THE MARKET PORTFOLIO

- Why has the market risk premium declined?
  - More investors participate in the stock market, driving down the risk premium
  - Financial innovations have decreased diversification costs
  - Overall volatility of the market has declined
- Consensus for the market risk premium is 4~6% over Treasury bills

THE MARKET PORTFOLIO

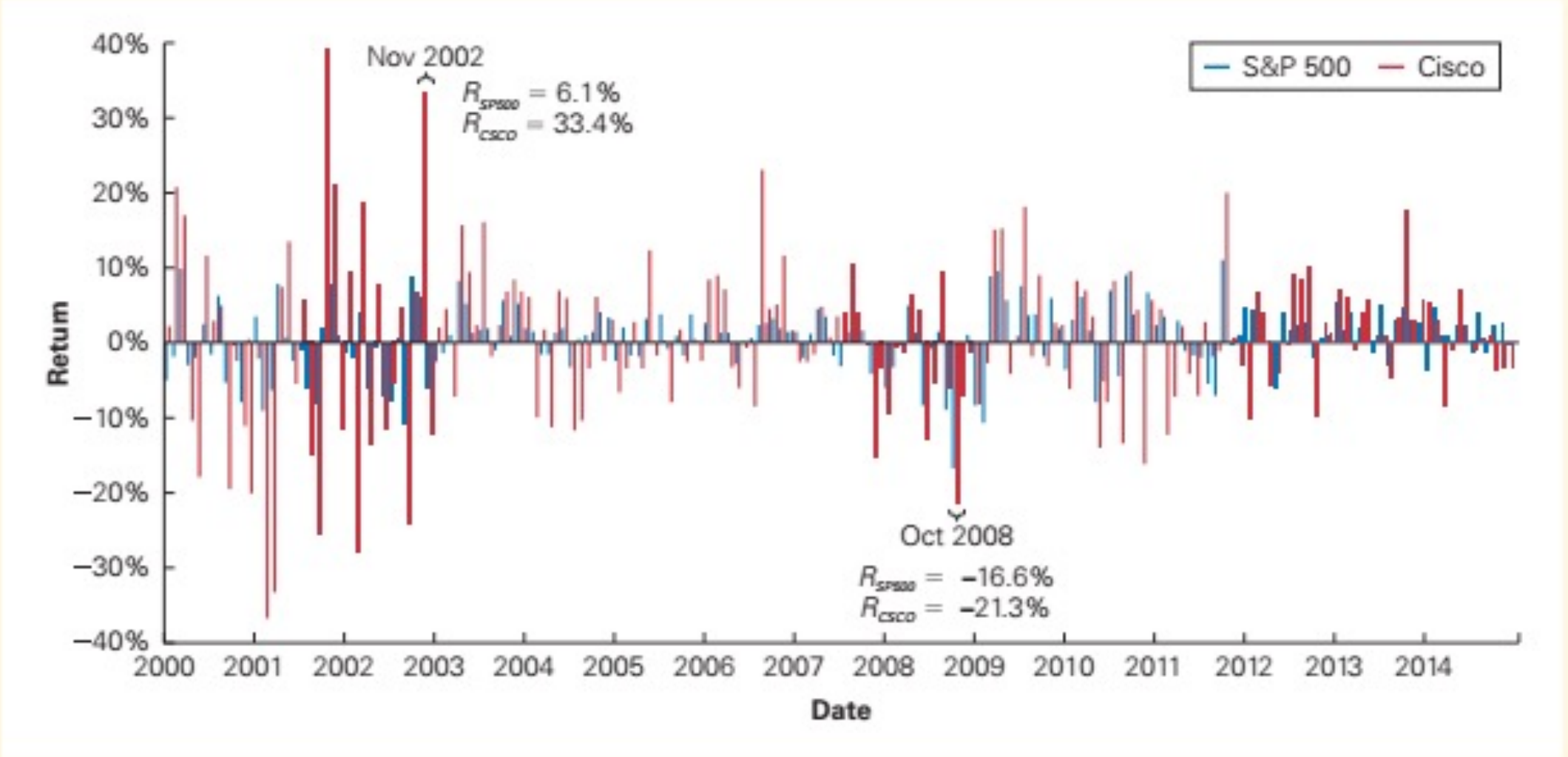
- A Fundamental Approach (free from setbacks of using historical data)
- Estimate the expected return of the market, by solving for the discount rate that is consistent with the current level of the index
- Ex) The constant expected growth model

$$r_{Mkt} = \frac{Div_1}{P_0} + g = \text{Dividend Yield} + \text{Expected Dividend Growth Rate}$$

BETA ESTIMATION

- Using Historical Returns
- We estimate beta based on the stock's historical sensitivity, which is acceptable because the beta tends to be relatively stable over time for most firms
- 2~5 years of weekly or monthly returns, using the S&P 500 as the market portfolio

FIGURE 12.1 Monthly Returns for Cisco Stock and for the S&P 500, 2000–2015



Cisco's returns tend to move in the same direction, but with greater amplitude, than those of the S&P 500.

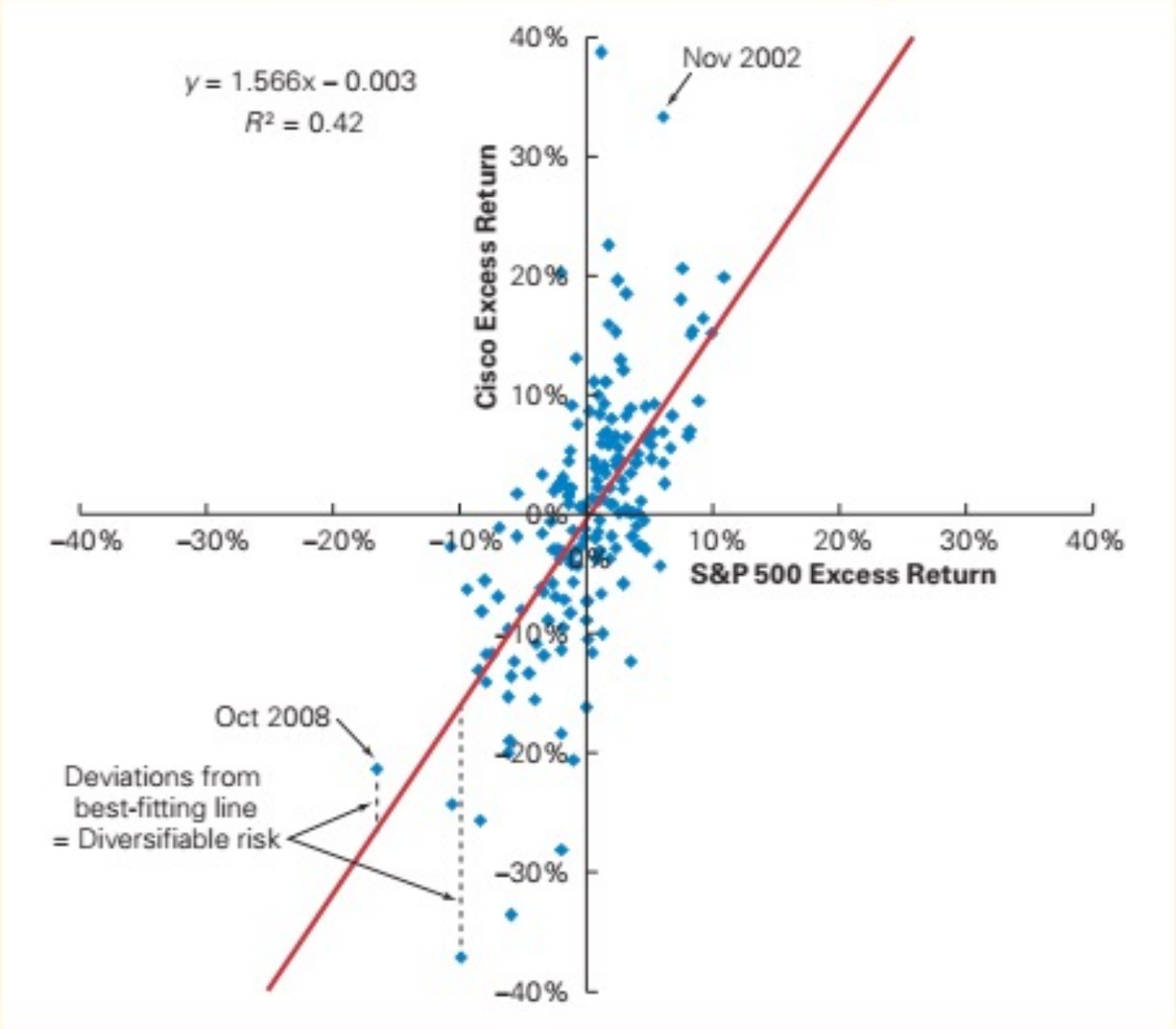
BETA ESTIMATION

- Identifying the Best-Fitting Line
- Once we plot the monthly excess returns of the S&P 500 and Cisco, we can plot the best-fitting line drawn through these points
- *Beta corresponds to the slope of the best-fitting line in the plot of the security's excess returns versus the market excess return*

FIGURE 12.2

Scatterplot of Monthly Excess Returns for Cisco Versus the S&P 500, 2000–2015

Beta corresponds to the slope of the best-fitting line. Beta measures the expected change in Cisco's excess return per 1% change in the market's excess return. Deviations from the best-fitting line correspond to diversifiable, non-market-related risk. In this case, Cisco's estimated beta is approximately 1.57.



BETA ESTIMATION

- Using Linear Regression
- The statistical technique that identifies the best-fitting line through a set of points

$$(R_i - r_f) = \alpha_i + \beta_i(R_{Mkt} - r_f) + \varepsilon_i$$

- alpha – constant, or intercept
- epsilon – error, or residual (deviation from the best-fitting line)

BETA ESTIMATION

- Using Linear Regression
- The expectation for epsilon is zero (otherwise, we could improve the fit)
- Taking expectations to both sides,

$$E[R_i] = \underbrace{r_f + \beta_i(E[R_{Mkt}] - r_f)}_{\text{Expected return for } i \text{ from the SML}} + \underbrace{\alpha_i}_{\text{Distance above / below the SML}}$$

BETA ESTIMATION

- The constant, or alpha, measures the historical performance of the security relative to the expected return predicted by the SML
- alpha is therefore a risk-adjusted measure of the stock's historical performance
- According to the CAPM, alpha should not be significantly different from zero

BETA ESTIMATION

- Given a beta of 1.57 for Cisco, and a 95% confidence interval of 1.3 to 1.8,

EXAMPLE 12.2 **Using Regression Estimates to Estimate the Equity Cost of Capital**

Problem

Suppose the risk-free interest rate is 3%, and the market risk premium is 5%. What range for Cisco's equity cost of capital is consistent with the 95% confidence interval for its beta?

Solution

Using the data from 2000 to 2015, and applying the CAPM equation, the estimated beta of 1.53 implies an equity cost of capital of $3\% + 1.57 \times 5\% = 10.85\%$ for Cisco. But our estimate is uncertain, and the 95% confidence interval for Cisco's beta of 1.3 to 1.8 gives a range for Cisco's equity cost of capital from $3\% + 1.3 \times 5\% = 9.5\%$ to $3\% + 1.8 \times 5\% = 12\%$.

THE DEBT COST OF CAPITAL

- The CAPM can be used to estimate the equity cost of capital
- What about the cost of debt – the required return by a firm's creditors?
- The debt cost of capital is useful information in itself, and also helps when estimating the cost of capital of a project