CHAPTER 9
Capital Market Theory: An Overview

Chapter Outline
9.1 Returns
9.2 Holding-Period Returns
9.3 Return Statistics
9.4 Average Stock Returns and Risk-Free Returns
9.5 Risk Statistics
9.6 Summary and Conclusions

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

Time 0 1
Initial investment

Ending
market value
Dividends

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

Dollar Return = Dividend + Change in Market Value

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 \( r_i \):

holding period return = \[(1 + r_1) \times (1 + r_2) \times \cdots \times (1 + r_n) - 1\]

9.1 Returns
Dollar Return = Dividend + Change in Market Value
percentage return = \[\frac{\text{dollar return}}{\text{beginning market value}}\]
= dividend yield + capital gains yield

Holding Period Return: Example
An investor who held this investment would have actually realized an annual return of 9.58%:

Geometric average return = \[(1 + r_1)^{1} \times (1 + r_2)^{1} \times \cdots \times (1 + r_n)^{1} - 1\]

<table>
<thead>
<tr>
<th>Year</th>
<th>Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td>2</td>
<td>-5%</td>
</tr>
<tr>
<td>3</td>
<td>20%</td>
</tr>
<tr>
<td>4</td>
<td>15%</td>
</tr>
</tbody>
</table>

rate = \[\frac{1}{4}(1.10) \times (0.95) \times (1.20) \times (1.15) - 1\]
= 0.95844 = 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)
Holding Period Return: Example

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

<table>
<thead>
<tr>
<th>Year</th>
<th>Return</th>
<th>Arithmetic average return ( \frac{r_1 + r_2 + r_3 + r_4}{4} )</th>
<th>Geometric average return ( \left(1 + \frac{r_1}{100}\right) \left(1 + \frac{r_2}{100}\right) \left(1 + \frac{r_3}{100}\right) \left(1 + \frac{r_4}{100}\right) - 1 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10%</td>
<td>10%</td>
<td>[1 \times \left(1 + \frac{10}{100}\right) \left(1 + \frac{-5}{100}\right) \left(1 + \frac{20}{100}\right) \left(1 + \frac{15}{100}\right) - 1 = 10% ]</td>
</tr>
<tr>
<td>2</td>
<td>-5%</td>
<td>[1 \times \left(1 + \frac{-5}{100}\right) \left(1 + \frac{20}{100}\right) \left(1 + \frac{15}{100}\right) - 1 = -10% ]</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>20%</td>
<td>[1 \times \left(1 + \frac{10}{100}\right) \left(1 + \frac{-5}{100}\right) \left(1 + \frac{20}{100}\right) - 1 = 10% ]</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>15%</td>
<td>[1 \times \left(1 + \frac{10}{100}\right) \left(1 + \frac{-5}{100}\right) \left(1 + \frac{20}{100}\right) \left(1 + \frac{15}{100}\right) - 1 = 10% ]</td>
<td></td>
</tr>
</tbody>
</table>

The Future Value of an Investment of $1 in 1925

Historical Returns, 1926-2002

<table>
<thead>
<tr>
<th>Series</th>
<th>Average Annual Return</th>
<th>Standard Deviation</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Company Stocks</td>
<td>12.2%</td>
<td>20.5%</td>
<td></td>
</tr>
<tr>
<td>Small Company Stocks</td>
<td>18.9%</td>
<td>33.2%</td>
<td></td>
</tr>
<tr>
<td>Long-Term Corporate Bonds</td>
<td>6.2%</td>
<td>8.7%</td>
<td></td>
</tr>
<tr>
<td>Long-Term Government Bonds</td>
<td>5.8%</td>
<td>9.4%</td>
<td></td>
</tr>
<tr>
<td>U.S. Treasury Bills</td>
<td>3.8%</td>
<td>3.2%</td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td>3.1%</td>
<td>4.4%</td>
<td></td>
</tr>
</tbody>
</table>

The Risk-Return Tradeoff
Rates of Return 1926-2002

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.”

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

- 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.

9.6 Summary and Conclusions

- This chapter presents returns for four asset classes:
  - Large Company Stocks
  - Small Company Stocks
  - Long-Term Government Bonds
  - Treasury Bills
- Stocks have outperformed bonds over most of the twentieth century, although stocks have also exhibited more risk.
### 9.6 Summary and Conclusions

- The stocks of small companies have outperformed the stocks of small companies over most of the twentieth century, again with more risk.
- The statistical measures in this chapter are necessary building blocks for the material of the next three chapters.