Chapter 10

Some Lessons from Capital Market History

Key Concepts and Skills

• Know how to calculate the return on an investment
• Understand the historical returns on various types of investments
• Understand the historical risks on various types of investments
Chapter Outline

• Returns
• The Historical Record
• Average Returns: The First Lesson
• The Variability of Returns: The Second Lesson
• More on Average Returns
• Capital Market Efficiency

Risk, Return, and Financial Markets

• We can examine returns in the financial markets to help us determine the appropriate returns on non-financial assets
• Lessons from capital market history
  – There is a reward for bearing risk
  – The greater the risk, the greater the potential reward
  – This is called the risk-return trade-off
Dollar Returns

- Total dollar return = income from investment + capital gain (loss) due to change in price
- Example:
  - You bought a bond for $950 one year ago. You have received two coupons of $30 each. You can sell the bond for $975 today. What is your total dollar return?
    - Income = $30 + $30 = $60
    - Capital gain = $975 – $950 = $25
    - Total dollar return = $60 + $25 = $85

Percentage Returns

- It is generally more intuitive to think in terms of percentages than dollar returns
- Dividend yield = income / beginning price
- Capital gains yield = (ending price – beginning price) / beginning price
- Total percentage return = dividend yield + capital gains yield
Example: Calculating Returns
• You bought a stock for $35 and you received dividends of $1.25. The stock is now selling for $40.
  – What is your dollar return?
    • Dollar return = 1.25 + (40 – 35) = $6.25
  – What is your percentage return?
    • Dividend yield = 1.25 / 35 = 3.57%
    • Capital gains yield = (40 – 35) / 35 = 14.29%
    • Total percentage return = 3.57 + 14.29 = 17.86%

The Importance of Financial Markets
• Financial markets allow companies, governments, and individuals to increase their utility
  – Savers have the ability to invest in financial assets so they can defer consumption and earn a return to compensate them for doing so
  – Borrowers have better access to the capital that is available, allowing them to invest in productive assets
• Financial markets also provide us with information about the returns that are required for various levels of risk
### Average Returns

<table>
<thead>
<tr>
<th>Investment</th>
<th>Average Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Stocks</td>
<td>12.3%</td>
</tr>
<tr>
<td>Small Stocks</td>
<td>17.4%</td>
</tr>
<tr>
<td>Long-term Corporate Bonds</td>
<td>6.2%</td>
</tr>
<tr>
<td>Long-term Government Bonds</td>
<td>5.8%</td>
</tr>
<tr>
<td>U.S. Treasury Bills</td>
<td>3.8%</td>
</tr>
<tr>
<td>Inflation</td>
<td>3.1%</td>
</tr>
</tbody>
</table>
Risk Premiums

- The “extra” return earned for taking on risk
- Treasury bills are considered to be risk-free
- The risk premium is the return over and above the risk-free rate

Historical Risk Premiums

- Large Stocks: $12.3 - 3.8 = 8.5\%$
- Small Stocks: $17.4 - 3.8 = 13.6\%$
- Long-term Corporate Bonds: $6.2 - 3.8 = 2.4\%$
- Long-term Government Bonds: $6.2 - 3.8 = 2.4\%$
- U.S. Treasury Bills: $3.8 - 3.8 = 0$ (by definition!)
Variance and Standard Deviation

- We use variance and standard deviation to measure the volatility of asset returns.
- The greater the volatility, the greater the uncertainty.
- Historical variance = sum of squared deviations from the mean / (number of observations − 1).
- Standard deviation = square root of the variance.
Example – Variance and Standard Deviation

<table>
<thead>
<tr>
<th>Year</th>
<th>Actual Return</th>
<th>Average Return</th>
<th>Deviation from the Mean</th>
<th>Squared Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.15</td>
<td>.105</td>
<td>.045</td>
<td>.002025</td>
</tr>
<tr>
<td>2</td>
<td>.09</td>
<td>.105</td>
<td>-.015</td>
<td>.000225</td>
</tr>
<tr>
<td>3</td>
<td>.06</td>
<td>.105</td>
<td>-.045</td>
<td>.002025</td>
</tr>
<tr>
<td>4</td>
<td>.12</td>
<td>.105</td>
<td>.015</td>
<td>.000225</td>
</tr>
<tr>
<td>Totals</td>
<td>.42</td>
<td>.00</td>
<td>.00</td>
<td>.0045</td>
</tr>
</tbody>
</table>

Note: Average return = .42 / 4 = .105
Variance = .0045 / (4-1) = .0015     Standard Deviation = .03873

Figure 10.10

Historical returns, standard deviations, and frequency distributions: 1926–2006

<table>
<thead>
<tr>
<th>Series</th>
<th>Average return</th>
<th>Standard deviation</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large-company stocks</td>
<td>12.3%</td>
<td>26.1%</td>
<td></td>
</tr>
<tr>
<td>Small-company stocks</td>
<td>17.4%</td>
<td>32.7%</td>
<td></td>
</tr>
<tr>
<td>Long-term corporate bonds</td>
<td>6.2%</td>
<td>8.5%</td>
<td></td>
</tr>
<tr>
<td>Long-term government</td>
<td>5.8%</td>
<td>9.2%</td>
<td></td>
</tr>
<tr>
<td>Intermediate-term government</td>
<td>5.4%</td>
<td>5.7%</td>
<td></td>
</tr>
<tr>
<td>U.S. Treasury bills</td>
<td>3.8%</td>
<td>3.1%</td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td>3.1%</td>
<td>4.3%</td>
<td></td>
</tr>
</tbody>
</table>

*The 1926 small-company stocks total return was 142.2 percent.
Source: Stocks, Bonds, Bills, and Inflation Yearbook®, Morningstar Associates, Inc., Chicago (annually updates work by Roger G. Ibbotson and Rex A. Sinquefield). All rights reserved.
Arithmetic vs. Geometric Mean

- Arithmetic average – return earned in an average period over multiple periods
- Geometric average – average compound return per period over multiple periods
- The geometric average will be less than the arithmetic average unless all the returns are equal
- Which is better?
  - The arithmetic average is overly optimistic for long horizons
  - The geometric average is overly pessimistic for short horizons
  - So the answer 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
Example: Computing Returns

• What are the arithmetic and geometric averages for the following returns?
  – Year 1 5%
  – Year 2 -3%
  – Year 3 12%
  – Arithmetic average = (5 + (–3) + 12)/3 = 4.67%
  – Geometric average = \[\left(1+.05\right)\left(1-.03\right)\left(1+.12\right)\right]^{1/3} – 1 = .0449 = 4.49%

Efficient Capital Markets

• Stock prices are in equilibrium - they are “fairly” priced
• If this is true, then 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
What Makes Markets Efficient?

- There are many investors out there doing research
  - As new information comes to market, this information is analyzed and trades are made based on this information
  - Therefore, prices should reflect all available public information
- If investors stop researching stocks, then the market will not be efficient
Common Misconceptions about EMH

- Efficient markets do not mean that you can’t make money
- They do mean that, on average, you will earn a return that is appropriate for the risk undertaken, and there is not a 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

Strong Form Efficiency

- Prices reflect all information, including public and private
- If the market is strong form efficient, then investors could not earn abnormal returns regardless of the information they possessed
- Empirical evidence indicates that markets are NOT strong form efficient, and that insiders can earn abnormal returns (may be illegal)
Semistrong Form Efficiency

• Prices reflect all publicly available information including trading information, annual reports, press releases, etc.
• If the market is semistrong form efficient, then investors cannot earn abnormal returns by trading on public information
• Implies that fundamental analysis will not lead to abnormal returns

Weak Form Efficiency

• Prices reflect all past market information such as price and volume
• If the market is weak form efficient, 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
Quick Quiz
• Which of the investments discussed have had the highest average return and risk premium?
• Which of the investments discussed have had the highest standard deviation?
• What is capital market efficiency?
• What are the three forms of market efficiency?