1. **CAPM in Excel**

A CAPM of ORCL stock return was implemented in both OLS regression in Excel and the in python. The CAPM values of beta and alpha were the same. The historical data for ORCL stock and the S&P 500 index were downloaded from Yahoo Finance and the Risk free rate used was the average annual returns for the 3 Month Treasury Bills downloaded from FRED.

Estimating the regression equation of the CAPM gives us the security characteristic line (SCL). The SCL is a lot of the typical excess return on a security (ORCL) as a function of the excess return on the market (SP500). For the period 25 March 2015 to 25 June 2015, we find that the beta coefficient of ORCL stock, as estimated by the slope of the regression line, is 1.12, and that the intercept for this SCL is -0.001% per day.

The Expected Annual Return for IBM from the Single Index Model was -0.24%, calculated from an the following equation:

The estimated Annualized CAPM is

Ro -Rf = alpha + beta\*(Rm - Rf) = -0.00214 + 1.12(0.52 -0.12) = -0.34%

Ro = -0.34 + 0.004 = - 0.3%

The ORCL Beta of 1.12 incorporates an asset’s total risk, which includes the market risk and firm specific risk. Thus, the Beta of ORCL measures the degree of ORCL stock’s market-risk. This market-risk is systemic, undiversifiable risk. Since, Beta measures an asset’s price volatility; the ORCL Beta of 1.12 indicates that the ORCL’s stock price will be 27.3% more volatile than the market.

The ORCL Alpha of -0.214% indicates an underperformance of the stock to its benchmark by 0.214% of actual returns from its expected return as forecasted using that ORCL’s Beta. The regression results show that both the Beta (p-value <0.0001) and Alpha (P-value <0.0001) were statically significant at the 99% level (strong). Therefore, there is statistical confidence at the 99% confidence interval; to support that ORCL returns are affected by the S&P 500 index (market).

Furthermore, ORCL’s returns have a mild positive relationship (r = 0.3642) with the market returns. If market return increases, ORCL’s returns increases and vice versa. As such, ORCL tracks the S&P index. While, the R2 of the regression is 0.3076. The wide scatter about the regression line illustrates this. As such, 30.76 % of variability of ORCL stock returns that is explained by variability in the market (S&P500). R-square tells us what fraction of a firm’s volatility is attributable to market movements. While, 1 - R2 = 0.868 so that 86.8% of ORCL's return, which is not explained by the market is the percentage of diversifiable risk.

For each month, t, our estimate of the residual, et, which is the deviation of ORCL’s excess return from the prediction of the SCL, equals Deviation = Actual − Predicted return.The standard error of the regression (SD of e(t)) is 0.0015. This is the typical distance of a dot from the regression line. The rest of the results are presented and explained in the Excel workbook.