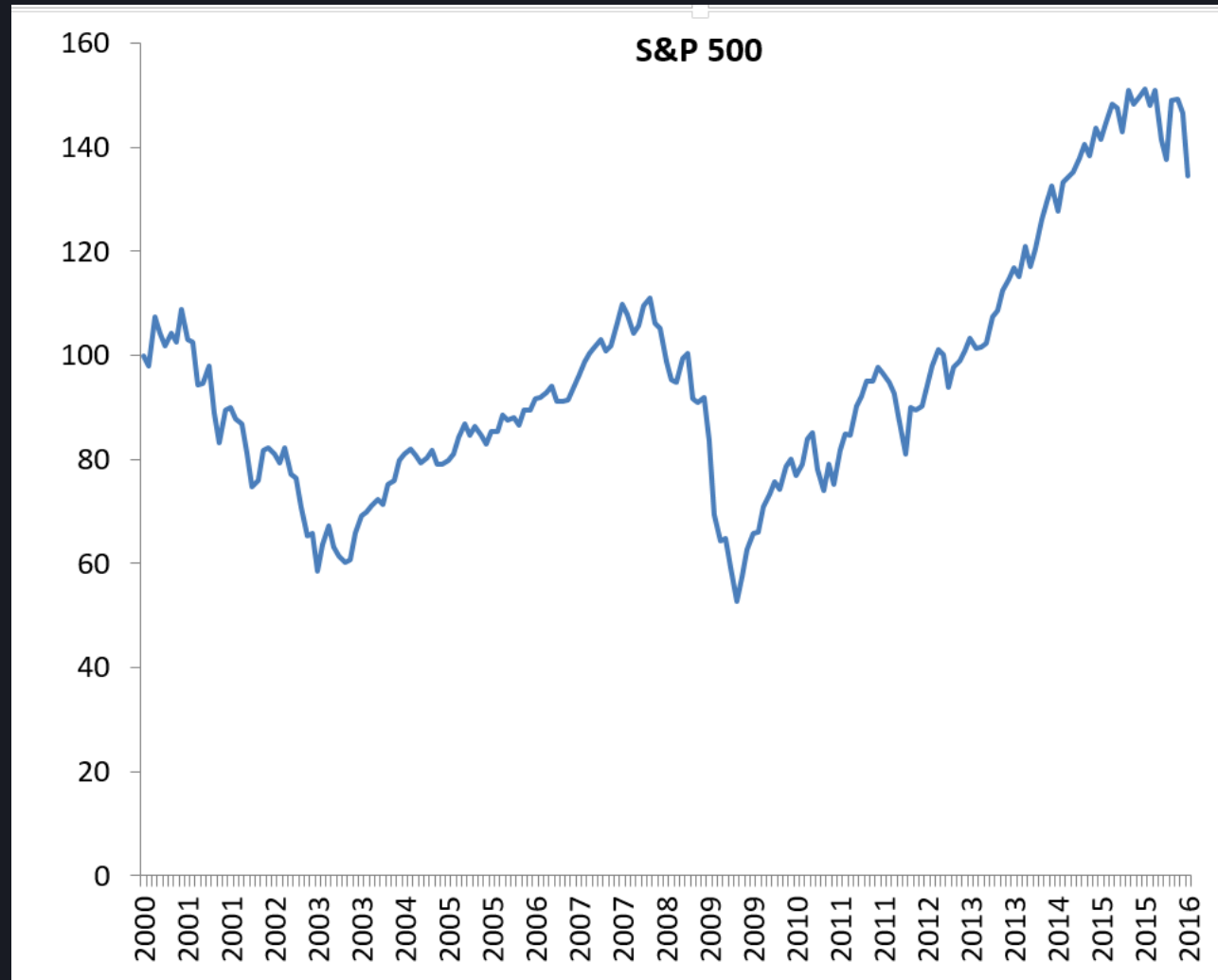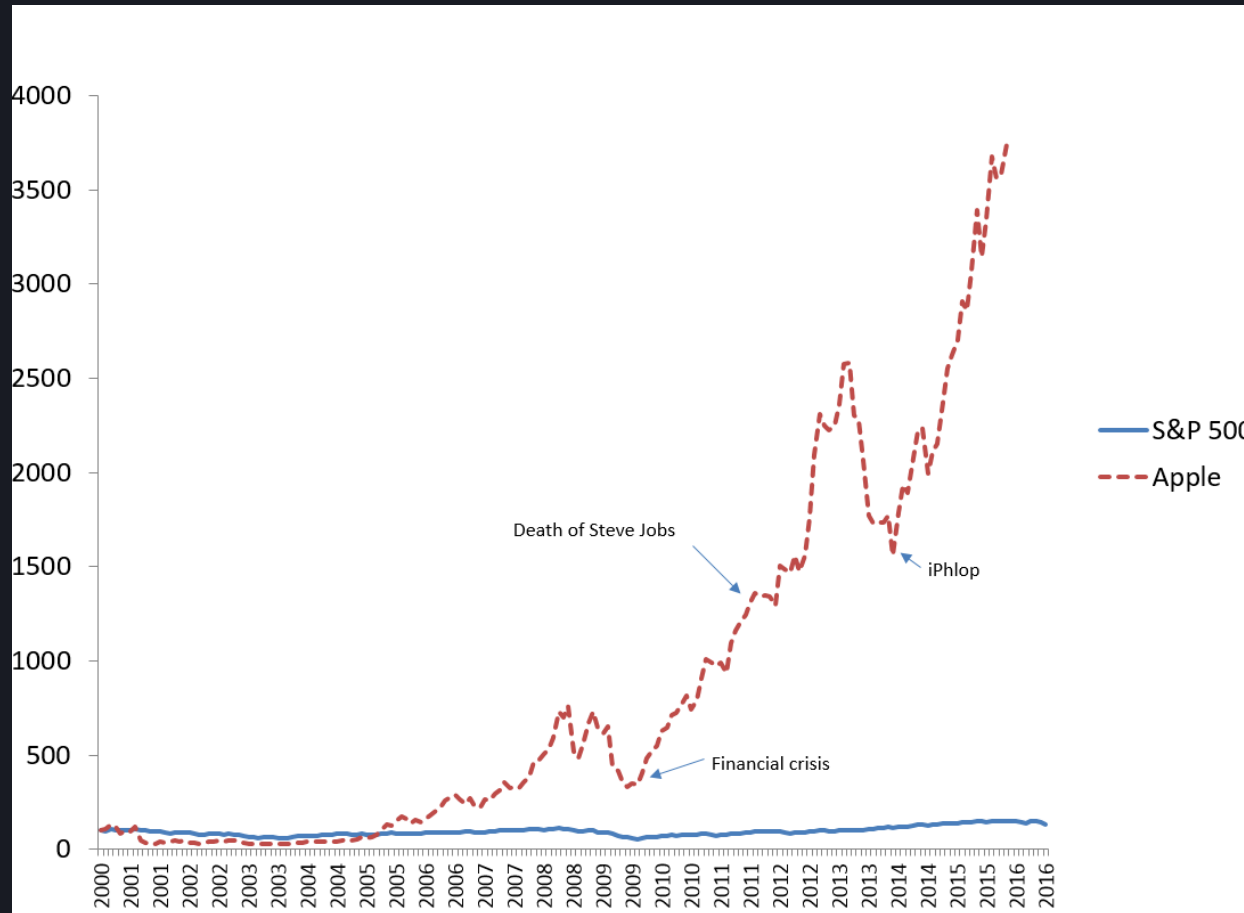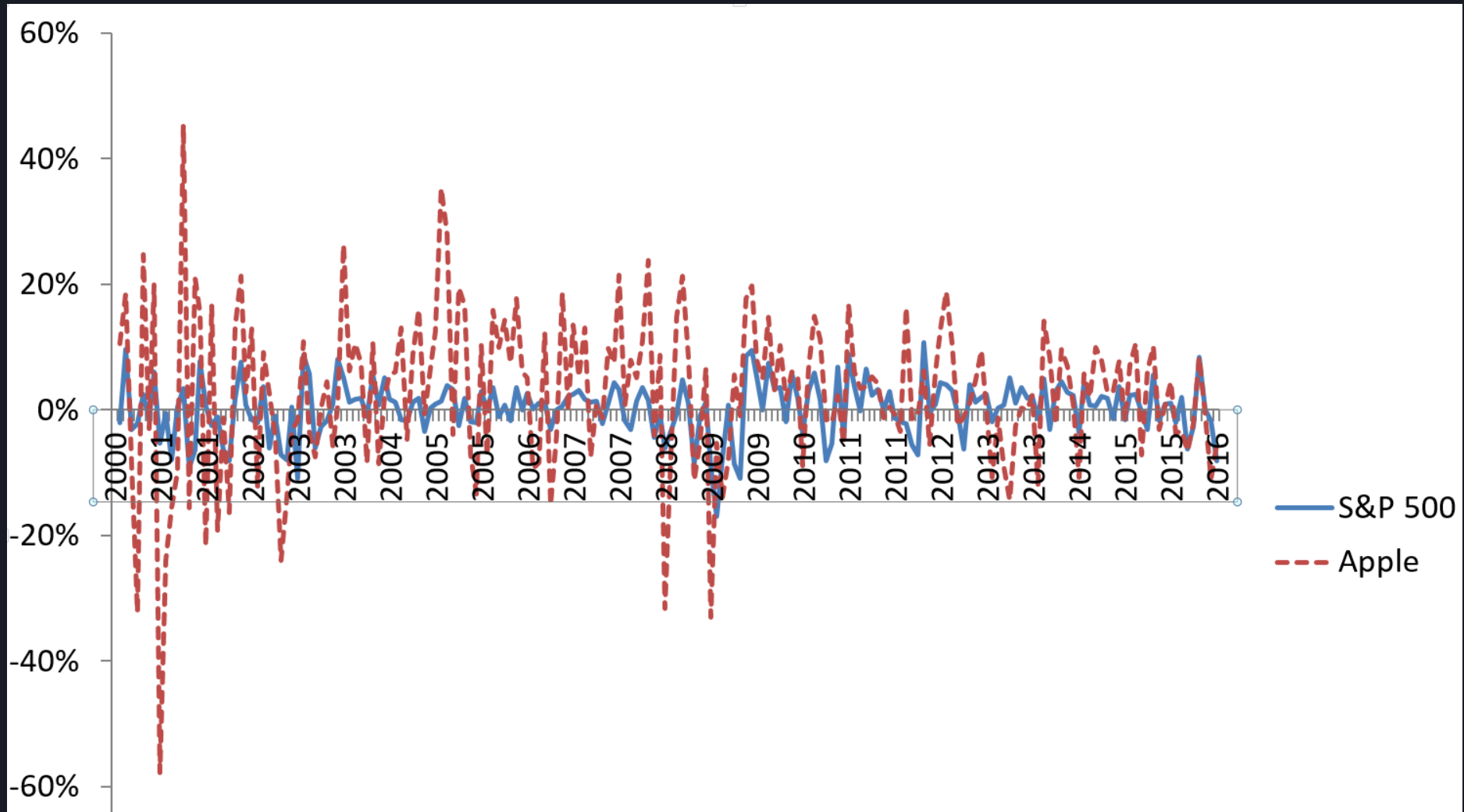# Stock Market Level, 2000-2016, 2000=100

# Apple, Inc. and S&P 500 Monthly Adjusted Price
2000-2016, 2000=100

# Apple, Inc. and S&P 500 Monthly Returns, 2000-2016

Variance of Apple vs Variance of S&P500

- Standard deviation of Apple capital gain in decade shown is 12.8% a month (not annualized) (arithmetic mean 3.47% a month, geometric mean 2.65% a month)

- $1.0347^{123}=65$, $1.0265^{123}=25$

- Standard deviation of S&P 500 return in decade shown is 4.7% (arithmetic mean capital gain mean 0.01%, geometric mean -0.16% a month, meaning we've lost money)

Scatter, Apple vs S&P 500 Returns Monthly Feb 2000-Jan 2016
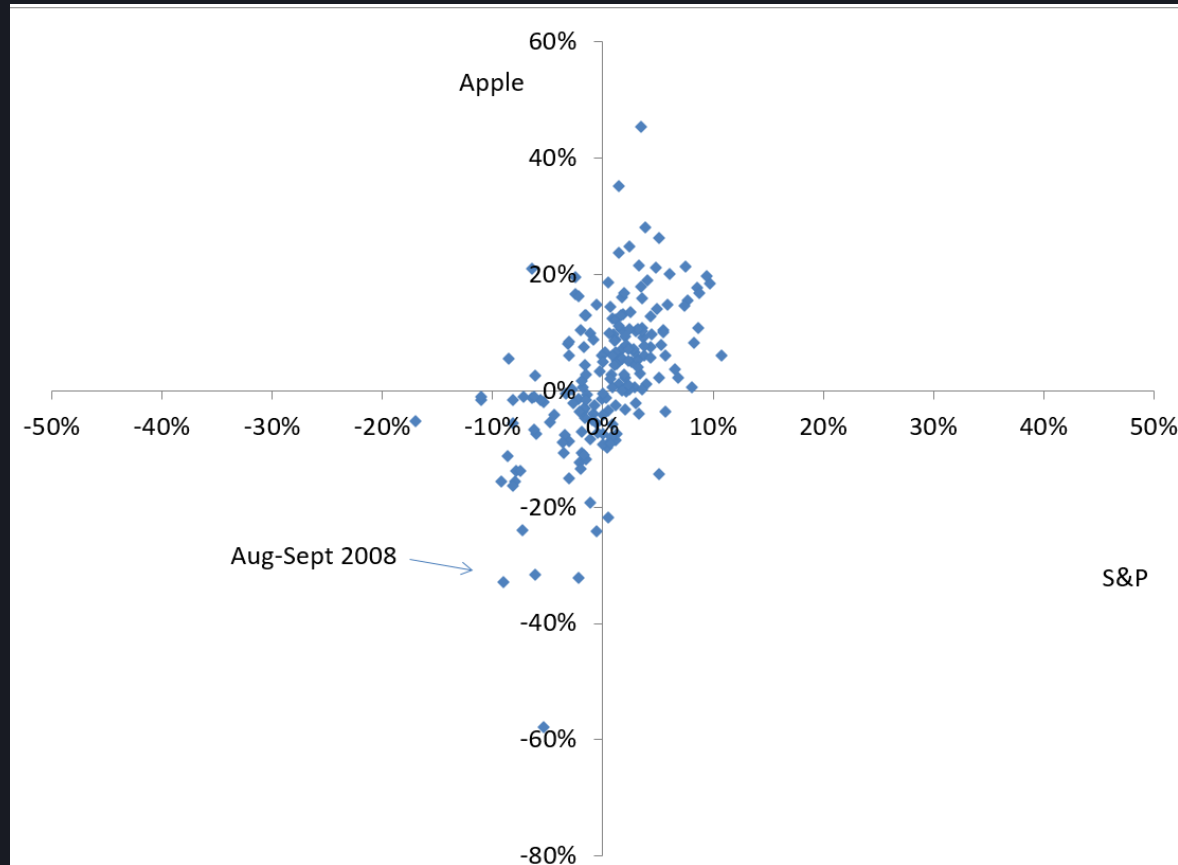
Same Scatter with Regression Line
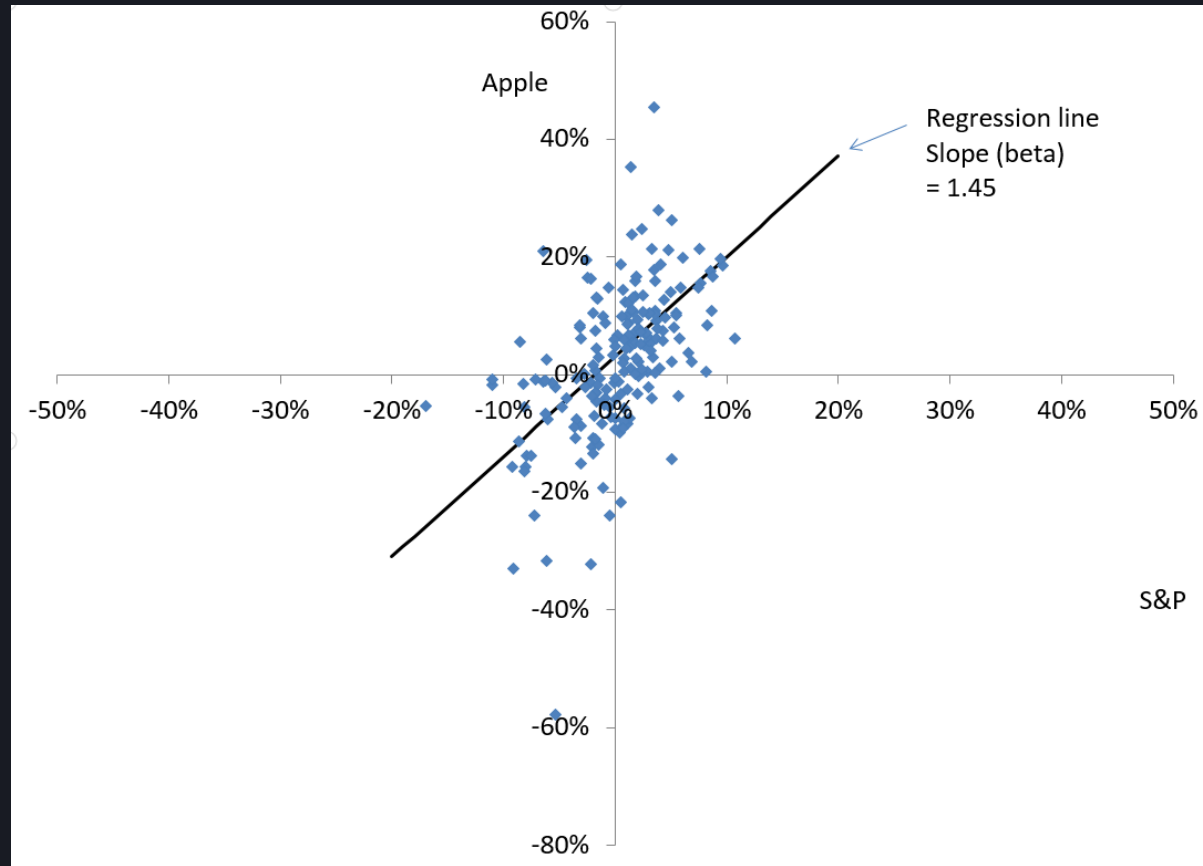
Beta

- The CAPM implies that the expected return on the ith asset is determined from its beta

- Beta (β_i) is the regression slope coefficient when the return on the ith asset is regressed on the return on the market

- Fundamental equation of the CAPM:

$$r_i = r_f + \beta_i(r_m - r_f)$$

Market Risk versus Idiosyncratic Risk

- By construction, the residuals of error terms in a regression are uncorrelated with the fitted or predicted value

- So, the variance of the return of a stock is equal to its beta squared times the variance of the market return (systematic risk) plus the variance of the residual in the regression (idiosyncratic risk)