

# Stock Valuation and Risk

# Chapter Objectives

- explain methods of valuing stocks
- explain how to determine the required rate of return on stocks
- identify the factors that affect stock prices
- explain how to measure the risk of stocks

# Stock Valuation Methods

- The Price-Earnings (PE) Method applies the mean price-earnings (PE) ratio based on expected earnings of all traded competitors to the firm's expected earnings for the next year
- Valuation = Expected earnings per share x  
Mean industry PE ratio
- Assumes future earnings are an important determinant of a firm's value
- Assumes that the growth in earnings in future years will be similar to that of the industry

# Stock Valuation Methods

- Price-Earnings Method (cont.)
- Reasons for Different Valuations
  - Investors may use different forecasts for the firm's earnings or the mean industry earnings over the next year
  - Investors disagree on the proper measure of earnings.
- Limitations of the PE Method –
  - May result in an inaccurate valuation of a firm if errors are made in forecasting the firm's future earnings or in choosing the industry composite used to derive the PE ratio.

# Dividend Discount Model

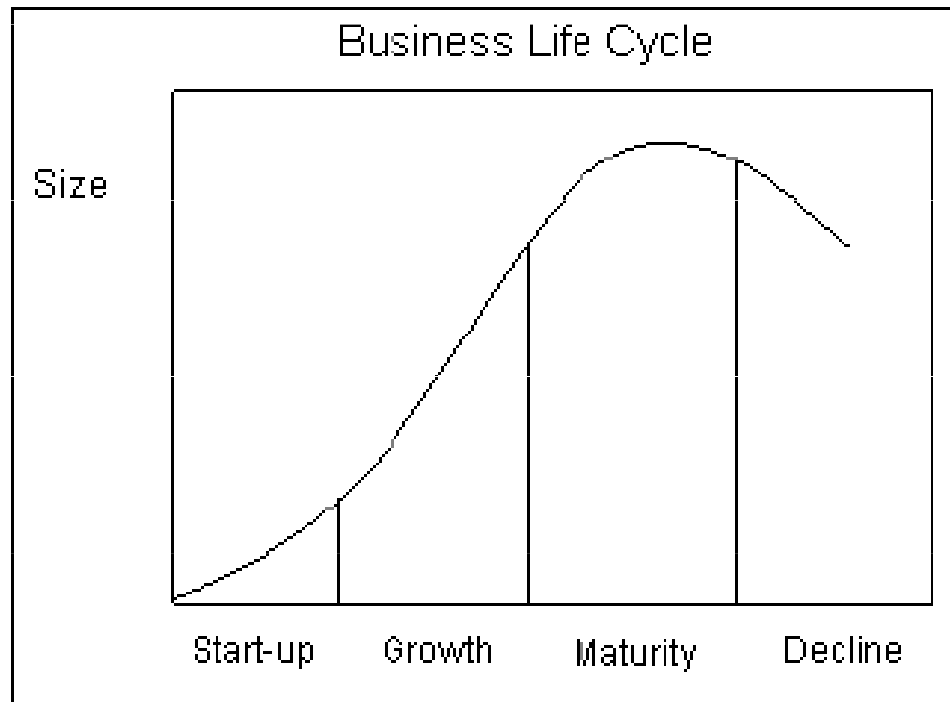
$$P = \sum_{t=1}^{\infty} \frac{D_t}{(1+k)^t}$$

where  $t$  = period

$D_t$  = dividend in period  $t$

$k$  = discount rate

# Business Life Cycle and Dividend Policy



# Stock Valuation Methods

- Dividend Discount Model (cont.)
- Relationship with PE Ratio for Valuing
- Limitations of the Dividend Discount Model
  - Errors can be made in determining the dividend to be paid, the growth rate, and the required rate of return
  - Errors are more pronounced for firms that retain most of their earnings.

# Stock Valuation Methods

- Free Cash Flow Model
- For firms that do not pay dividends:
  - estimate the free cash flows that will result from operations.
  - FCFF (discount factor WACC) – value of the firm
  - FCFE (discount factor  $k$  – required rate of return/ costs of equity capital) – value of the equity capital
- Limitations - difficulty of obtaining an accurate estimate of free cash flow per period.



# Free Cash Flow to the Firm

- $FCFF = CFO + [Int \times (1 - \text{tax rate})] - FCInv$

Where:

CFO = Cash Flow from Operations

Int = Interest Expense

FCInv = Fixed Capital Investment (total capital expenditures)

# Free Cash Flow to the Firm (for firm's that follow IFRS)

- $FCFF = NI + NCC + [Int \times (1 - \text{tax rate})] - FCInv - WCInv$

Where:

NI = Net Income

NCC = Non-cash Charges (depreciation and amortization)

Int = Interest Expense

FCInv = Fixed Capital Investment (total capital expenditures)

WCInv = Working Capital Investments (Change in Net working Capital)

# Free Cash Flow to Equity

- $FCFE = FCFF - [Int \times (1 - \text{tax rate})] + \text{Net Borrowing}$
- $FCFE = \text{Net Income} - \text{Net Capital Expenditure} - \text{Change in Net Working Capital} + \text{New Debt} - \text{Debt Repayment}$

# Required Rate of Return on Stocks

- Capital Asset Pricing Model
- Sometimes used to estimate the required rate of return for any firm with publicly traded stock.
- The only important risk of a firm is systematic risk.
- Suggests that the return of a stock ( $R_j$ ) is influenced by the prevailing risk-free rate ( $R_f$ ), the market return ( $R_m$ ), and the beta ( $B_j$ ):

$$R_j = R_f + B_j(R_m - R_f)$$

where  $B_j$  is measured as the covariance between  $R_j$  and  $R_m$ , which reflects the asset's sensitivity to general stock market movements.

# Required Rate of Return on Stocks



















- Capital Asset Pricing Model (Cont.)
- Estimating the Market Risk Premium
  - The yield on newly issued Treasury bonds is commonly used as a proxy for the risk-free rate.
  - The term,  $(R_m - R_f)$ , is the market risk premium: the return of the market in excess of the risk-free rate.
  - Historical data for 30 or more years can be used to determine the average market risk premium over time.
- Estimating the Firm's Beta - typically measured by applying regression analysis to determine the sensitivity of the asset's return to the market return based on monthly or quarterly data.

# Country Risk Premium

<HELP> for explanation.  
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9) Output to Excel Country Risk Premium

Date 09/04/14 Region Global 9) Customize

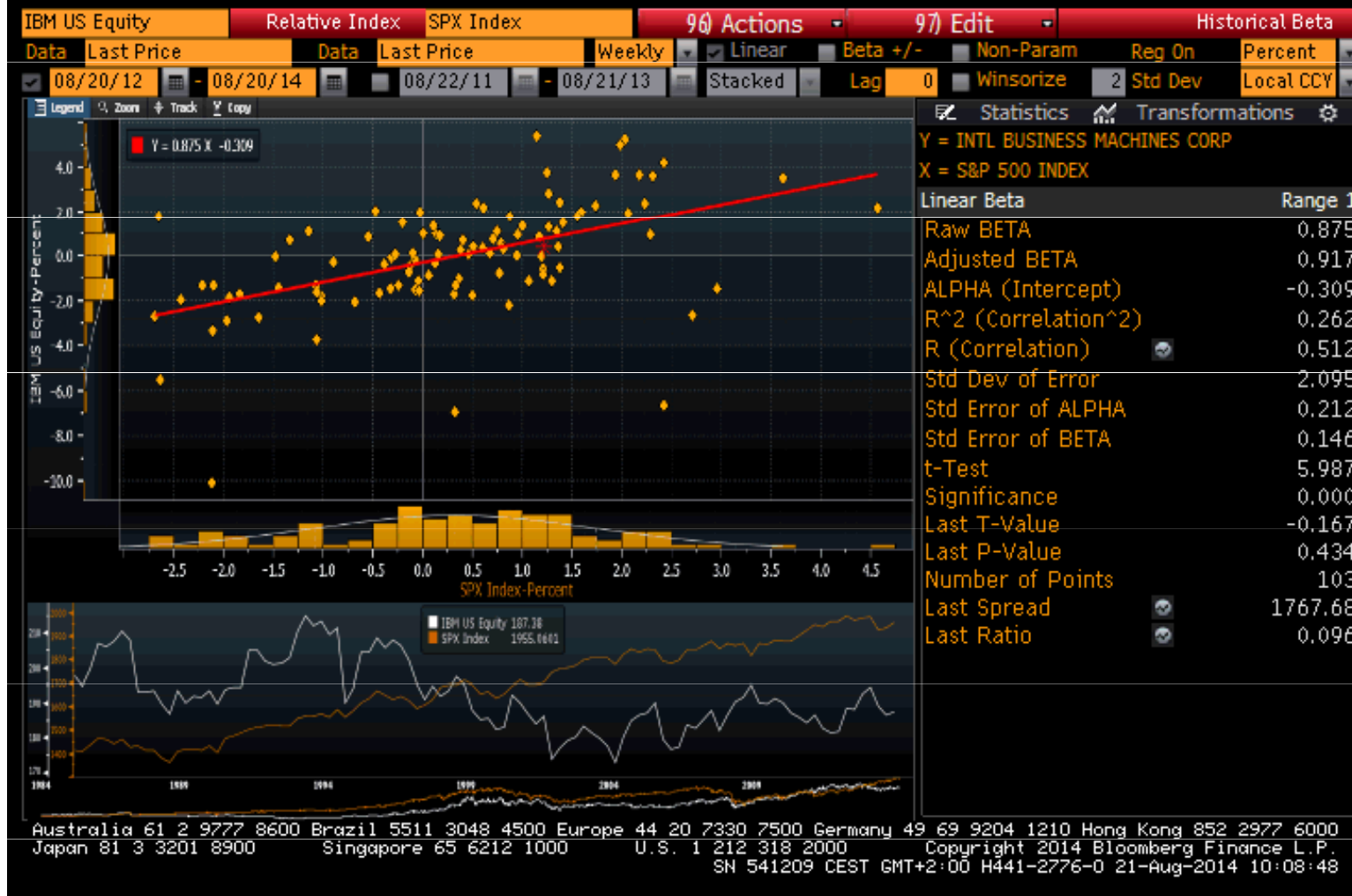
	Country	Curr	Div Yld	Grwth Rate	Div Pay Ratio	Mkt Return	RF Rate ↓	Premium
1)	 Switzerland (CRP CH)	CHF	2.832%	6.895%	55.043%	8.646%	0.513%	8.133%
2)	 Japan (CRP JP)	JPY	1.524%	11.785%	27.217%	10.793%	0.535%	10.258%
3)	 Germany (CRP DE)	EUR	2.628%	8.706%	37.362%	10.095%	0.970%	9.125%
4)	 Slovenia (CRP SI)	EUR	4.128%	9.038%	46.828%	11.209%	0.970%	10.239%
5)	 Eurozone (CRP EU)	EUR	2.849%	12.065%	47.193%	11.223%	0.970%	10.253%
6)	 Finland (CRP FI)	EUR	4.127%	14.610%	69.071%	13.520%	1.117%	12.403%
7)	 Netherlands (CRP NL)	EUR	2.925%	9.170%	46.359%	9.746%	1.122%	8.624%
8)	 Austria (CRP AT)	EUR	2.710%	23.069%	46.784%	17.960%	1.204%	16.756%
9)	 Denmark (CRP DK)	DKK	2.032%	12.854%	43.028%	10.866%	1.240%	9.626%
10)	 Czech (CRP CZ)	CZK	4.471%	8.302%	68.334%	11.721%	1.240%	10.481%
11)	 Belgium (CRP BE)	EUR	3.439%	8.823%	56.433%	9.506%	1.271%	8.235%
12)	 France (CRP FR)	EUR	2.977%	9.143%	47.834%	10.446%	1.304%	9.142%
13)	 Sweden (CRP SE)	SEK	3.568%	8.247%	64.811%	9.967%	1.475%	8.492%
14)	 Taiwan (CRP Tw)	TwD	3.040%	14.910%	30.128%	13.536%	1.617%	11.919%
15)	 Ireland (CRP IE)	EUR	1.494%	10.325%	30.875%	12.742%	1.747%	10.995%
16)	 Hong Kong (CRP HK)	HKD	3.537%	9.846%	38.462%	11.974%	1.871%	10.103%
17)	 Italy (CRP IT)	EUR	2.656%	12.695%	53.668%	12.633%	1.908%	10.725%
18)	 Romania (CRP RO)	RON	5.139%	9.297%	39.024%	14.237%	1.934%	12.303%

Data is updated daily. Click on a row to see historical data

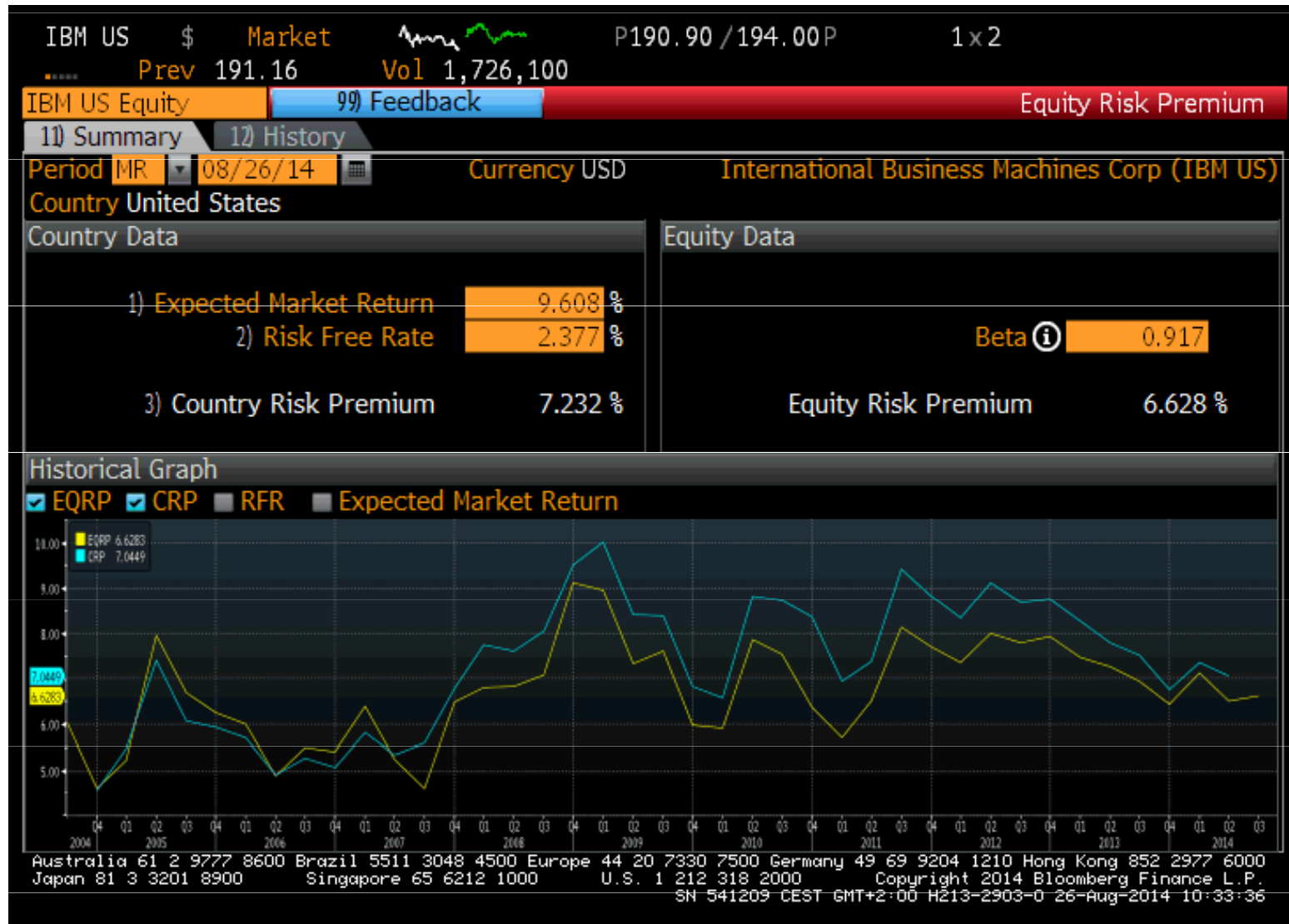
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 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2014 Bloomberg Finance L.P.  
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# Firm's Beta

<HELP> for explanation, <MENU> for similar functions.



# Equity Risk Premium





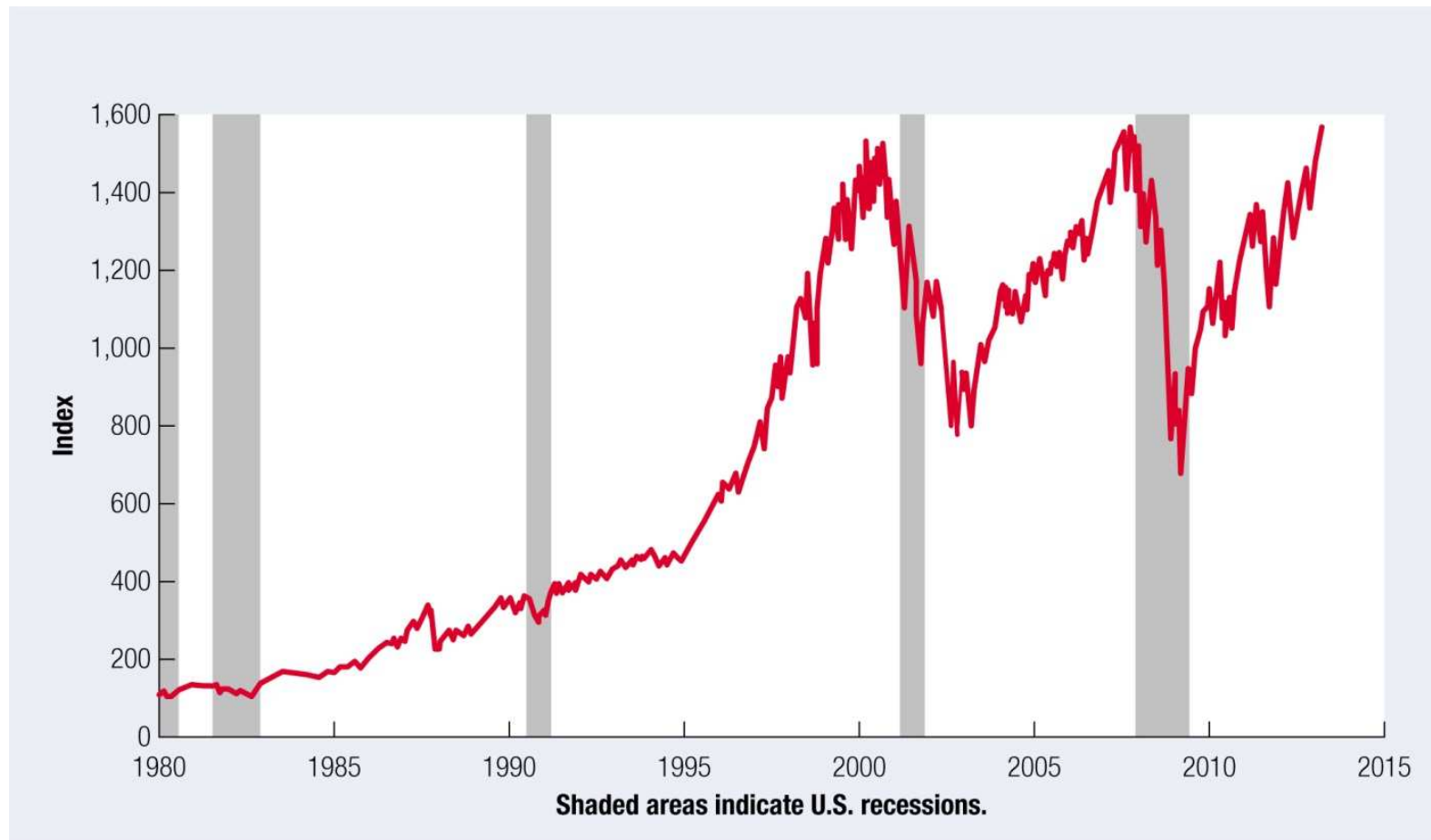
# Required Rate of Return on Stocks

- Capital Asset Pricing Model (Cont.)
- Application of the CAPM
  - Given the risk-free rate as well as estimates of the firm's beta and the market risk premium, it is possible to estimate the required rate of return from investing in the firm's stock.
  - At any given time, the required rates of return estimated by the CAPM will vary across stocks because of differences in their risk premiums, which are due to differences in their systematic risk (as measured by beta).

# Factors that Affect Stock Prices

- Economic Factors
- Impact of Economic Growth (Exhibit 11.1)
  - An increase in economic growth is expected to increase the demand for products and services produced by firms and thereby increase a firm's cash flows and valuation.
- Impact of Interest Rates
  - Given a choice of risk-free Treasury securities or stocks, investors should purchase stocks only if they are appropriately priced to reflect a sufficiently high expected return above the risk-free rate.
  - Interest rates commonly rise in response to an increase in economic growth.

# Exhibit 11.1 Stock Market Trend Based on the S&P 500 Index



# Factors that Affect Stock Prices

- Market-Related Factors
- Investor Sentiment
  - Represents the general mood of investors in the stock market.
- January Effect
  - Portfolio managers prefer investing in riskier, small stocks at the beginning of the year and then shifting to larger, more stable companies near the end of the year in order to lock in their gains.
  - This tendency places upward pressure on small stocks in January each year

# Factors that Affect Stock Prices

- Firm-Specific Factors
- Change in Dividend Policy
  - An increase in dividends may reflect the firm's expectation that it can more easily afford to pay dividends.
- Earnings Surprises
  - When a firm's announced earnings are higher than expected, some investors raise their estimates of the firm's future cash flows and hence revalue its stock upward.

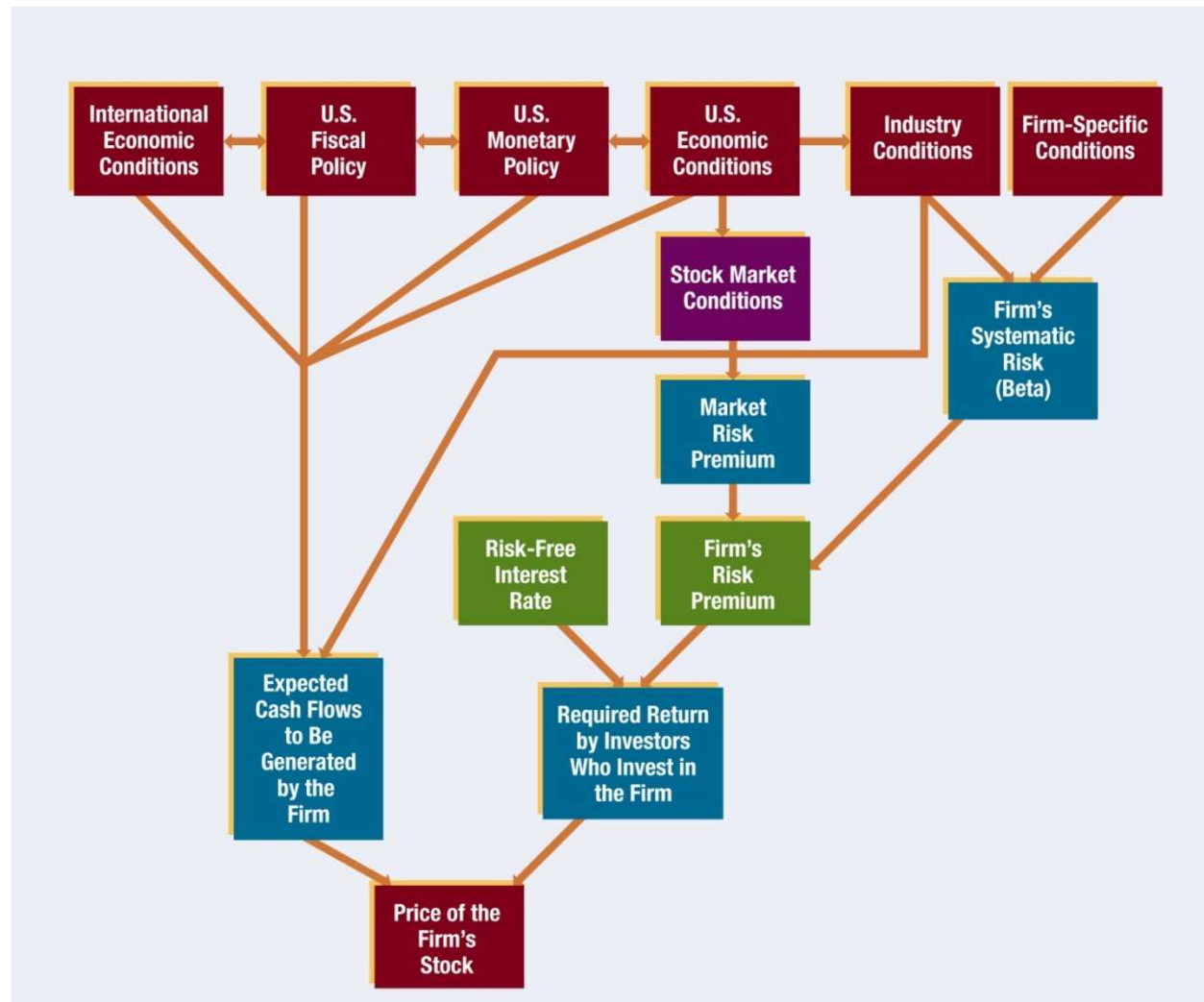
# Factors that Affect Stock Prices

- Firm-Specific Factors (Cont.)
- Acquisitions
  - The expected acquisition of a firm typically results in an increased demand for the target's stock, which raises its price.
- Expectations
  - Attempting to anticipate new policies so that they can make their move in the market before other investors.

# Factors that Affect Stock Prices

- Integration of Factors Affecting Stock Prices
  - Whenever indicators signal the expectation of higher interest rates, there is upward pressure on the required return by investors and downward pressure on a firm's value.  
(Exhibit 11.2)

# Exhibit 11.2 Framework for Explaining Changes in a Firm's Stock Price over Time





# Stock Risk

- The return from investing in stock over a particular period is measured as

$$R = \frac{(SP - INV) + D}{INV}$$

where  $INV$  = initial investment

$D$  = dividend

$SP$  = selling price of the stock

- The risk of a stock can be measured by using its price volatility, its beta, and the value-at-risk method.

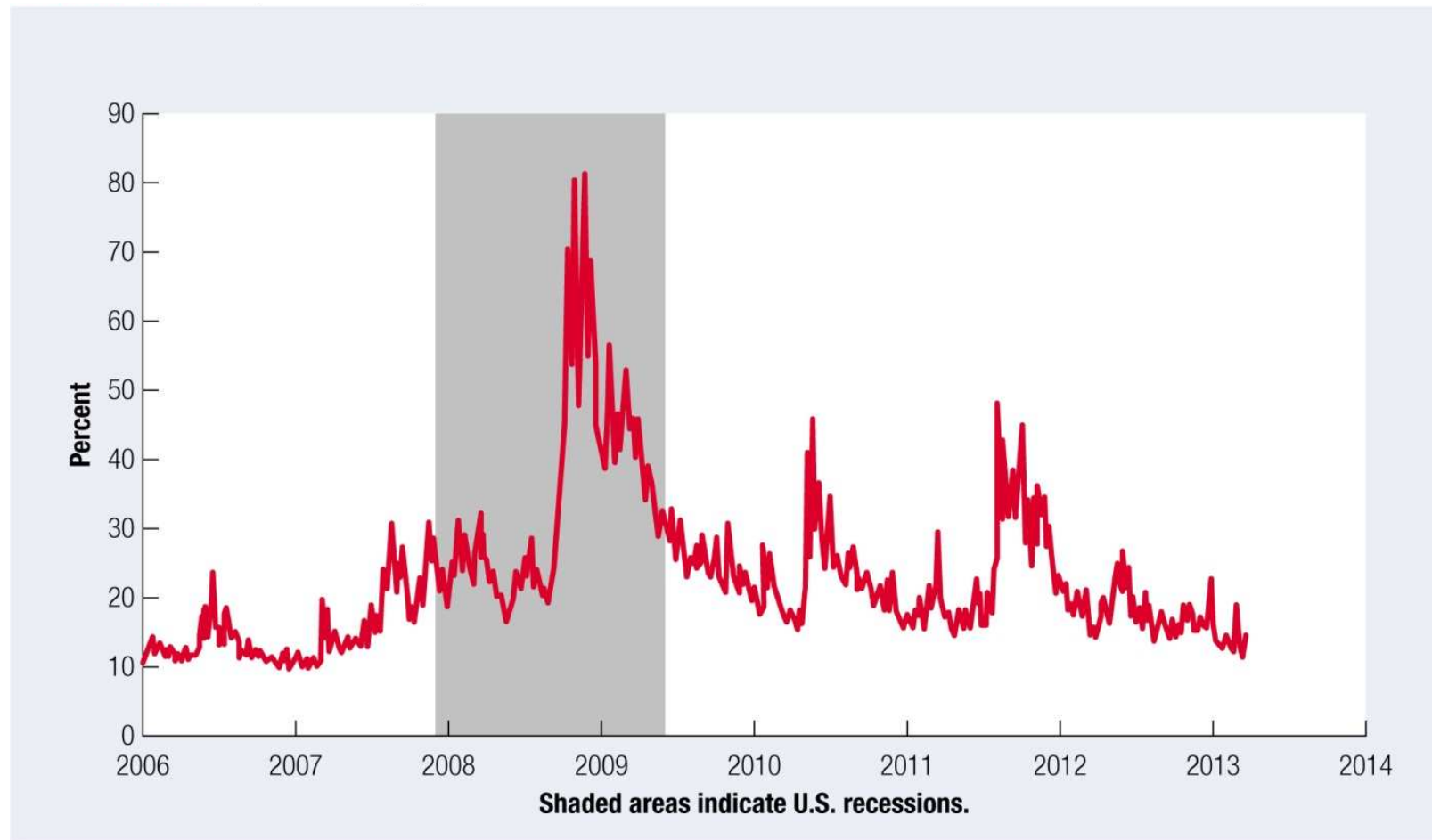
# Stock Risk

- Volatility of a Stock or total risk serves as a measure of risk because it may indicate the degree of uncertainty surrounding the stock's future returns.
- Using Standard Deviation to forecast Stock Price Volatility
  - Using the historical method: a historical period is used to derive a stock's standard deviation of returns, and that estimate is then used as the forecast over the future.
- Using Implied Volatility to Forecast Stock Price Volatility
  - Derive a stock's implied standard deviation from a stock option pricing model.

# Stock Risk

- Volatility of a Stock (cont.)
- Forecasting Stock Price Volatility of the Stock Market
  - Monitor the volatility index (VIX) derived from stock options on the S&P 500 stock at a given point in time.
  - The VIX measures investors' expectation of the stock market volatility over the next 30 days. (Exhibit 11.3)

# Exhibit 11.3 Implied Volatility Index for U.S. Stocks over Time



# Stock Risk

- Volatility of a Stock (Cont.)
  - Volatility of a Stock Portfolio - The portfolio's volatility can be measured by the standard deviation:

$$\sigma_p = \sqrt{w_i^2 \sigma_i^2 + w_j^2 \sigma_j^2 + \sum_{i=1}^n \sum_{j=1}^n w_i w_j \sigma_i \sigma_j CORR_{ij}}$$

*where*

$\sigma_i$  = standard deviation of returns of the  $i$ th stock

$\sigma_j$  = standard deviation of returns of the  $j$ th stock

$CORR_{ij}$  = correlation coefficient between the  $i$ th and  $j$ th stocks

$w_i$  = proportion of funds invested in the  $i$ th stock

$w_j$  = proportion of funds invested in the  $j$ th stock

# Stock Risk

- Beta of a Stock - measures the sensitivity of its returns to market (Exhibit 11.4)
- Beta of a Stock Portfolio can be measured as the weighted average of the betas of stocks that make up the portfolio

$$\beta_p = \sum w_i \beta_i$$

- High-beta stocks are expected to be relatively volatile because they are more sensitive to market returns over time. Likewise, low-beta stocks are expected to be less volatile because they are less responsive to market returns.

# Stock Risk

- Value at Risk
- Estimates the largest expected loss to a particular investment position for a specified confidence level.
- Is intended to warn investors about the potential maximum loss that could occur
- Is commonly used to estimate the risk of a portfolio
  - Monte Carlo Simulation
  - Riskmetrics JP Morgan
  - (confidence level: 95% (99%), time frame: 1 day, loss amount (or percentage) )

# Risk-Adjusted Stock Performance

- Sharpe Index
- The reward-to-variability ratio, or Sharpe Index, measures risk-adjusted returns when total variability is the most appropriate measure of risk.

$$\text{Sharpe Index} = \frac{\overline{R} - \overline{R}_f}{\sigma}$$

where  $\overline{R}$  = average return on the stock

$\overline{R}_f$  = average risk - free rate

$\sigma$  = standard deviation of the stock's return

- This index measures the excess return above the risk-free rate per unit of risk.



# Risk-Adjusted Stock Performance

## Treynor Index

The Treynor Index measures risk-adjusted returns when **beta** is the most appropriate measure of risk.

$$\text{Treynor Index} = \frac{\overline{R} - \overline{R}_f}{\beta}$$

where  $\overline{R}$  = average return on the stock

$\overline{R}_f$  = average risk - free rate

$\beta$  = stock's beta

Thank you for your attention