Lecture 2: Risk and Financial Crises

Economics 252, Spring 2011

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Return

- $Return_t = \frac{Price_{t+1} - Price_t + Dividend_t}{P_t}$
- $Gross\ Return = 1 + Return$

Expected Value, Mean, Average

$$E(x) = \mu_x = \sum_{i=1}^{\infty} prob(x = x_i)x_i$$

$$E(x) = \mu_x = \int_{-\infty}^{\infty} f(x)x\,dx$$

$$\bar{x} = \sum_{i=1}^{n} x_i / n$$

$$G(x) = \left(\prod_{i=1}^{n} x_i\right)^{1/n}$$

Variance and Standard Deviation

$$\text{var}(x) = \sum_{i=1}^{n} \text{prob}(x = x_i)(x_i - \mu_x)^2$$

$$s_x^2 = \sum_{i=1}^{n} (x_i - \bar{x})^2 / n$$

Covariance

$$\mathrm{cov}(x, y) = \sum_{i=1}^{n} (x - \bar{x})(y - \bar{y}) / n$$

Correlation

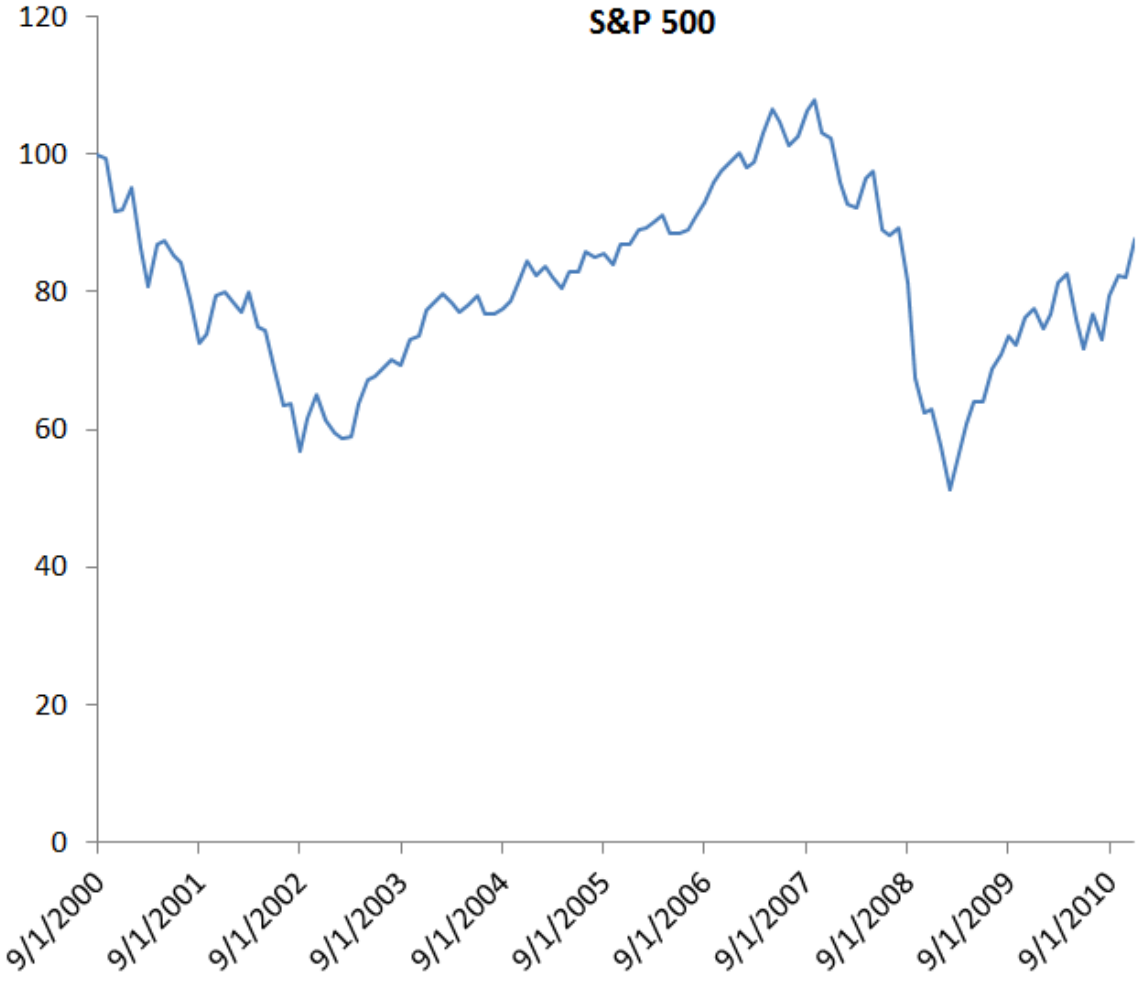
- A scaled measure of how much two variables move together
- $-1 \leq \rho \leq 1$

$$\rho = \mathrm{cov}(x, y)/(s_x s_y)$$

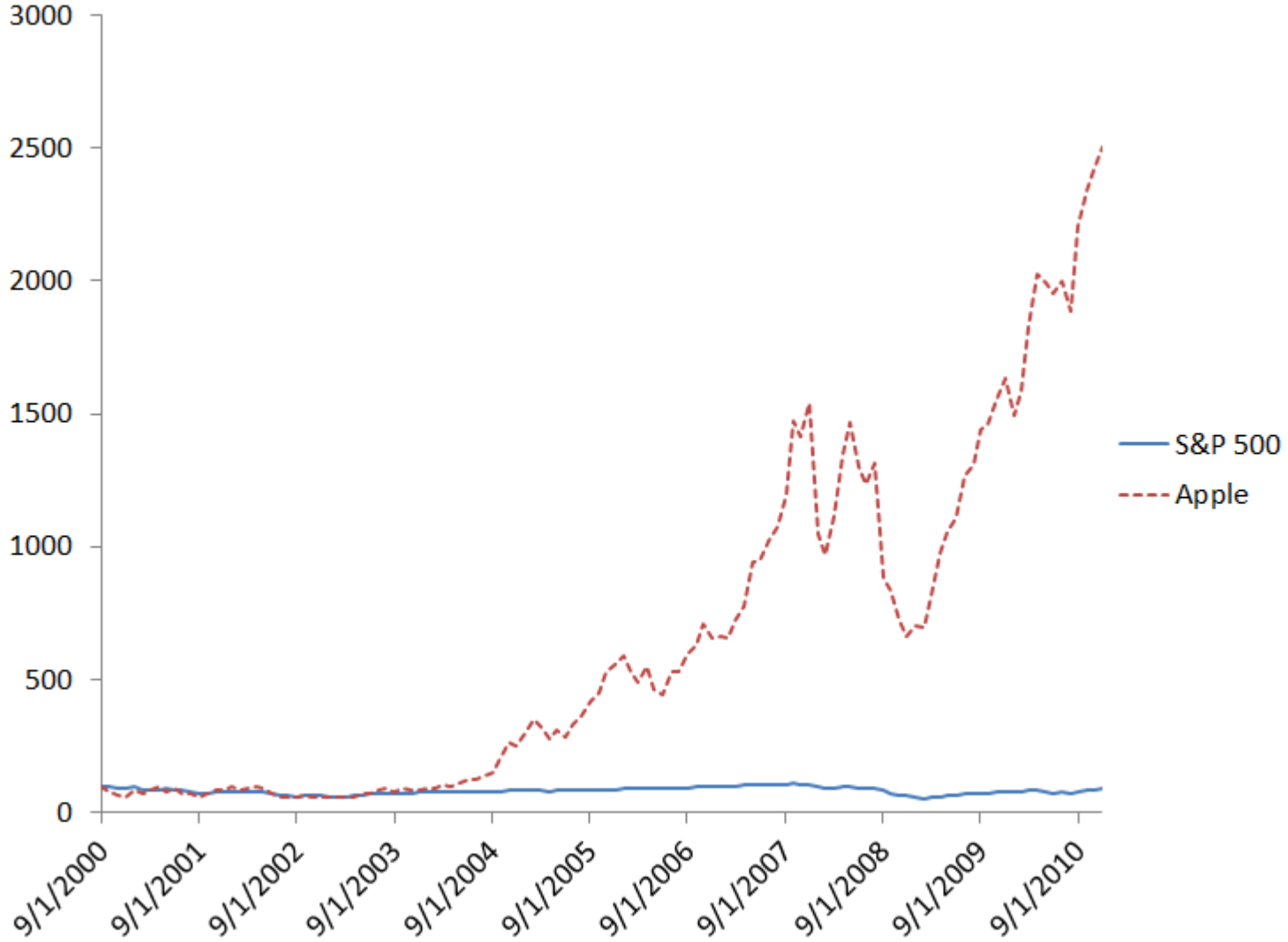
Variance of Sum

- $\mathrm{var}(x + y) = \mathrm{var}(x) + \mathrm{var}(y) + 2\mathrm{cov}(x, y)$

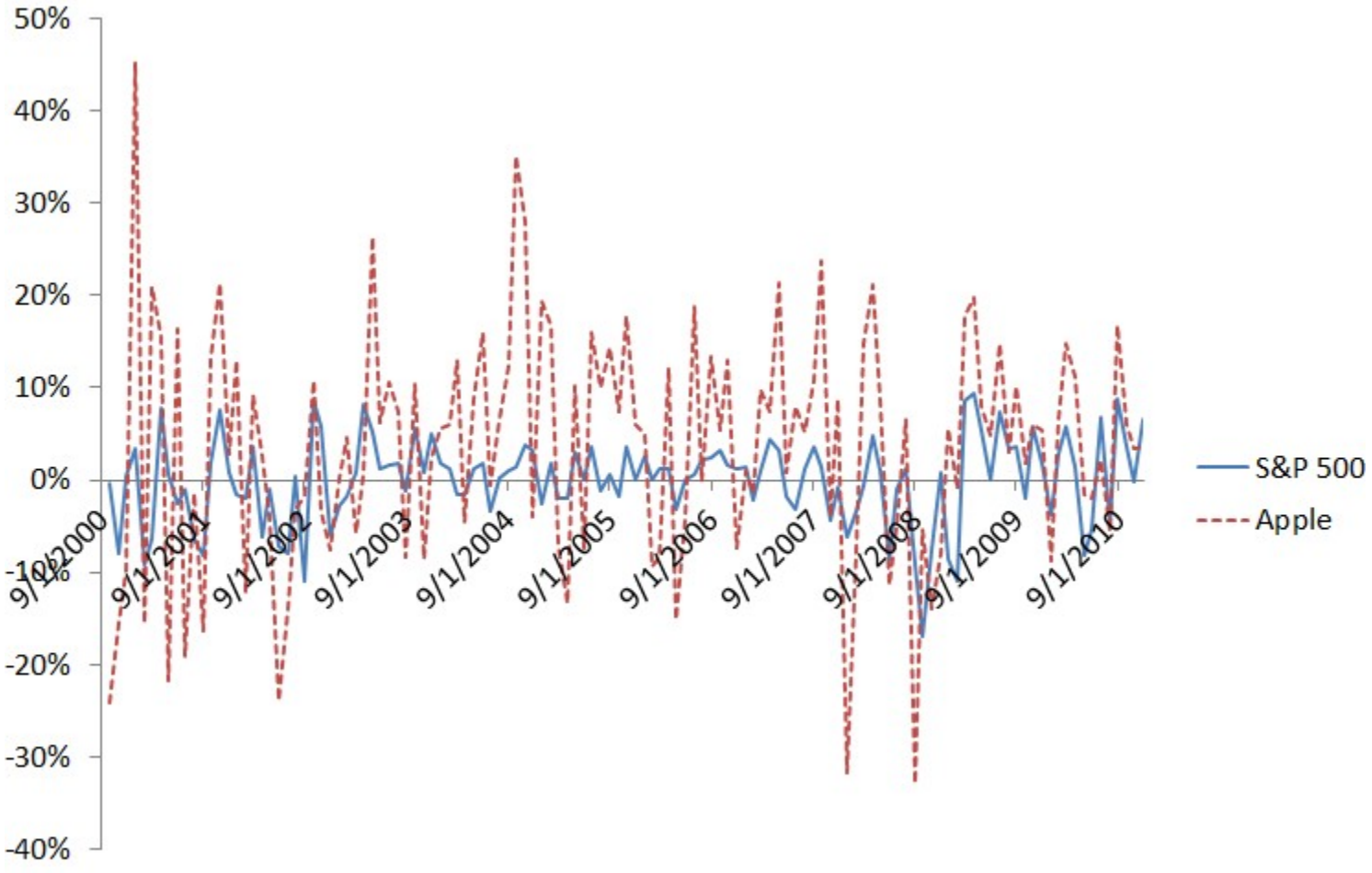
Stock Market Level, 2000-2010, 2000=100



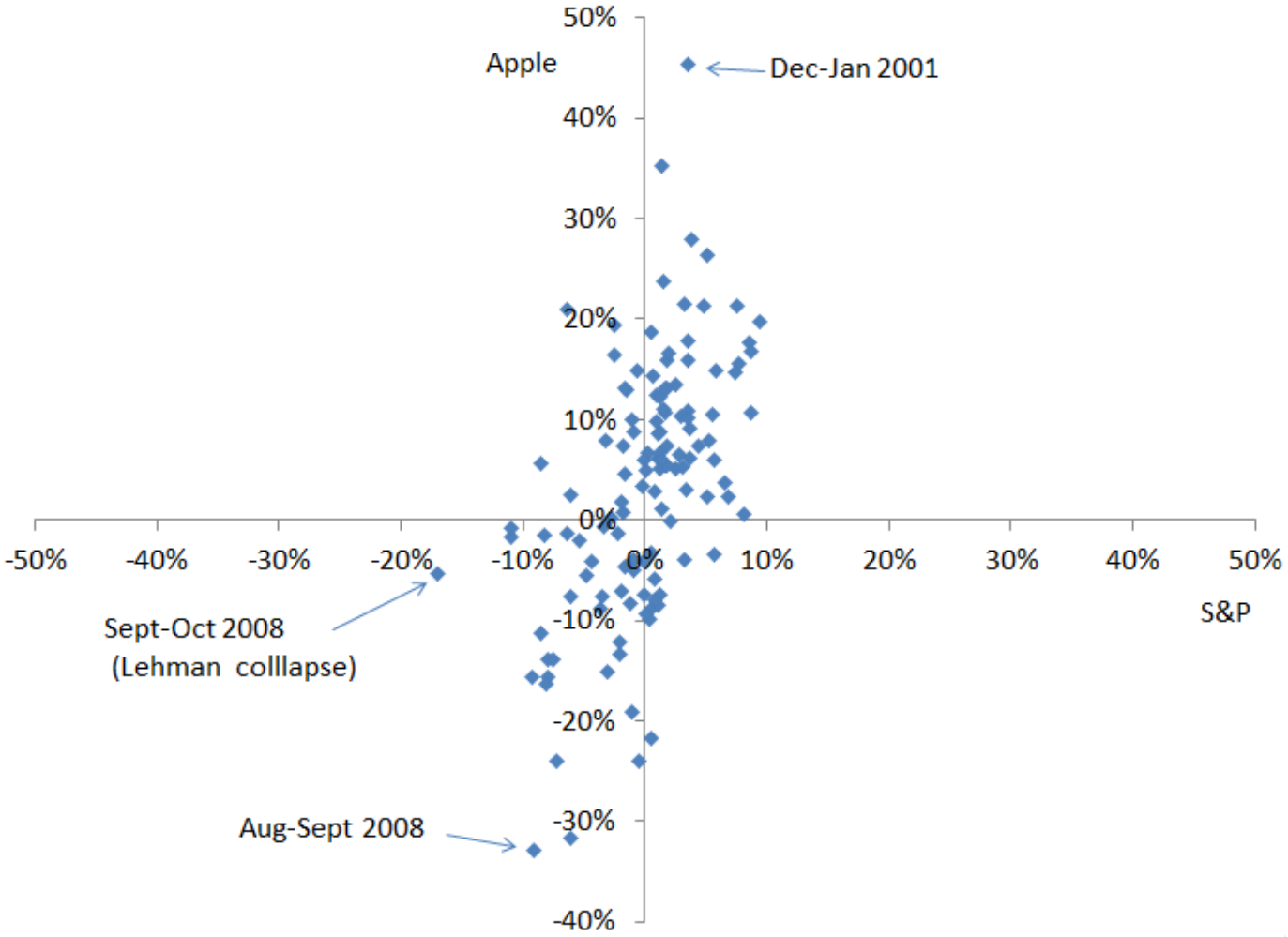
Apple, Inc. and S&P 500 Monthly Adjusted Price
First Decade of 2000s. 2000=100



Apple, Inc. and S&P 500 Monthly Returns, First Decade of 2000s



Scatter, Apple vs S&P 500



Same Scatter with Regression Line