much data to use? 1 Year, 3 Years or 5 Years? Let's assume monthly (rather than daily or weekly returns) for now, though that debate is also open.
How do you calculate Beta?
There are generally two accepted equations for beta as a total return calculation or an excess return over a risk free rate.

Equation 1: $R_a = \alpha + \beta * Rm$
Equation 2: $(R_a - r_f) = \alpha + \beta * (R_m - r_f)$

Where:
R_a is the return to the asset
R_m is the return to the market, which is the S&P 500 for our case
α is the intercept of the regression equation
β is the slope of the equation
r_f is the risk free rate

So, let's say we choose monthly returns and pick AAPL, a steady company, for our test case.

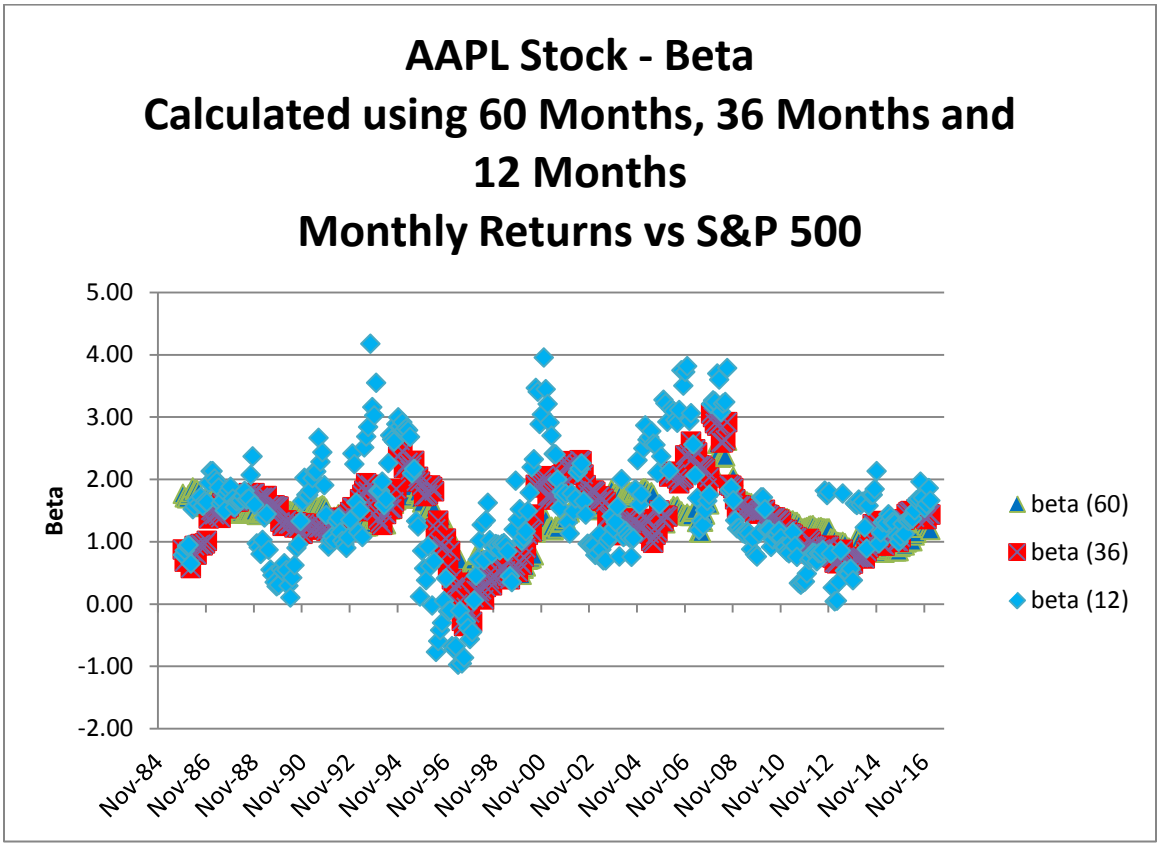
For simplicity and consistency, let's calculate using total returns from Equation 1 above.

You can see from the table below that Beta is 1.19 using 60 months of data but 1.66 if we used only the last 12 months of data, and 1.43 using 36 months of data.

Table 1 – AAPL Beta

60 Months	36 Months	12 Months
1.19	1.43	1.66

Graph 1 – AAPL Beta – Time Series for Different Time Periods



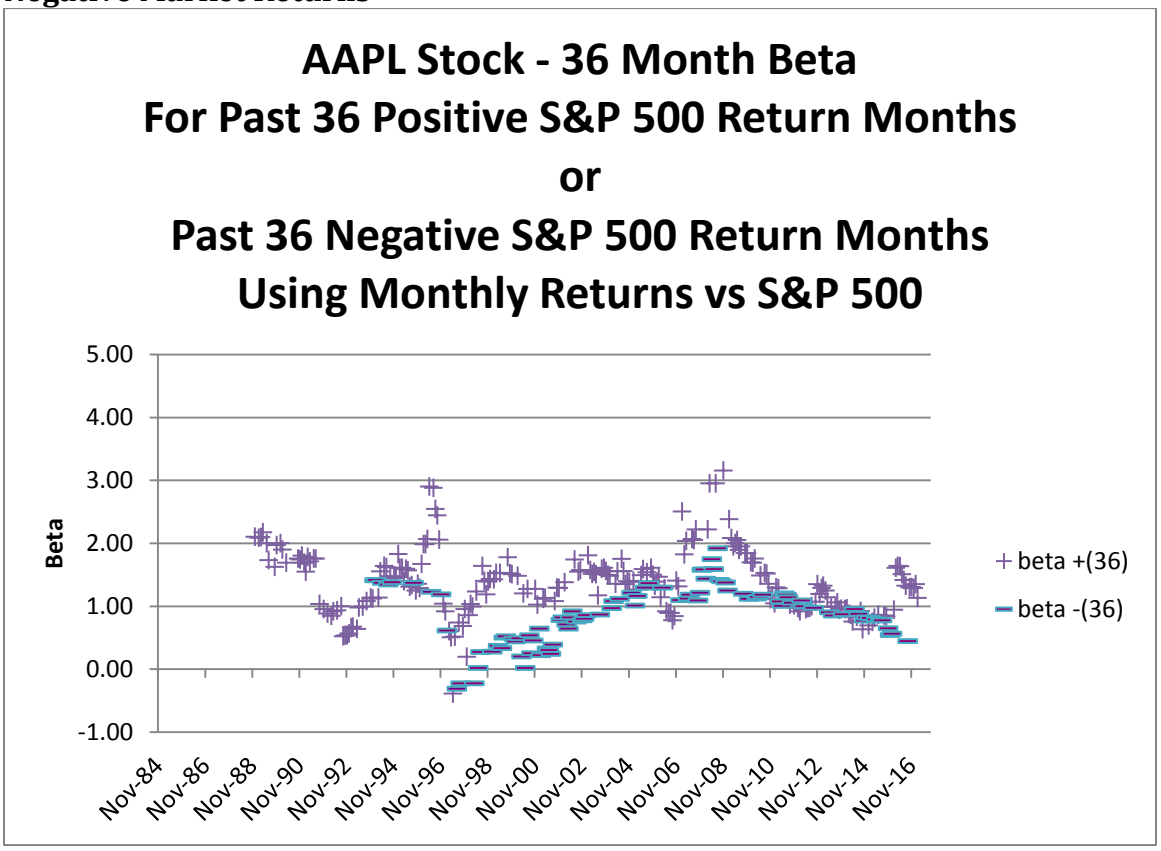
The first issue is whether to subtract the risk free rate, but in this low rate environment, it has minimal effect on the resulting Beta. In this instance, the number of months used in the calculation has a more impactful effect. Whether the beta is 1.2 or 1.7 is quite a meaningful difference.

Unfortunately, I don't think that beta of either 1.2 or 1.7 is necessarily the appropriate answer. The questions are what does beta represent and what are we going to do with that information?

Table 2 – AAPL Beta for 36 Months

All Data	Positive S&P Only	Negative S&P Only1
1.43	1.13	.45

Graph 2 – AAPL Beta for 36 Months of Data– Time Series for All, Positive or Negative Market Returns



If we use the last 36 months of returns, beta is calculated as 1.43. However, if we use the last 36 months of returns when the S&P 500 had positive returns, then the beta is calculated as 1.13. But, if we calculate beta using only the last 36 months when the market had negative returns, then the beta is .45. Looking at all markets gives us one answer, viewing only up markets or down markets gives us a very different result. So, which is the most meaningful answer? It clearly depends!

There is also the issue that these are calculations from the past. Are we trying to calculate what beta was over the past or is it a forecast for the next month, 6 months or year?

We tackle these issues and more in the upcoming IQS Brief series on Beta!