Lecture 8

Capital Market Theory: An Overview

Capital Market Theory: An Overview

Returns

Holding-Period Returns

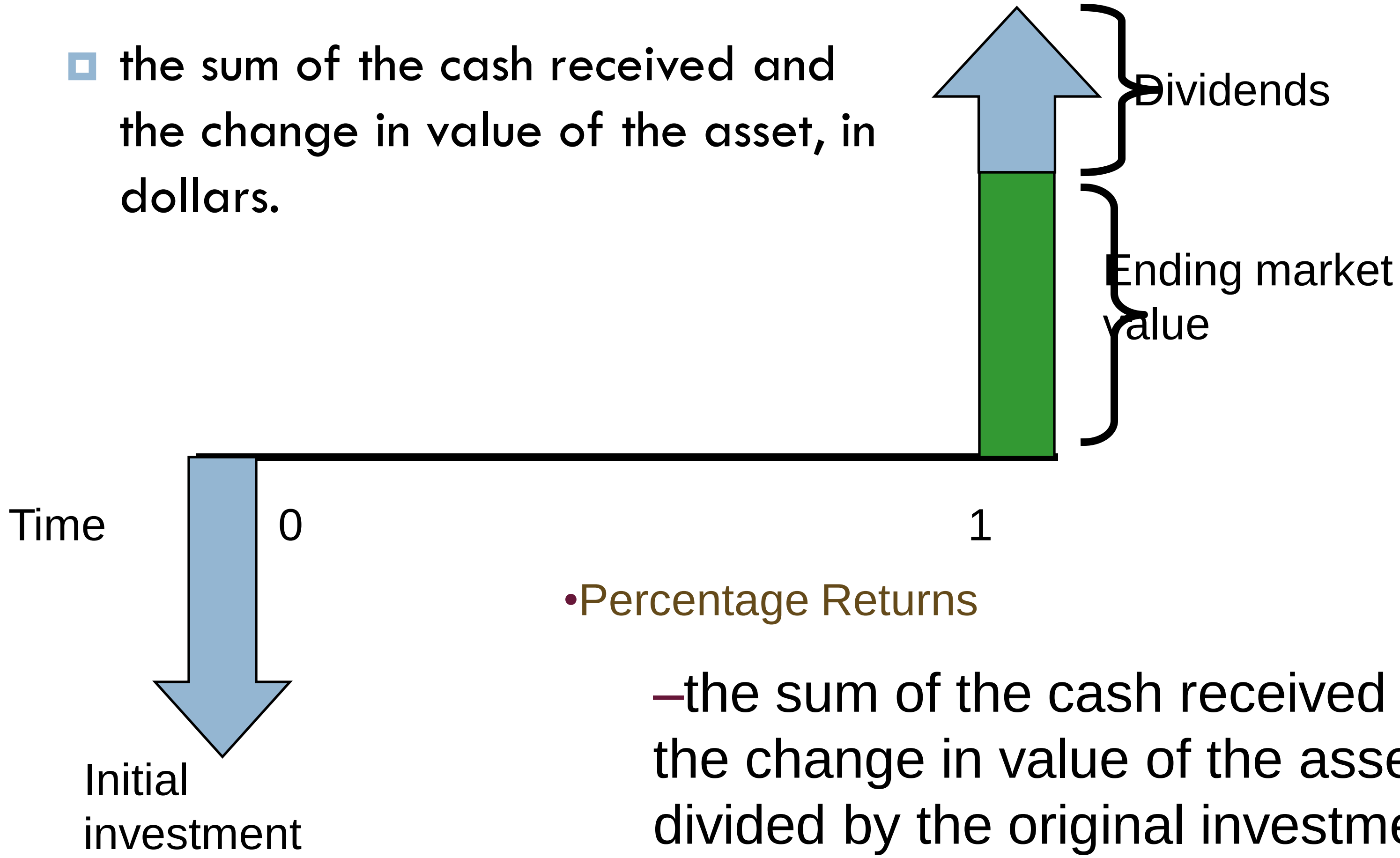
Return Statistics

Average Stock Returns and Risk-Free Returns

Risk Statistics

Returns

- Dollar Returns
  - the sum of the cash received and the change in value of the asset, in dollars.



- Percentage Returns
  - the sum of the cash received and the change in value of the asset divided by the original investment.

Returns

Dollar Return = Dividend + Change in Market Value

$$\text{percentage return} = \frac{\text{dollar return}}{\text{beginning market value}}$$

$$= \frac{\text{dividend} + \text{change in market value}}{\text{beginning market value}}$$

$$= \text{dividend yield} + \text{capital gains yield}$$

Returns: Example

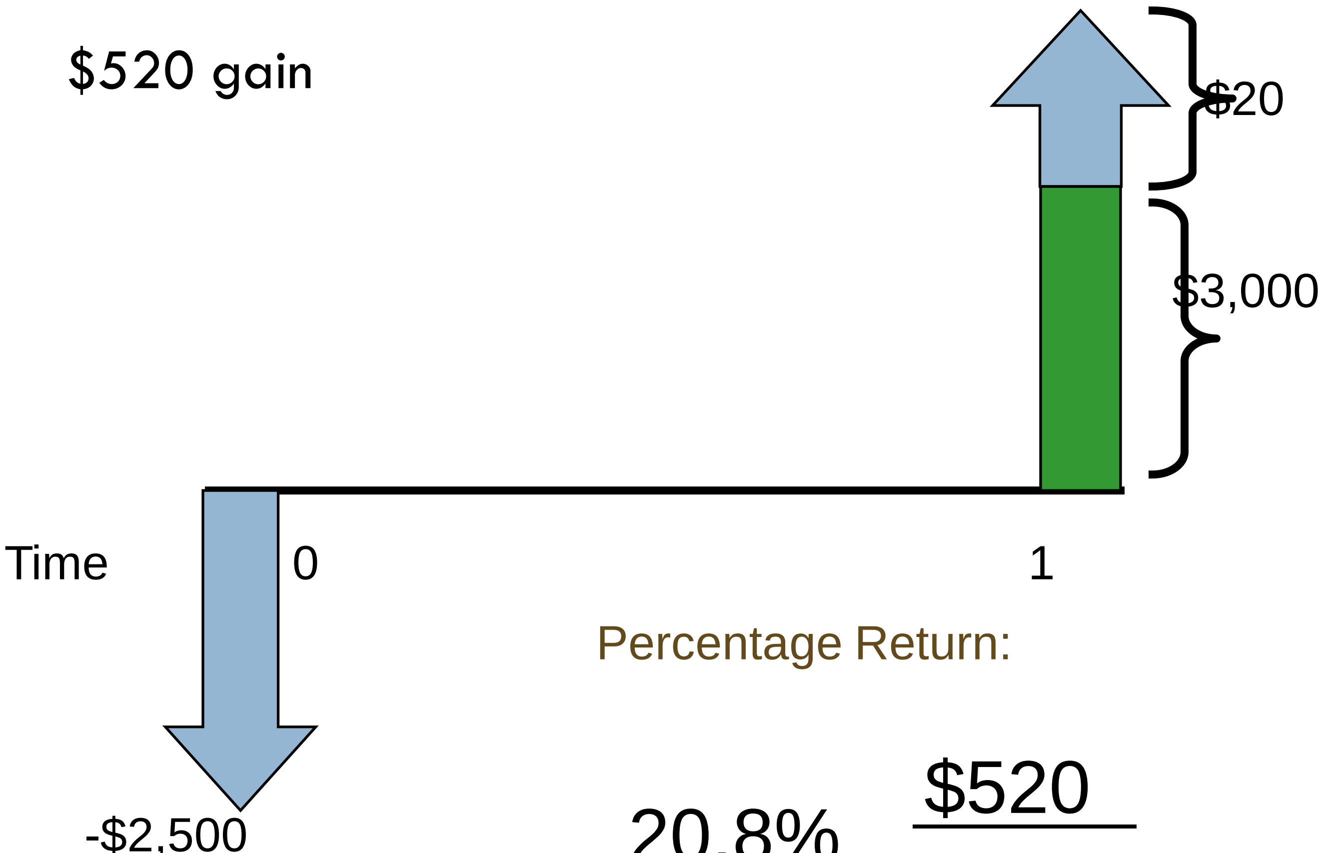
- Suppose you bought 100 shares of Wal-Mart (WMT) one year ago today at \$25. Over the last year, you received \$20 in dividends (= 20 cents per share × 100 shares). At the end of the year, the stock sells for \$30. How did you do?
- Quite well. You invested \$25 × 100 = \$2,500. At the end of the year, you have stock worth \$3,000 and cash dividends of \$20. Your dollar gain was \$520 = \$20 + (\$3,000 – \$2,500).
- Your percentage gain for the year is

$$20.8\% = \frac{\$520}{\$2{,}500}$$

Returns: Example

Dollar Return:

$520 gain



Percentage Return:

$$20.8\% = \frac{\$520}{\$2{,}500}$$

9.2 Holding-Period Returns

- The holding period return is the return that an investor would get when holding an investment over a period of *n* years, when the return during year *i* is given as r_i:

$$\text{holding period return} =$$
$$= (1 + r_1) \times (1 + r_2) \times \cdots \times (1 + r_n) - 1$$

Holding Period Return: Example

- Suppose your investment provides the following returns over a four-year period:

Year	*Return*
1	10%
2	-5%
3	20%
4	15%

Your holding period return =

$$= (1+r_1)\times(1+r_2)\times(1+r_3)\times(1+r_4)-1$$

$$= (1.10)\times(.95)\times(1.20)\times(1.15)-1$$

$$= .4421 = 44.21\%$$

Holding Period Return: Example

- An investor who held this investment would have actually realized an annual return of 9.58%:

Year	*Return*
1	10%
2	-5%
3	20%
4	15%

Geometric average return =

$$(1+r_g)^4 = (1+r_1)\times(1+r_2)\times(1+r_3)\times(1+r_4)$$

$$r_g = \sqrt[4]{(1.10)\times(.95)\times(1.20)\times(1.15)} - 1$$

$$= .095844 = 9.58\%$$

- So, our investor made 9.58% on his money for four years, realizing a holding period return of 44.21%

$$1.4421 = (1.095844)^4$$

Holding Period Return: Example

- Note that the geometric average is not the same thing as the arithmetic average:

Year	*Return*
1	10%
2	-5%
3	20%
4	15%

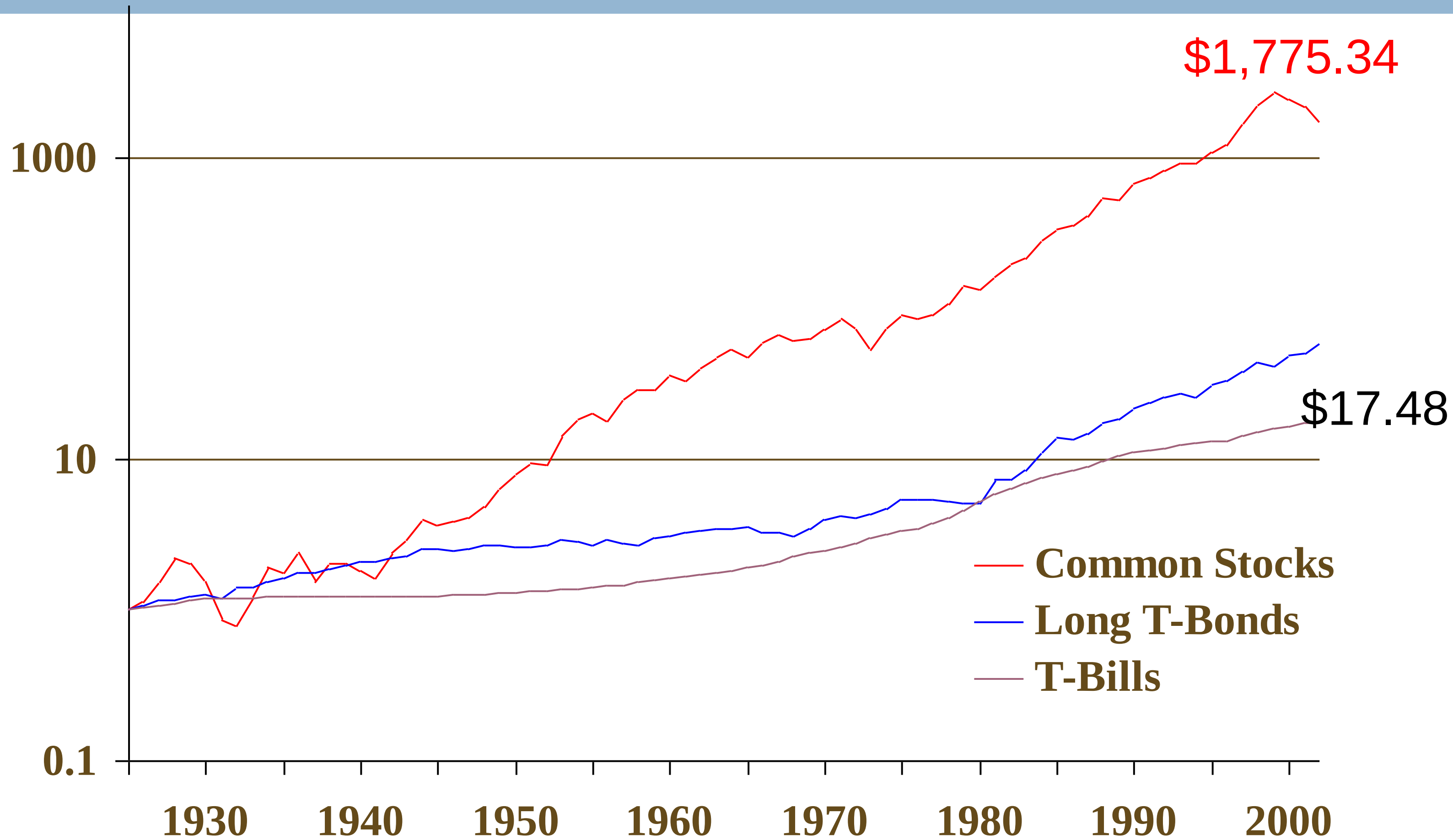
$$\text{Arithmetic average return} = \frac{r_1 + r_2 + r_3 + r_4}{4}$$

$$= \frac{10\% - 5\% + 20\% + 15\%}{4} = 10\%$$

Holding Period Returns

- A famous set of studies dealing with the rates of returns on common stocks, bonds, and Treasury bills was conducted by Roger Ibbotson and Rex Sinquefield.
- They present year-by-year historical rates of return starting in 1926 for the following five important types of financial instruments in the United States:
  - Large-Company Common Stocks
  - Small-company Common Stocks
  - Long-Term Corporate Bonds
  - Long-Term U.S. Government Bonds

The Future Value of an Investment of $1 in 1925



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Return Statistics

- The history of capital market returns can be summarized by describing the
  - average return

$$\overline{R} = \frac{(R_1 + \cdots + R_T)}{T}$$

  - the standard deviation of those returns

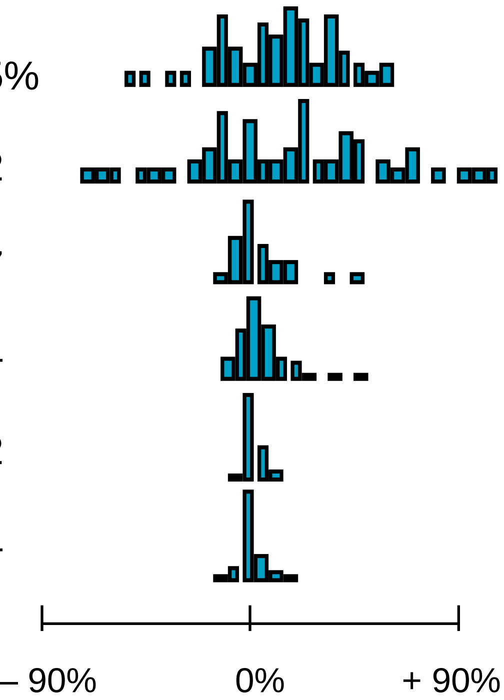
$$SD = \sqrt{VAR} = \sqrt{\frac{(R_1 - \overline{R})^2 + (R_2 - \overline{R})^2 + \cdots (R_T - \overline{R})^2}{T - 1}}$$

  - the frequency distribution of the returns.

Historical Returns, 1926-2002

Series	Average Annual Return	Standard Deviation
Large Company Stocks	12.2%	20.5%
Small Company Stocks	16.9	33.2
Long-Term Corporate Bonds	6.2	8.7
Long-Term Government Bonds	5.8	9.4
U.S. Treasury Bills	3.8	3.2
Inflation	3.1	4.4

Distribution



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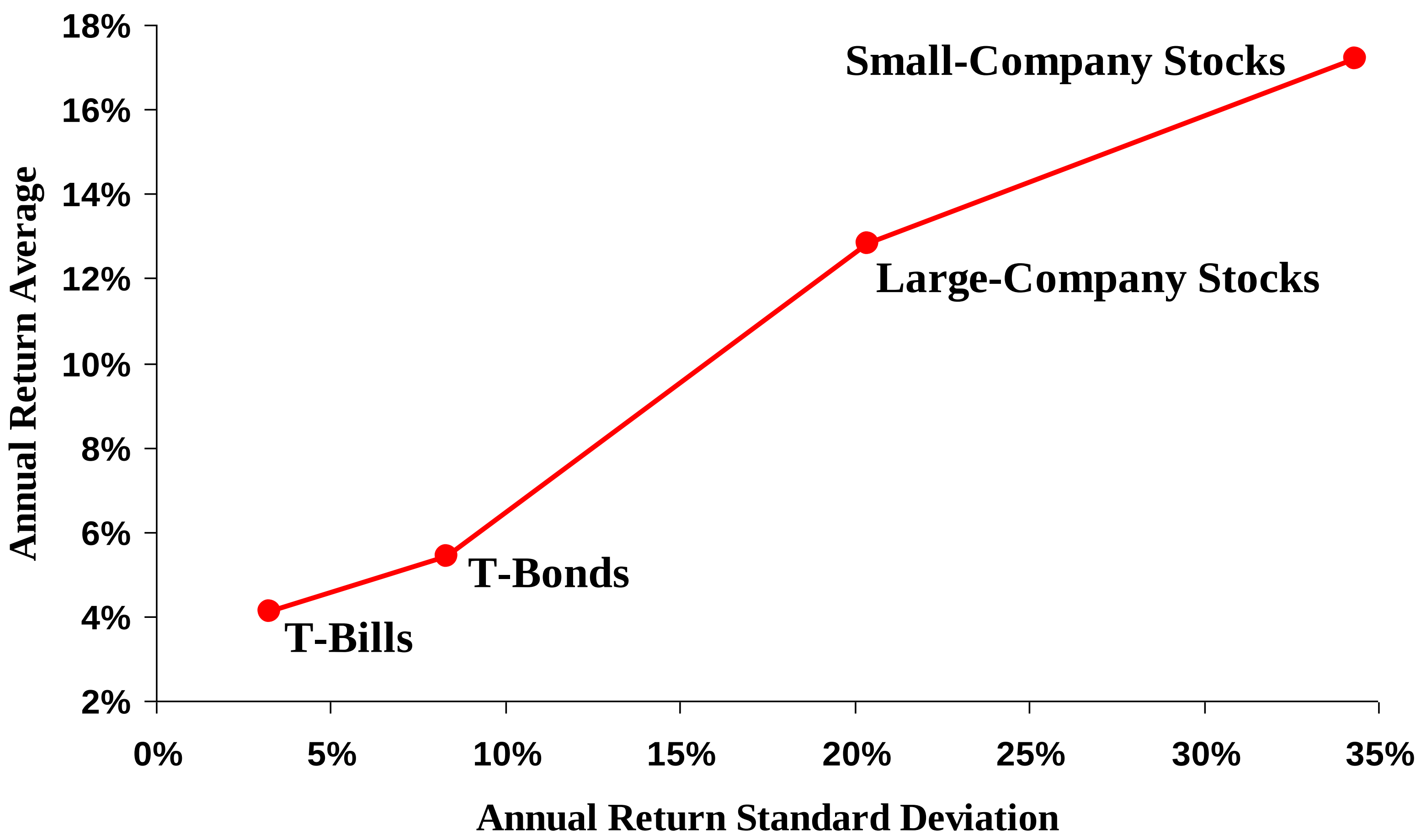
9.4 Average Stock Returns and Risk-Free Returns

- The *Risk Premium* is the additional return (over and above the risk-free rate) resulting from bearing risk.
- One of the most significant observations of stock market data is this long-run excess of stock return over the risk-free return.
  - The average excess return from large company common stocks for the period 1926 through 1999 was 8.4% = 12.2% – 3.8%
  - The average excess return from small company common stocks for the period 1926 through 1999 was 13.2% = 16.9% – 3.8%
  - The average excess return from long-term corporate bonds for the period 1926 through 1999 was 2.4%

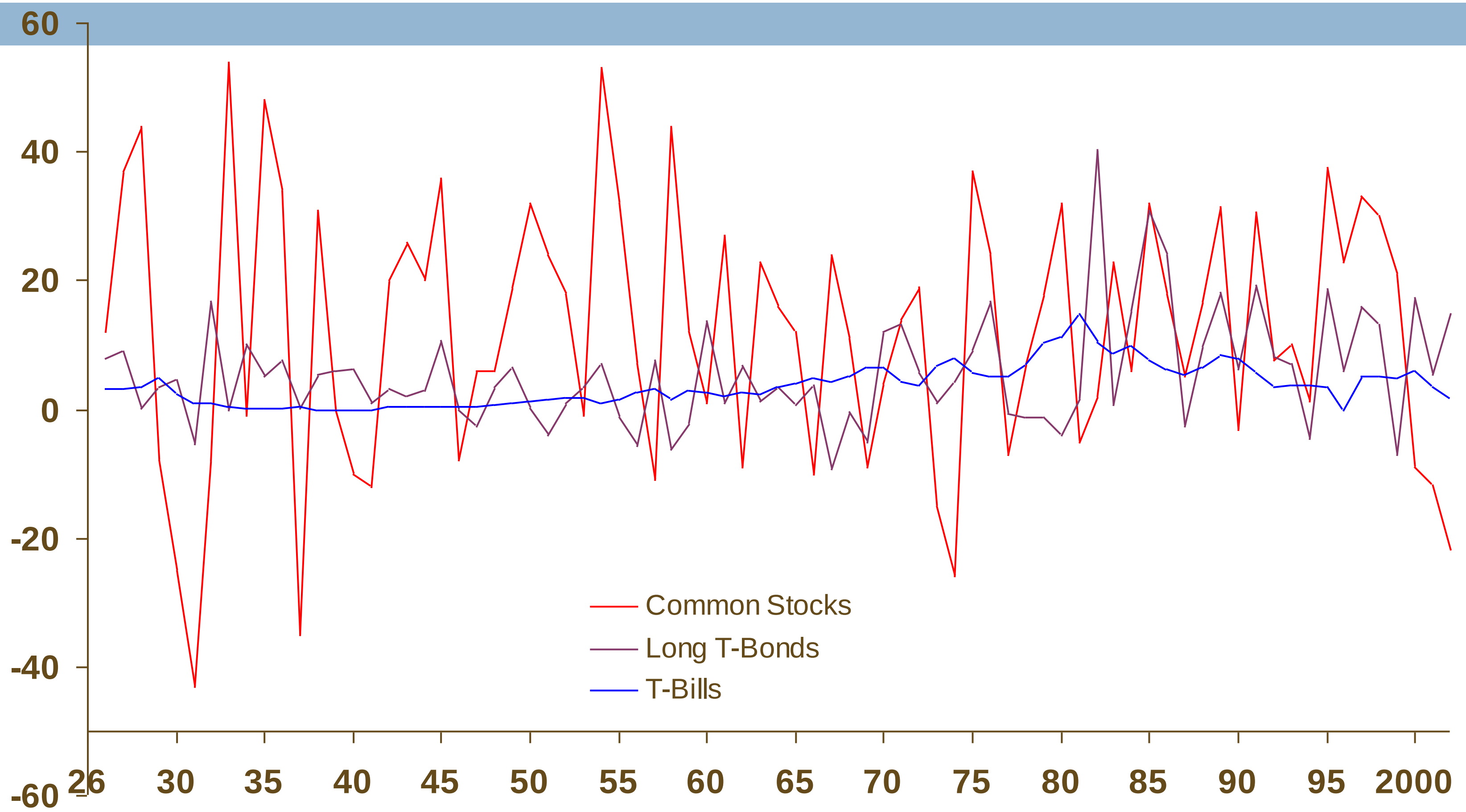
Risk Premia

- Suppose that *The Wall Street Journal* announced that the current rate for on-year Treasury bills is 5%.
- What is the expected return on the market of small-company stocks?
- Recall that the average excess return from small company common stocks for the period 1926 through 1999 was 13.2%
- Given a risk-free rate of 5%, we have an expected return on the market of small-company stocks of 18.2% = 13.2% + 5%

The Risk-Return Tradeoff



Rates of Return 1926-2002



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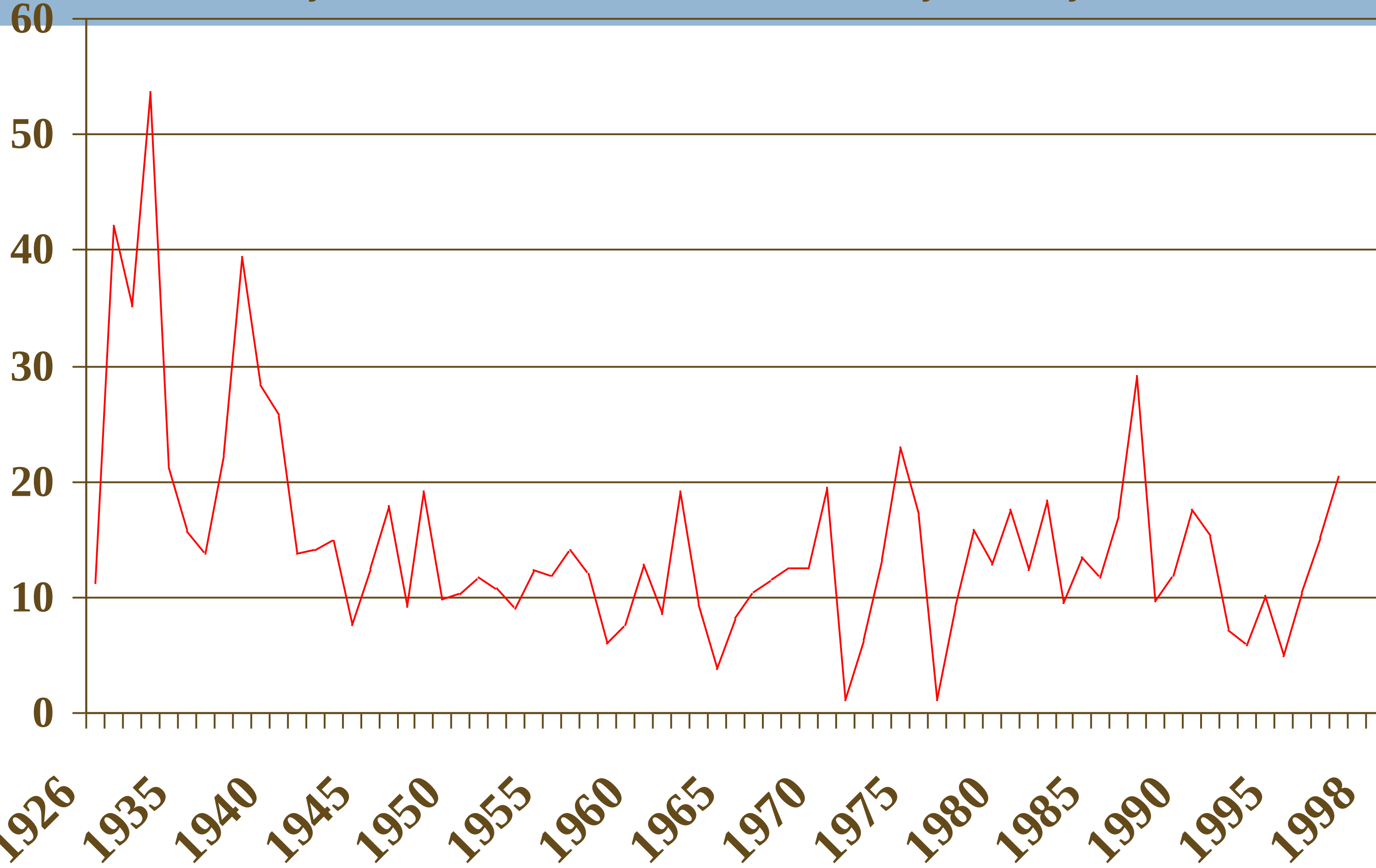
Risk Premiums

- Rate of return on T-bills is essentially risk-free.
- Investing in stocks is risky, but there are compensations.
- The difference between the return on T-bills and stocks is the risk premium for investing in stocks.
- An old saying on Wall Street is “You can either sleep well or eat well.”

Stock Market Volatility

The volatility of stocks is not constant from year to year.



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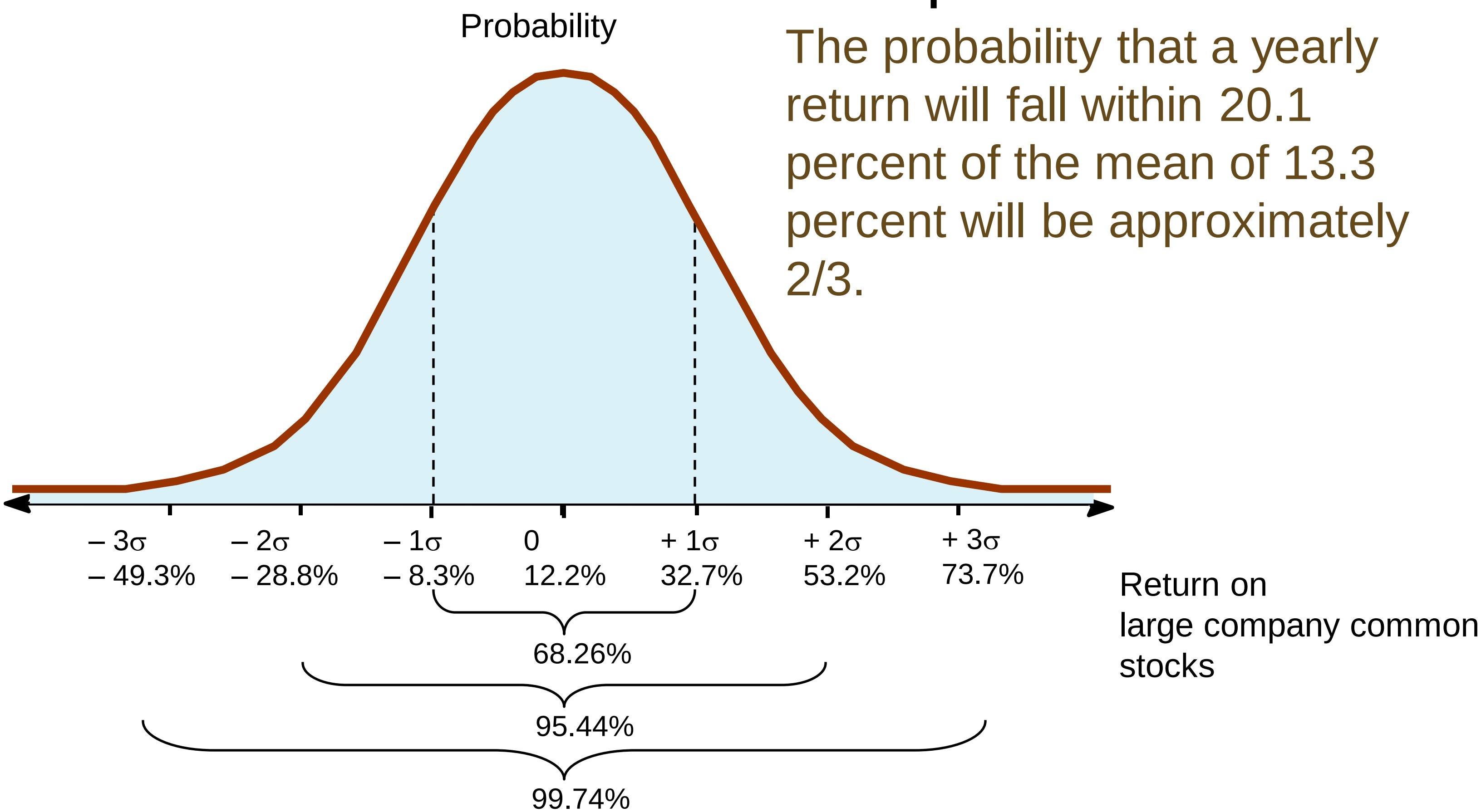
9.5 Risk Statistics

- There is no universally agreed-upon definition of risk.
- The measures of risk that we discuss are variance and standard deviation.
  - The standard deviation is the standard statistical measure of the spread of a sample, and it will be the measure we use most of this time.
  - Its interpretation is facilitated by a discussion of the normal distribution.

Normal Distribution

- A large enough sample drawn from a normal distribution looks like a bell-shaped curve.

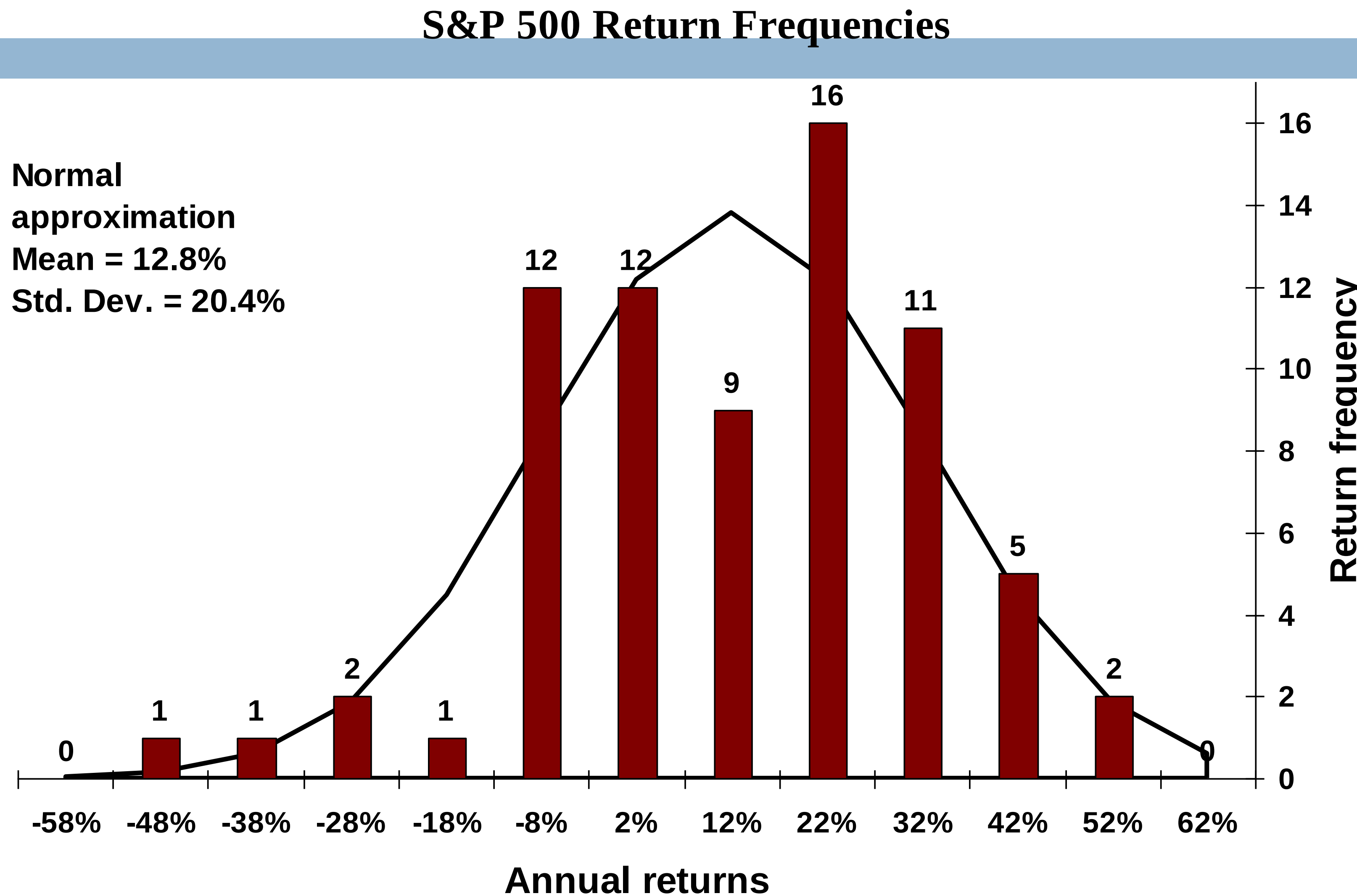


The probability that a yearly return will fall within 20.1 percent of the mean of 13.3 percent will be approximately 2/3.

Normal Distribution

- The 20.1-percent standard deviation we found for stock returns from 1926 through 1999 can now be interpreted in the following way: if stock returns are approximately normally distributed, the probability that a yearly return will fall within 20.1 percent of the mean of 13.3 percent will be approximately 2/3.

Normal Distribution



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