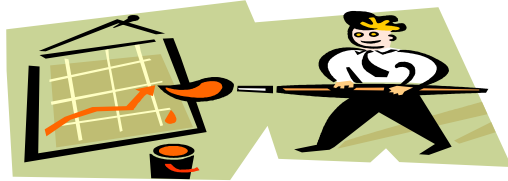


# Chapter 10 Lecture - Some Lessons from Capital Market History

## Chapter 10 Lecture - Some Lessons from Capital Market History



### Learning Objectives

After studying this chapter, you should be able to:

- ◆ **L01** Calculate the return on an investment.
- ◆ **L02** Discuss the historical returns on various important types of investments.
- ◆ **L03** Explain the historical risks on various important types of investments.
- ◆ **L04** Assess the implications of market efficiency

10-2

### Risk–Return Tradeoff

- ◆ Two key lessons from capital market history:
  - ◆ There is a reward for bearing risk
  - ◆ The greater the potential reward, the greater the risk



10-3

### Dollar & Percent Returns

- ◆ **Total dollar return** = the return on an investment measured in dollars
  - \$ Return = Dividends + Capital Gains
  - Capital Gains = Price received – Price paid
- ◆ **Total percent return** = the return on an investment measured as a percentage of the original investment.
  - % Return = \$ Return/\$ Invested

10-4

### Percent Return

Dividend Yield  $\Rightarrow DY = \frac{D_{t+1}}{P_t}$

Capital Gains Yield  $\Rightarrow CGY = \frac{P_{t+1} - P_t}{P_t}$

$\% \text{ Return} = DY + CGY$

$\% \text{ Return} = \frac{D_{t+1} + P_{t+1} - P_t}{P_t}$

10-5

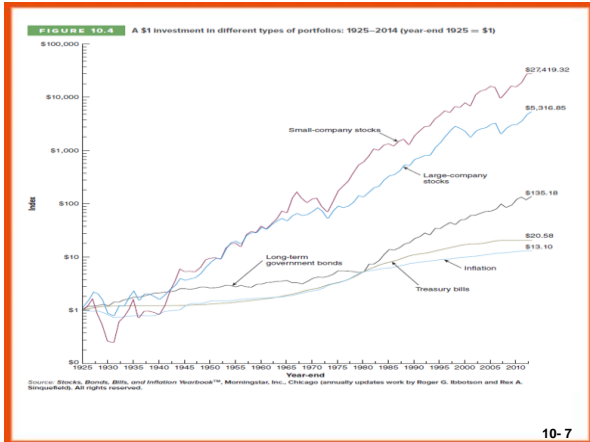
### Example: Calculating Total Dollar and Total Percent Returns

- ◆ You invest in a stock with a share price of \$25.
- ◆ After one year, the stock price per share is \$35
- ◆ Each share paid a \$2 dividend
- ◆ What was your total return?

	Dollars	Percent
Dividend	\$2.00	\$2/\$25 = 8%
Capital Gain	\$35 - \$25 = \$10	\$10/\$25 = 40%
Total Return	\$2 + \$10 = \$12	\$12/\$25 = 48%

10-6

# Chapter 10 Lecture - Some Lessons from Capital Market History



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## Average Returns: The First Lesson 1926 - 2014

Investment	Average Return
Large Stocks	12.1%
Small Stocks	16.7%
Long-term Corporate Bonds	6.4%
Long-term Government Bonds	6.1%
U.S. Treasury Bills	3.5%
Inflation	3.0%

[http://pages.stern.nyu.edu/~adamodar/New\\_Home\\_Page/datafile/histretSP.html](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/histretSP.html)

10-8

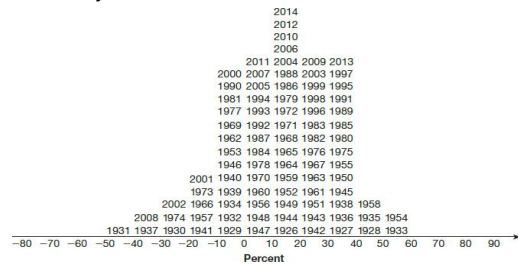
## Risk Premiums

- ◆ Risk-free rate:
  - ◆ Rate of return on a riskless investment
  - ◆ Treasury Bills are considered risk-free
- ◆ Risk premium:
  - ◆ Excess return on a risky asset over the risk-free rate
  - ◆ Reward for bearing risk
- ◆ Large Stocks:  $11.8 - 3.6 = 8.2\%$
- ◆ Small Stocks:  $16.5 - 3.6 = 12.9\%$
- ◆ L/T Corporate Bonds:  $6.4 - 3.6 = 2.8\%$
- ◆ L/T Government Bonds:  $6.1 - 3.6 = 2.5\%$
- ◆ U.S. Treasury Bills:  $3.6 - 3.6 = 0^*$

10-9

## Risk

**FIGURE 10.9** Frequency distribution of returns on common stocks: 1926–2014 - Risk is measured by the dispersion, spread, or volatility of returns



10-10

## Return Variability Review

- ◆ Variance =  $VAR(R)$  or  $\sigma^2$ 
  - ◆ Common measure of return dispersion
  - ◆ Also call *variability*
- ◆ Standard deviation =  $SD(R)$  or  $\sigma$ 
  - ◆ Square root of the variance
  - ◆ Sometimes called *volatility*
  - ◆ Same "units" as the average

10-11

## Return Variability: The Statistical Tools for Historical Returns

- ◆ Return variance: ("T" = number of returns)

$$VAR(R) = \sigma^2 = \frac{\sum_{i=1}^T (R_i - \bar{R})^2}{T - 1}$$

- ◆ Standard Deviation:

$$SD(R) = \sigma = \sqrt{VAR(R)}$$

10-12

# Chapter 10 Lecture - Some Lessons from Capital Market History

## Example: Calculating Historical Variance and Standard Deviation

◆ Using **data from text for large-company stocks**:

(1)	(2)	(3)	(4)	(5)
Year	Return	Average Return:	Difference (2) - (3)	Squared (4) x (4)
1926	11.14	11.48	-0.34	0.12
1927	37.13	11.48	25.65	657.82
1928	43.31	11.48	31.83	1013.02
1929	-8.91	11.48	-20.39	415.83
1930	-25.26	11.48	-36.74	1349.97
Sum:	57.41		Sum:	3436.77
Average:	11.48		Variance:	859.19
			Standard Deviation:	29.31

10-13

## The Normal Distribution

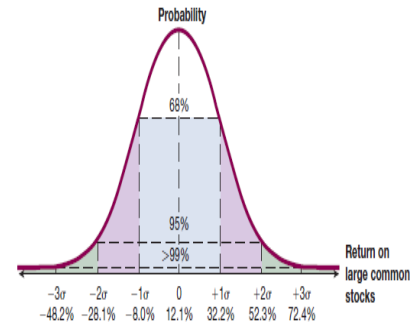


FIGURE 10.11

The normal distribution

Illustrated returns are based on the historical return and standard deviation for a portfolio of large common stocks.

10-14

## Arithmetic vs. Geometric Mean

◆ Arithmetic average:

- ◆ Return earned in an average period over multiple periods
- ◆ Answers the question: "What was your return *in an average year* over a particular period?"

◆ Geometric average:

- ◆ Average compound return per period over multiple periods
- ◆ Answers the question: "What was your average *compound* return per year over a particular period?"

◆ Geometric average < arithmetic average unless all the returns are equal

10-15

## Geometric Average Return

$$GAR = [(1 + R_1) \times (1 + R_2) \times \dots \times (1 + R_N)]^{1/N} - 1$$

Where:

$R_i$  = return in each period

$T$  = number of periods

$$GAR = \left[ \prod_{i=1}^T (1 + R_i) \right]^{1/T} - 1$$

Where:

$\Pi$  = Product (like  $\Sigma$  for sum)

$T$  = Number of periods in sample

$R_i$  = Actual return in each period

10-16

## Example: Calculating a Geometric Average Return

Year	Percent Return	One Plus Return	Compounded Return:
1926	11.14	1.1114	1.1114
1927	37.13	1.3713	1.5241
1928	43.31	1.4331	2.1841
1929	-8.91	0.9109	1.9895
1930	-25.26	0.7474	1.4870
		(1.4870) <sup>(1/5)</sup> :	1.0826

Geometric Average Return: **8.26%**

10-17

## Arithmetic vs. Geometric Mean Which is better?

- ◆ The arithmetic average is overly optimistic for long horizons
- ◆ The geometric average is overly pessimistic for short horizons
- ◆ Depends on the planning period under consideration
  - 15 – 20 years or less: use arithmetic
  - 20 – 40 years or so: split the difference between them
  - 40 + years: use the geometric

10-18

# Chapter 10 Lecture - Some Lessons from Capital Market History

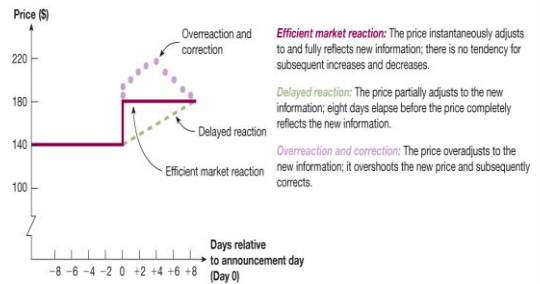
## Efficient Capital Markets

- ◆ **The Efficient Market Hypothesis:**
  - ◆ Stock prices are in equilibrium
  - ◆ Stocks are “fairly” priced
  - ◆ Informational efficiency
- ◆ **If true, you should not be able to earn “abnormal” or “excess” returns**
- ◆ **Efficient markets *DO NOT* imply that investors cannot earn a positive return in the stock market**

10-19

## Reaction of stock price to new information in efficient and inefficient markets

FIGURE 10.14 Reaction of stock price to new information in efficient and inefficient markets



10-20

## Forms of Market Efficiency

- ◆ **Strong-form Efficient Market:**
  - ◆ Prices reflect all information, including public and private
  - ◆ If true, then investors can not earn abnormal returns regardless of the information they possess
  - ◆ Empirical evidence indicates that markets are **NOT** strong form efficient
    - ◆ *Insiders* can earn abnormal returns (may be illegal)

10-21

## Forms of Market Efficiency

- ◆ **Semistrong Form Efficiency**
  - ◆ Prices reflect all publicly available information including trading information, annual reports, press releases, etc.
  - ◆ If true, then investors cannot earn abnormal returns by trading on public information
  - ◆ Implies that fundamental analysis will not lead to abnormal returns

10-22

## Forms of Market Efficiency

- ◆ **Weak Form Efficiency**
  - ◆ Prices reflect all past market information such as price and volume
  - ◆ If true, then investors cannot earn abnormal returns by trading on market information
  - ◆ Implies that technical analysis will not lead to abnormal returns
  - ◆ Empirical evidence indicates that markets are generally weak form efficient

10-23

## Common Misconceptions about EMH

- ◆ **EMH does not mean that you can't make money**
- ◆ **EMH does mean that:**
  - ◆ On average, you will earn a return appropriate for the risk undertaken
  - ◆ There is no bias in prices that can be exploited to earn excess returns
  - ◆ Market efficiency will not protect you from wrong choices if you do not diversify – you still don't want to put all your eggs in one basket

10-24