Finance is the study of value and how it is determined. Individuals, small businesses and corporations regularly make use of value determinations for making strategic decisions that affect the future outcomes of their endeavors. The importance of accurate valuations cannot be overestimated; valuing assets too highly will lead to investing in assets whose costs are greater than their returns, while undervaluing assets will lead to missed opportunities for growth. In some situations (such as a merger or an acquisition), the outcome of the decision can make or break the investor. The need for solid financial skills has never been more pressing than in today’s global economy.

The Fundamental Principles of Finance offers a new and innovative approach to financial theory. The book introduces three fundamental principles of finance that flow throughout the theoretical material covered in most corporate finance textbooks. These fundamental principles are developed in their own chapter of the book, then referred to in each chapter introducing financial theory. In this way, the theory is able to be mastered at a fundamental level. The interactions among the principles are introduced through the three precepts, which help show the impact of the three principles on financial decision-making.

This fresh and original approach to finance will be key reading for undergraduate students of introduction to finance, corporate finance, capital markets, financial management and related courses, as well as managers undertaking MBAs.

Robert Irons, PhD, is Associate Professor of Finance at Illinois Wesleyan University, USA. He has taught undergraduate and MBA students for over 20 years and is published in numerous academic journals, including the Journal of Investing and the Journal of Portfolio Management. Prior to teaching full time, Dr. Irons worked as a financial analyst for such firms as AT&T and United Airlines.
“The Fundamental Principles of Finance by Dr. Robert Irons addresses the basics of financial management in a way that makes finance and investment strategy accessible even to those of us who regularly struggle with math and money.”

— Dr. Jim Twombly, Professor of American Politics, Elmira College, New York, USA

“The Fundamental Principles of Finance covers a wide range of topics related to financial management in a very well-structured fashion. It defines and explicates the relevant concepts for a beginner in financial management. It seamlessly transitions from the conceptual framework to succinct definitions and practical applications and exercises. It is a great introductory textbook in this area.”

— Dr. Khalid Razaki, Professor of Accounting, Brennan School of Business, Dominican University, Illinois, USA
## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Figures</td>
<td>xii</td>
</tr>
<tr>
<td>List of Tables</td>
<td>xiii</td>
</tr>
<tr>
<td><strong>1 The Fundamental Principles of Finance</strong></td>
<td></td>
</tr>
<tr>
<td>The Three Fundamental Principles of Finance</td>
<td>1</td>
</tr>
<tr>
<td>The Three Precepts</td>
<td>6</td>
</tr>
<tr>
<td>Differentiating Between the Principles and the Precepts</td>
<td>8</td>
</tr>
<tr>
<td>Making Use of the Principles and Precepts</td>
<td>9</td>
</tr>
<tr>
<td>Summary</td>
<td>11</td>
</tr>
<tr>
<td>End of Chapter Problems</td>
<td>11</td>
</tr>
<tr>
<td><strong>2 Time Value of Money</strong></td>
<td>12</td>
</tr>
<tr>
<td>The Cost of Money</td>
<td>12</td>
</tr>
<tr>
<td>The Fundamental Principles in Action</td>
<td>12</td>
</tr>
<tr>
<td>Understanding Why Money Has Time Value—Economic Equivalency</td>
<td>12</td>
</tr>
<tr>
<td>Adjusting Cash Flow Values Over Time</td>
<td>13</td>
</tr>
<tr>
<td>Future Value and Compounding</td>
<td>14</td>
</tr>
<tr>
<td>FV of a Single Cash Flow</td>
<td>15</td>
</tr>
<tr>
<td>FV of Uneven Cash Flows</td>
<td>16</td>
</tr>
<tr>
<td>Present Value and Discounting</td>
<td>17</td>
</tr>
<tr>
<td>PV of a Single Cash Flow</td>
<td>18</td>
</tr>
<tr>
<td>Determining the Correct Exponent</td>
<td>18</td>
</tr>
<tr>
<td>PV of Uneven Cash Flows</td>
<td>19</td>
</tr>
<tr>
<td>Compounding/Discounting More Often Than Annually</td>
<td>20</td>
</tr>
<tr>
<td>The Effective Annual Rate (EAR)</td>
<td>21</td>
</tr>
<tr>
<td>The Impact of EAR on FV and PV Calculations of Single Cash Flows</td>
<td>22</td>
</tr>
<tr>
<td>Annuities</td>
<td>22</td>
</tr>
<tr>
<td>Future Value of an Ordinary Annuity</td>
<td>23</td>
</tr>
<tr>
<td>Future Value of an Annuity Due</td>
<td>23</td>
</tr>
<tr>
<td>Present Value of an Ordinary Annuity</td>
<td>24</td>
</tr>
<tr>
<td>Present Value of an Annuity Due</td>
<td>25</td>
</tr>
</tbody>
</table>
Contents

A Simple Understanding of the Annuity Due Value 25
Perpetuities 25
Amortized Loans 26
Solving for Other Variables in the TVM Calculations 27
Discrete Time vs. Continuous Time 29
Summary of the Principles and Precepts Applied in This Chapter 31
End of Chapter Problems 32

3 Risk and Return
The Fundamental Principles in Action 34
Measuring Return 34
  Annualized Return 35
  Average Returns 36
Expected Return and Risk 37
Risk and Risk Aversion 38
The Relationship Between Risk and Return 39
Types of Risk 40
  Business Risk 40
    The Coefficient of Variation of EBIT 40
    The Coefficient of Variation of the Operating Margin 42
    The Degree of Operating Leverage 42
  Financial Risk 43
    The Coefficient of Variation of Net Income 44
    The Coefficient of Variation of the Net Margin 44
    The Degree of Financial Leverage 45
    Degree of Combined Leverage 45
Portfolio Risk 46
  Measuring Portfolio Risk 46
  Beta 47
  Portfolio Risk and Return 47
Relevant Risk and Required Return—The CAPM 49
Summary of the Principles and Precepts Applied in This Chapter 51
End of Chapter Problems 51
  Excel Project 54

4 The Term Structure of Interest Rates
The Fundamental Principles in Action 55
Real vs. Nominal Interest Rates—The Effects of Inflation 56
The Determinants of Interest Rates 56
  The Default Risk Premium 57
  The Liquidity Risk Premium 58
  The Maturity Risk Premium 59
  Determining Interest Rates 60
The Yield Curve 60
## Contents

Bond Yields vs. Stock Returns—The Fed Model  63  
Summary of the Principles and Precepts Applied in This Chapter  65  
End of Chapter Problems  65  

5 **Bonds and Bond Valuation**  68  
The Fundamental Principles in Action  68  
The Basics of Bonds  68  
Calculating the Value of a Bond  70  
  Bond Values Over Time  71  
  Using Excel to Calculate Bond Prices  73  
Calculating a Bond’s Yield to Maturity  74  
Calculating a Bond’s Yield to Call  75  
Duration and Its Use  76  
Summary of the Principles and Precepts Applied in This Chapter  80  
End of Chapter Problems  80  

6 **Stocks and Stock Valuation**  83  
The Fundamental Principles in Action  83  
The Basics of Stocks  84  
The Dividend Discount Model  85  
Preferred Stock Valuation  86  
Common Stock Valuation With Dividends—Constant Growth  86  
Common Stock Valuation With Dividends—Non-Constant Growth  87  
Common Stock Valuation Without Dividends—The Cash Flow From Assets Model  90  
  Understanding Operating Accounts  91  
  Calculating Cash Flow From Assets  92  
  Using the Cash Flow From Assets Model to Value a Firm’s Common Equity  93  
Summary of the Principles and Precepts Applied in This Chapter  96  
End of Chapter Problems  97  

7 **Capital Budgeting Decision Methods**  100  
The Fundamental Principles in Action  100  
The Capital Budgeting Decision Methods  101  
  The Payback Period  101  
  The Discounted Payback Period  102  
  The Net Present Value  104  
  The Internal Rate of Return  105  
  Comparing the NPV and IRR Methods  106  
  The Modified Internal Rate of Return  107  
Evaluating Capital Budgeting Projects  109  
  Cash Flow Estimation  110  
  Relevant Cash Flows  110
Contents

Changes in Net Working Capital 111
Evaluating Capital Budgeting Projects 111
Initial Cash Flows 112
Operating Cash Flows 112
Terminal Cash Flows 113
Net Operating Cash Flow 114
Paying Attention to Details 114
The Truth of PR2 115
Adjusting for Risk in the Capital Budgeting Analysis Process 116
The Investment Opportunity Schedule 116
Summary of the Principles and Precepts Applied in This Chapter 118
End of Chapter Problems 119
Excel Project 122
Replacement Project Analysis 122

8 Capital Structure and the WACC 123
The Fundamental Principles in Action 123
Understanding Capital Structure and Its Effects 123
The Component Costs of Capital 124
The After-Tax Cost of Debt 125
The Cost of Preferred Equity 126
The Cost of Internal Common Equity 126
The CAPM Approach 127
The DDM Approach 127
The Cost of External Common Equity 128
Determining the Weights for the Component Costs 128
Putting It All Together 129
Summary of the Principles and Precepts Applied in This Chapter 131
End of Chapter Problems 132
Comprehensive Excel Problem 133

9 Analyzing and Forecasting Financial Statements 136
Understanding the Financial Statements 136
The Balance Sheet 136
Current Assets 138
Long-Term Assets 139
Current Liabilities 140
Long-Term Liabilities 140
Equity 140
The Income Statement 141
The Statement of Cash Flows 141
Statement of Retained Earnings 143
Analyzing the Financial Statements 143
Liquidity Ratios 144
Asset Management Ratios 144
Debt Management Ratios 147
Profitability Ratios 148
Market Value Ratios 149
Value and Growth Metrics 150
The Du Pont Equation 151
Trend Analysis, Benchmarking, Common Size Analysis and Percent Change Analysis 152
Benchmarking 153
Common Size Analysis and Percent Change Analysis 153
Forecasting Financial Statements—The Percent of Sales Method 156
Forecasting the Income Statement 157
Forecasting the Balance Sheet 158
Analyzing the Pro Forma Statements 161
Summary 161
End of Chapter Problems 162
Comprehensive Excel Problem 162

10 Finance Within the Firm 165
The Role of Finance 165
Finance Is a Strategic Discipline 165
The Intrinsic Value of the Firm 166
Corporate Sustainability 168
How to Maximize the Intrinsic Stock Price 169
Types of Financial Decisions 170
The Importance of Finance 171
Careers in Finance 172
Investments and Wealth Management 172
Financial Markets and Institutions 173
Financial Management 173
Forms of Business Organization 173
Proprietorship 174
Partnership 174
Corporation 174
The Secret to a Successful Business 175
Summary 175
End of Chapter Problems 176

11 Legal and Ethical Issues in Finance 178
Financial and Accounting Scandals 178
WorldCom 178
Enron 179
Towers Financial 179
Adelphia Communications 179
12 Financial Markets and Institutions

Financial Markets 191
Primary Markets 191
Secondary Markets 192
Money Market 192
Capital Market 192
The Efficient Market Hypothesis 193
Beating the Market 194
The Three Levels of Market Efficiency 194
Weak Form Efficiency 194
Semi-Strong Form Efficiency 194
Strong Form Efficiency 195
A Way to View Market Efficiency 195
Forces That Determine Market Efficiency 196
Institutional Investors 196
Financial Securities 197
Money Market Securities 197
Capital Market Securities 198
Equity 198
Debt 198
Treasury Bonds 198
Municipal Bonds 198
Corporate Bonds 199
Mutual Funds 199
Derivative Securities 199
Options 200
Financial Institutions 201
The Federal Reserve System 201
Contents

Commercial Banks  202
Savings and Loan Associations  202
Credit Unions  202
Finance Companies  202
Insurance Companies  203
Retirement Plans  203
Summary  204
End of Chapter Problems  204

Index  

206
Figures

<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Annual and Mean Returns, Stock A vs. Stock B</td>
<td>5</td>
</tr>
<tr>
<td>2.1</td>
<td>The Future Value of $1,000 Invested to Earn 5% APR Over One Year</td>
<td>14</td>
</tr>
<tr>
<td>2.2</td>
<td>The Future Value of $100 Invested to Earn 10% APR Over Five Years</td>
<td>15</td>
</tr>
<tr>
<td>2.3</td>
<td>Calculating the Sum of the Future Values of the Cash Flows</td>
<td>17</td>
</tr>
<tr>
<td>2.4</td>
<td>Equation for Determining the Exponent in FV or PV Calculations</td>
<td>19</td>
</tr>
<tr>
<td>4.1</td>
<td>Treasury Yield Curve for June 1, 2018 and March 20, 1980</td>
<td>61</td>
</tr>
<tr>
<td>4.2</td>
<td>Stock Market Returns vs. 10-Year Treasury Note Yields 1881–2007</td>
<td>64</td>
</tr>
<tr>
<td>5.1</td>
<td>Changes in Bond Values Over Time Holding Market Interest Rates Constant</td>
<td>72</td>
</tr>
<tr>
<td>5.2</td>
<td>Price Changes for 5% Coupon Bonds of Varying Maturity</td>
<td>77</td>
</tr>
<tr>
<td>6.1</td>
<td>Calculating the Intrinsic Value of a Non-Constant Growth Stock</td>
<td>89</td>
</tr>
<tr>
<td>6.2</td>
<td>Solving a Non-Constant Growth Stock Problem</td>
<td>90</td>
</tr>
<tr>
<td>7.1</td>
<td>NPV Profile of Mutually Exclusive Projects</td>
<td>106</td>
</tr>
<tr>
<td>7.2</td>
<td>Time Line for Calculating a Project’s MIRR</td>
<td>108</td>
</tr>
<tr>
<td>7.3</td>
<td>Investment Opportunity Schedule Graph and Table</td>
<td>118</td>
</tr>
<tr>
<td>9.1</td>
<td>Financial Ratios and Metrics</td>
<td>145</td>
</tr>
<tr>
<td>9.2</td>
<td>Financial Analysis for Marquardt Manufacturing 2014–2019PF</td>
<td>146</td>
</tr>
<tr>
<td>9.3</td>
<td>Common-Size Statements for Marquardt Manufacturing 2014–2018</td>
<td>154</td>
</tr>
<tr>
<td>9.4</td>
<td>Percent Change Analysis—Marquardt Manufacturing 2015–2018</td>
<td>155</td>
</tr>
<tr>
<td>9.5</td>
<td>Marquardt Financial Statements 2014–2019 Pro Forma</td>
<td>159</td>
</tr>
<tr>
<td>9.6</td>
<td>Marquardt Percent of Sales Balance Sheet 2014–2018</td>
<td>160</td>
</tr>
</tbody>
</table>
Tables

1.1 Returns for Two Stocks Over Five Years 4
2.1 Amortization Schedule 27
3.1 Expected Returns and Standard Deviations of Returns for Stocks A and B 38
3.2 Income Statements for Amazon and IBM 2013–2017 41
3.3 Returns, Betas and Correlations for Amazon, IBM and the S&P 500 2013–2017 48
3.4 Income Statements for Petrosian Consolidated LLC 2015–2019 54
4.1 Standard & Poor’s Credit Rating System for Corporate Bonds 58
5.1 Determining a Bond’s Value Using Excel’s PRICE Function 74
5.2 Using Excel’s RATE Function to Calculate a Bond’s Yield to Maturity 74
5.3 Calculating Yield to Call Using the RATE and IRR Functions 75
5.4 Comparing Bond Price Changes at Varying Coupon Rates 77
5.5 Using Duration and Modified Duration to Estimate Changes to Bond Prices 79
6.2 Cash Flow From Assets Model Inputs and Calculations 96
7.1 Cash Flows and Discount Rates for Projects E and L 101
7.2 Capital Budgeting Decision Tools Using Excel 109
7.3 Net Operating Cash Flow Schedule for Wellman Expansion Project (000s) 115
9.1 Financial Statements for Marquardt Manufacturing 2014–2018 137
9.3 Financial Statements for Imperial Packaging, Inc. 2014–2018 163
1 The Fundamental Principles of Finance

Finance is the study of value and how it is determined. While different types of assets are valued using different specific methods, the underlying principles are the same for each method. It is those underlying principles, and their impact on value, that are the subject of this chapter. The material covered here will be seen in various forms throughout the next seven chapters of the book; this present chapter serves as an introduction to these principles and a guide to their comprehension. A command of these principles will aid in understanding the theory introduced in the coming chapters.

The chapters that follow this one introduce the theory of finance as applied to such things as determining the value of an asset (such as a security, or even a firm); assessing risk and ascertaining the appropriate return for the perceived level of risk; and establishing the optimal level of each source of funds to minimize the firm’s costs and thereby maximize its intrinsic value. Each remaining chapter offers theory in a different specific area of finance—for example, valuing bonds, valuing stocks or valuing a potential investment in operating assets. The current chapter serves to explain in detail the fundamental principles of finance, to show that the fundamental principles flow through the remaining chapters and to promote how comprehension of these fundamental principles can aid in understanding how the theory in the remaining chapters is interrelated.

There are three fundamental principles that flow throughout the theory of finance and that interact within the theory discussed in the following chapters. These three principles are not directly related to each other—each stands on its own—but they work together in shaping financial theory. The interactions among these principles are highlighted in the three precepts that are discussed later in the chapter. These precepts show how the principles combine to affect theory, and therefore how we can better understand the theory through the use of the fundamental principles.

The Three Fundamental Principles of Finance

The First Fundamental Principle (FP1): The value of any asset is equal to the present value of the cash flows the asset is expected to produce over its economic life.

This first principle is at the heart of the valuation process and is the basis of all methods used for determining the value of virtually anything: a stock or bond being issued by the firm, an investment project the firm is considering or even the firm itself. This principle can be clarified by deconstructing it into smaller phrases that can be understood at a more basic level.

The value of any asset is equal to:

- the present value—present value and its calculation are discussed in Chapter 2, “The Time Value of Money.” For now, it is enough to understand that a dollar today does not
The Fundamental Principles of Finance

have the same value as a dollar one year from today. A dollar today can be invested to earn interest and will therefore be worth more than a dollar in one year’s time. Thus, the ability to invest and earn interest means that a dollar today is worth more than a dollar one year from today. This basic truth indicates the need for evaluating investments in terms of dollars today—their present value.

• of the cash flows—the basis of value for an asset stems from the cash flows the asset will produce. Those cash flows, put into current dollar terms (their present value), are summed to determine the value of the asset. The nature of the asset will determine the nature and timing of the cash flows produced by the asset. The cash flows produced by a bond are different from the cash flows produced by a stock and are also different from the cash flows produced by an asset used in production. In any case, value will be calculated as the sum of the present values of the expected future cash flows.

• the asset is expected to produce—the word “expected” is underlined here to emphasize the fact that the cash flows to be produced by the asset are to be forecasted and therefore are a matter of judgment. It is possible that three different analysts attempting to value the same asset will produce three slightly different sets of expected cash flows, since they may each make different assumptions. There is much use of judgment in finance, and analysts who develop good judgment get paid very well. You are not expected to have good judgment in business at this time in your career, when you are just starting out. However, college is your opportunity to develop your judgment. Firms hire people with good judgment to manage their business, and those managers whose judgment proves effective climb the corporate ladder successfully. Therefore, it is in your best interests to put your own judgment to the test, in this course as well as in other courses. Even if finance is not your chosen field, if you wish to succeed in business, it is your judgment that will convince others of your value to the firm.

• over its economic life—different assets have different expected lives. For example, when a firm purchases a new machine for use in production, it assigns an economic life, based on the nature of the asset, for purposes of depreciation. Some production assets have shorter lives (5–10 years), while others have much longer lives (20–30 years). Also, while bonds have a limited expected life (they have a date at which they mature), stocks are expected to last forever. Therefore, the economic life of the asset in question will have an impact on the cash flows it is expected to produce.

Thus, when we are attempting to value an asset, we must determine:

• The discount rate (i.e., the cost) that is appropriate for the perceived level of risk for the given asset (which will be used to calculate the present value of the cash flows);
• The size and the timing of the cash flows the asset is expected to produce; and
• When the asset is expected to be sold or taken out of service (when its economic life ends).

The discount rate to be used for calculating the present value of the cash flows is determined by the level of risk associated with the asset in question, and thus will vary from asset to asset and from firm to firm. This will be discussed further in Chapter 3, “Risk and Return,” as well as in the discussion of the second fundamental principle. It is enough at this point to understand that different types of assets will use different discount rates to determine the present value of their cash flows.

The cash flows associated with an asset can take on different forms. When a firm offers a new product, or improves an existing product, it does so with the expectation that the new
(or improved) product will increase sales, and thus the cash flows for the product will include additional sales revenue. In a different scenario, a firm may invest in a new technology to produce an existing product because the new technology will decrease production costs, leading to higher profitability on the product. In that case, the cash flows for the project will include the reduced operating costs offered by the new technology.

The economic life of the asset will be determined by the nature of the asset as well as the intended use of the asset. Most physical assets (trucks, machines or buildings) fit into predetermined asset classes that estimate their economic life (e.g., the MACRS asset classes used for calculating depreciation). In addition, the firm may have reasons for using a different economic life than the one suggested by the asset class. For example, if the product in question will no longer be sold after a future date, then the asset used to produce the product may have effectively reached the end of its economic life at that date. The expected economic life of the asset must be established in order to be able to determine the time span over which cash flows can be expected and, with that, its value.

The general method outlined in the first fundamental principle will be used to establish the value of a firm’s bonds, their common stock, their preferred stock, any capital investments they are considering and even the firm itself. Thus, the current market value of any asset can be seen as the sum of the value of the cash flows it is expected to produce, assuming all of the cash flows were to be received today, rather than over an extended period of time.

The Second Fundamental Principle (FP2): There is a direct relationship between risk and return; as perceived risk increases, required return will also increase (and vice versa), holding other things constant.

Risk is typically understood as the chance of a bad outcome. In finance, risk is identified as the probability of not earning the return you expect from your investment over a given period of time. In statistics class, you are taught that the expected value of a variable is the mean, or the arithmetic average, of the variable. In the same way, the expected value of a data set is its mean, and the perceived risk of the data set is the likelihood of the outcome being other than its mean. That likelihood is measured using the standard deviation of the data set.

The standard deviation of a data set essentially measures the average deviation from the mean among the observations in the data set. In other words, it shows how likely the actual observations are to vary from their average. If the actual observations are very close to their mean, the standard deviation will be small, indicating that there is a small tendency for the observations to be different from their mean, or a large likelihood of achieving the expected value. If the actual observations are very different from their mean, the standard deviation will be larger, indicating a larger tendency for the observations to be different from their mean, or a smaller likelihood of achieving the expected value. This tendency reflects the behavior of the returns over the period in question—some period of time in the past. If we assume that the data will behave similarly in the future as they did in the past (a big assumption), then we can use the standard deviation as a measure of the likelihood of the observations varying from their mean in the future. There are two issues with using the standard deviation in this way.

First, as mentioned above, assuming that past behavior will be replicated in the future is a big assumption, and there is no basis in fact for making such an assumption. However, barring any specific reason to believe otherwise, it is as good an assumption as any we can possibly make. If we have reason to believe certain things about the future, things that may or may not differ from the past, we can build that knowledge into our calculations of the mean
and standard deviation of the returns in the future by using a probability distribution. We will in fact use this method in Chapter 3, “Risk and Return.”

Second, there is an issue with using the standard deviation as a measure of risk, since it measures any deviation from the mean, lower or higher. While returns lower than the mean are disappointing, returns higher than the mean are welcome—they increase our wealth. Treating higher-than-expected returns the same as lower-than-expected returns doesn’t seem right. However, until statistical theory offers a better metric, we will use the standard deviation, since it does in fact offer some insights into the behavior of the data. A simple example will help to make this point.

Table 1.1 contains the annual returns for two different stocks (Stock A and Stock B) over a five-year period. The arithmetic mean (or expected) return over the period is the same for both stocks:

\[
\bar{x}_A = \frac{.048 + .058 + .055 + .059 + .05}{5} = .054 \text{ or } 5.4\%
\]

\[
\bar{x}_B = \frac{-0.025 + .031 + .094 + .026 + .144}{5} = .054 \text{ or } 5.4\%
\]

However, if you look at the raw data in the table, it is apparent that these two stocks’ returns are not the same. Stock A’s returns get as low as 4.8% and as high as 5.9%, while over the same period Stock B’s returns get as low as −2.5% and as high as 14.4%. Clearly, Stock B’s returns have a higher tendency to vary from their mean. The standard deviation of the returns for each stock quantifies this:

\[
s_A = \sqrt{\frac{(0.048 - .054)^2 + (0.058 - .054)^2 + (0.055 - .054)^2 + (0.059 - .054)^2 + (0.05 - .054)^2}{5 - 1}}
\]

\[= .0048 \text{ or } 0.48\%
\]

\[
s_B = \sqrt{\frac{(-0.025 - .054)^2 + (0.031 - .054)^2 + (0.094 - .054)^2 + (0.026 - .054)^2 + (0.144 - .054)^2}{5 - 1}}
\]

\[= .0657 \text{ or } 6.57\%
\]

Thus, while both stocks have the same expected return over the five-year period, Stock B’s returns had a greater tendency to vary from their mean during the period. Stock B’s higher standard deviation (more than 10 times as high!) indicates a higher likelihood for its investors not to get their expected return. The interpretation of these statistics is that, for this five-year period, Stock B’s returns were riskier than Stock A’s returns. This can be seen easily if we plot the returns against their mean, as in the following graphs.

<table>
<thead>
<tr>
<th>Year</th>
<th>Stock A</th>
<th>Stock B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>.048</td>
<td>−.025</td>
</tr>
<tr>
<td>Year 2</td>
<td>.058</td>
<td>.031</td>
</tr>
<tr>
<td>Year 3</td>
<td>.055</td>
<td>.094</td>
</tr>
<tr>
<td>Year 4</td>
<td>.059</td>
<td>.026</td>
</tr>
<tr>
<td>Year 5</td>
<td>.05</td>
<td>.144</td>
</tr>
</tbody>
</table>
In the graphs in Figure 1.1, the black dots represent the returns for each year, while the dashed grey line represents the mean return during this period. Over the five-year period in question, the returns to Stock A hover around their mean without deviating very far, an indication that their standard deviation is small. The returns to Stock B, on the other hand, vary significantly from their mean, indicating that their standard deviation is much larger. For an investor looking to put their money into either Stock A or Stock B in the future, it would make sense to choose A over B, since while both have the same expected return, B has more risk. Why take on the additional risk associated with Stock B when you can get the same expected return from Stock A without the additional risk? The rules of rational investing in these cases are simple:

- If two investments have the same expected return but different levels of risk, choose the investment with less risk;
- If two investments have the same level of risk but different expected returns, choose the investment with the higher expected return.

*Figure 1.1 Annual and Mean Returns, Stock A vs. Stock B*
Rational investors will either maximize their expected return for a given level of risk, or minimize the risk for a given level of expected return. Thus, rational investors will require a higher level of return for investments with a higher level of perceived risk, and be willing to accept lower levels of return for investments with less perceived risk. This is the essence of fundamental principle two: as perceived risk increases, required return will also increase, holding other things constant.

**The Third Fundamental Principle (FP3): There is an inverse relationship between price and yield; if an asset's price increases, its return will decrease (and vice versa), holding other things constant.**

Yield is simply another word for return, more specifically the percentage return. This fundamental principle is based on the relationship between the terms of a fraction: as the denominator of a fraction increases, holding the numerator constant, the value of the fraction decreases. This can be shown mathematically:

\[
\frac{1}{2} > \frac{1}{3} > \frac{1}{4} > \frac{1}{5}, \text{ or } 0.50 > 0.33 > 0.25 > 0.20
\]

For an example of how this works, suppose you bought a $1,000 bond at the beginning of the year that pays $100 interest annually. At the end of the year, your percentage return on the bond would be 10% ($100 cash flow ÷ $1,000 investment = 0.10). Next, suppose that after the New Year starts, you want to sell the bond, and it has gone up in price to $1,080. Ignoring what the increase in price does to your returns, since the annual payment is fixed, that increase in the price will cause the yield the bond pays to decrease. The person who buys the bond from you will get the same $100 payment at the end of the year. However, since they paid more for the bond, that person will earn a lower yield (percentage return): $100 ÷ $1,080 = 0.0926 or 9.26%. Thus, the increase in the price of the bond has led to a decrease in the percentage return on the bond. Similarly, if the bond had gone down in price to $925, the new bond owner would earn a higher yield ($100 ÷ $925 = 0.1081 or 10.81%).

As will be seen in Chapter 5, “Bond Valuation,” the market value of a bond already in circulation will vary in line with fundamental principle three based on changes to interest rates in the market. Bonds are issued at interest rates that equate their face value with their market value. While the face value of a bond never changes, its market value will change over time inversely with changes to market interest rates.

**The Three Precepts**

As stated earlier in this chapter, the three fundamental principles work independently of each other. However, they do interact, and their interactions can be better understood through the use of the three precepts. These precepts explain interactions between the fundamental principles in ways that help clarify the impact of the fundamental principles.

The Oxford Dictionary defines a precept as “a general rule intended to regulate behavior or thought.” The three precepts offered here are intended to guide your thoughts through the maze of financial theory by showing how the fundamental principles interact and how theory
The Fundamental Principles of Finance

is driven by those interactions. The precepts are specific rules designed to give insight into how the fundamental principles work in shaping financial theory.

**The First Precept (PR1):** The present value of a cash flow (or an asset) is inversely related to its discount rate; increasing the discount rate decreases the present value (and vice versa), holding other things constant.

The first precept reflects the interaction between fundamental principles one and three, and it is similar to the third fundamental principle in that it is mathematical in nature. The discount rate used to calculate the present value of a cash flow is determined by the nature of the cash flow (or the asset it is derived from) as well as the relative riskiness of the cash flow (or the asset it is derived from). Different types of assets will require different discount rates; PR1 tells us that the discount rate used will affect the value determined for the asset.

This first precept relates the impact of the first fundamental principle (FP1), concerning how value is determined, with the impact of the third fundamental principle (FP3), showing the relationship between the value of an asset and the return it earns. When we discount cash flows to determine their present value (or the present value of the asset that produces the cash flows), we are removing value to account for returns to investors over time. In this way, we can equate current cash flows with future cash flows by assuming they will earn a given return over a particular period of time. Understanding how cash flows in two different time periods can be economically equivalent is an important part of financial theory and will be discussed in more detail in Chapter 2.

**The Second Precept (PR2):** The timing of the cash flows of an asset is important; sooner is better (later cash flows are more heavily discounted, reducing their present value).

The second precept shows another interaction between fundamental principles one and three; it relates to the timing of the cash flows associated with an asset. It is similar to the first precept in that it is driven by a mathematical relationship, but it is different in that risk is not the issue here; time is. A cash flow that occurs at the end of the first time period is discounted for one period to obtain its present value, while a cash flow that occurs at the end of the second time period is discounted for two periods to obtain its present value. As will be discussed in detail in Chapter 2, “The Time Value of Money,” discounting is the removal of value from the cash flows in order to pay the firm’s investors. The further out the cash flows occur, the more value gets removed in the discounting process, and consequently the lower the present value. Therefore, an asset for which larger cash flows come earlier in its economic life will have a higher present value than another similar asset for which the larger cash flows come later, since the earlier large cash flows will not be discounted as much. This will be made clearer in the discussion on present value in Chapter 2.

These first two precepts show us that the present value of a cash flow is affected by the size of the cash flow, the timing of the cash flow and the discount rate used to determine its present value. The third precept shows us that the discount rate used is a reflection of the riskiness of the cash flow.

**The Third Precept (PR3):** The present value of a cash flow (or an asset) is inversely related to its perceived risk; the higher the risk, the higher the discount rate, and therefore the lower the present value.
The third precept shows the interaction between fundamental principles two and three. It relates the discount rate used for calculating the present value of a cash flow with the level of risk associated with the cash flow (or the asset producing the cash flow). While the first fundamental principle (FP1) shows how value is determined through the discounting process, the third fundamental principle (FP3) indicates that the value can change if the discount rate changes. This third precept tells us why the discount rate may be changed.

Fundamental principle two (FP2) indicates the positive relation between risk and return, while fundamental principle three (FP3) describes the negative relation between return and value. Since risk and return are positively correlated (as per FP2), risk must be negatively correlated with value (as per FP3). Thus, if an asset or a cash flow is determined to have above-average risk, its present value will be lower than if it were of average risk, and vice versa. This occurs because, in the discounting process, we adjust the discount rate to account for the difference in risk. In this way, if two different assets have identical cash flows but different levels of risk, the value of the lower-risk asset will be greater than the value of the higher-risk asset. This is because the higher-risk asset will be valued using a higher discount rate to account for the higher level of risk—we are increasing the denominator of the fraction, where the cash flow in question is the numerator of the fraction.

Differentiating Between the Principles and the Precepts

The three fundamental principles describe relationships among the different forces that impact value: the size, timing and nature of the cash flows produced by the asset and the relative riskiness of the asset or its cash flows. These principles apply when valuing any type of asset and can therefore be used when attempting to determine a value when confronted with some new type of asset. Regardless of the nature of the asset, its value lies in the cash flows that the asset is expected to produce. These principles flow throughout financial theory, in some form or another, whenever we are attempting to determine an asset’s value, its riskiness or its expected return. Therefore, if we understand the fundamental principles, we can intuit what to expect when confronted with a financial situation with which we may be unfamiliar.

While the principles describe the forces that impact value, the precepts describe interactions between the principles that can be utilized to better understand the theory of finance. PR1 describes part of the mechanics of valuation: holding other things equal, increasing the discount rate will decrease the value of an asset or a cash flow, and vice versa. This tells us that if we have two assets that have identical cash flows, and the two assets have different discount rates (for whatever reason), then we can intuit that the asset with the lower discount rate will have the greater value. We know this without having to calculate anything, because the mathematical mechanics described in PR1 tell us so.

PR2 indicates that the timing of the cash flows will have an impact on the asset’s value. This occurs because of the discounting process; the further out in time a cash flow occurs, the more value is removed during the discounting process, and therefore the lesser the present value of the cash flow.

We can take this one step further: the structure of the cash flows an asset is expected to produce has an impact on the value of that asset as well. If most of the asset’s large cash flows arrive early in its economic life, those cash flows will be discounted less (i.e., will have less value removed), and therefore the present value of the cash flows will be greater. Similarly, if an asset has most of its large cash flows being produced later in its economic life, those cash flows will have more value removed during the discounting process, and therefore the
The Fundamental Principles of Finance

present value of the cash flows will be lesser. We can intuit this without calculating anything thanks to PR2, which helps us understand the mechanics of the discounting process.

PR3 tells us that riskier cash flows will have lower present values, while less risky cash flows will have higher present values. This occurs because the discount rate can be adjusted for risk—increased for cash flows of higher-than-average risk, and decreased for cash flows of lower-than-average risk. Therefore, if we have two assets with identical cash flows, but with different levels of risk, the riskier asset will have a lower value than the less risky asset. The reason behind this is that the discounting process removes more value from the riskier asset (with the higher discount rate) than it does from the less risky asset (with the lower discount rate). We can intuit this with help from PR3, which tells us the impact of risk on the discounting process, without having to calculate anything.

This also ties in with the second fundamental principle; since both assets have the same cash flows, the riskier asset will have not only the lower value but also the higher expected return. Once again, this is the mechanics of mathematics—the higher risk asset will have a lower value in the denominator, but the same cash flow in the numerator, as the less risky asset. Therefore, the value of the fraction (the percentage return) will be higher. In fact, the higher discount rate is used for the riskier asset specifically to pay a higher return to the firm’s investors, in order to compensate them for taking on the higher level of risk. Thus, PR3 gives us one possible explanation for PR1, an explanation that is grounded in financial theory, and in FP2.

Making Use of the Principles and Precepts

As was mentioned previously, the next seven chapters in this book introduce the theory of finance and how it is used for valuation. There is a chapter on how to value a firm’s bonds, another on how to value their stock and another on how to value the projects the firm is considering investing in for production purposes. We will review how to value a single future cash flow as well as a series of future cash flows. We will see how the costs of the different sources of funds are incorporated into the value analysis, and how those costs may be adjusted to account for risk. Seven different chapters, covering different areas of valuation, occur later in this book. Each covers a different area of financial theory. Yet each of those chapters makes use of the three fundamental principles described in the current chapter. Therefore, each remaining chapter can be better understood by having a solid understanding of the three fundamental principles and the three precepts.

Chapter 2, “The Time Value of Money,” discusses how to value different types of cash flows associated with different types of investment vehicles. For example, suppose you were to win the lottery, and you were given a choice of how to collect your winnings: a single cash flow now, or an annual cash flow for the next 20 years. How would you choose between those offers? FP1 is the basis for valuing these two choices, and PR1 tells you if the discount rate the lottery firm is using to calculate the single cash flow payment is reasonable. Similarly, it is likely that at some point in the future you will own a credit card (if you don’t own one already). The credit card company offers you credit and charges you an annual percentage rate (APR) for the use of the credit. In Chapter 2, you will learn that the APR they quote you is not the rate you will actually pay. This discrepancy is explained by FP1. When compounding (or discounting) is done more frequently than annually, the future value (or present value) changes due to the change in frequency. This result is addressed by FP3.

Chapter 3 describes the relationship between risk and return, and how return is affected by risk. In this chapter, we will see that while investing in a single stock can earn you a higher
expected return than investing in a number of stocks, the lower expected return you earn from the group of stocks is safer than the return you may earn from the single stock. This result, and the desirability of this result, is explained by FP2. The impact of risk on value is explained directly by PR3, and indirectly by PR1 (since risk affects the discount rate used to calculate the value).

Chapter 4, “The Term Structure of Interest Rates,” shows how interest rates are determined in the market. The material in this chapter shows very clearly how FP2 works in practice. PR3 examines the inverse relationship between value and the risk, while PR1 describes the inverse relationship between value and the discount rate. These two precepts are linked by the direct relationship between risk and return, since the return to bondholders is used as the discount rate for determining the market value of bonds.

Chapter 5, “Bond Valuation,” explains how a firm’s bonds are valued and why their value changes over time. Suppose you were to buy a newly issued bond from Microsoft for $1,000 that had a 10-year maturity. If you decide to sell the bond after five years, there is a good chance that you will not get $1,000 for the bond when you sell it—maybe more, maybe less, but not $1,000. FP3 explains why this is so, and PR1 shows how the true market value is determined.

Chapter 6 discusses different methods for determining the value of a firm’s common equity (its common stock). As will be seen, the basic model for determining the value of a common stock is based on the dividends the stock is expected to pay over time. The future dividends the stock is expected to pay are determined by making an assumption about the rate at which the dividend is expected to grow over time. There are three separate assumptions that are used for this purpose: that the dividend will not grow at all; that it will grow at a constant future rate; or that it will grow at a nonconstant rate for a period of time before eventually settling down to grow at a constant rate. The impact of these different assumptions is explained by FP1 and FP3, and the methods used for calculating the value of the stock are described by PR1 and PR2.

Chapter 7, “Capital Budgeting Decision Methods,” details the various methods used to determine the value of the production projects in which the firm may choose to invest. There are several metrics given for deciding among a set of possible investments, each looking at the project from a slightly different perspective. The process for determining the cash flows of a project is given in detail, and the value metrics themselves are explained thoroughly in terms of all three fundamental principles as well as all three precepts. This is one of the most important chapters in the book, as investing in projects that earn more than they cost is the key to making a business grow.

Chapter 8 explains the theory behind determining the firm’s weighted average cost of capital—the cost of the money the firm raises to invest in new production assets. Each source of funds (debt, preferred equity and common equity) is valued differently, using different assumptions, but all follow the fundamental principles outlined in this chapter. The weighted average cost of capital is the basis of the discount rate used for valuing the firm’s investment projects, and all three fundamental principles impact the methods used in the calculation.

Whenever these issues arise in the coming chapters, you will be reminded of these principles and precepts, and how they impact the theory in question. Understanding the theory at a fundamental level enables you to draw conclusions and make decisions when confronted with new theoretical questions. Just as a coach in sports drills the players on fundamentals to make them better players, this book will drill you on the fundamentals of financial theory to make you a better financial analyst. This chapter serves as the basis for those fundamental understandings; refer to it whenever you confront a theoretical issue that puzzles you. It is your best bet for understanding the complicated theory to follow.
Summary

The three fundamental principles are the basis for all of the theory addressed in the following seven chapters of this text. The three precepts help to understand how the theories interact and how you can make use of the theories to solve problems. Having a solid understanding of these principles and precepts will aid in the understanding and use of the theory. The theory in each of the coming chapters is grounded in one or more of these principles, and it will aid your understanding of the theories to find the link between the theories and the underlying principles.

End of Chapter Problems

1. Describe in your own words the nature of the relationship between risk and return, how changes in one affect changes in the other and what human trait is responsible for that relationship.
2. Describe in your own words the method for determining the value of an asset.
3. Describe in your own words the nature of the relationship between the price of an asset and the percentage return it earns, how changes in one affect the other and the basic principle that determines that relationship.
4. Describe in your own words the relationship between the value of an asset and the discount rate used to calculate its value.
5. Describe in your own words the relationship between the discount rate used to value an asset and the risk of the asset, as well as the relationship between the risk of an asset and the value of the asset.
6. Describe in your own words the impact of the timing of an asset’s cash flows on the value of the asset.
7. What purpose do the principles given in this chapter serve?
8. What purpose do the precepts given in this chapter serve?
9. Suppose you purchased a corporate bond for its par value of $1,000 when it was issued. The bond pays a 10% coupon ($100) annually. After two years, you sell the bond to another investor for $950. How will the change in the bond’s market value affect the new owner’s yield on the bond?
10. The production manager at a manufacturing plant wants to invest in a new technology for producing the firm’s product. This new technology will replace one of the employees currently used to produce the item. How can you determine the value of this new technology?
11. You win a contest for which you get to pick your prize. Your options are:
   a. $1,000 in the first month, $2,000 in the second month, $3,000 in the third month, and so on for one year.
   b. $5,000 per month for one year.
   c. $12,000 in the first month, $11,000 in the second month, $10,000 in the third month and so on for one year.

   Which prize should you pick?
12. The marketing manager at your firm shows you an analysis he performed of a new production process that he believes will reduce production costs and show a slight profit after taking into account the cost of operating the new technology. While the marketing manager believes the project is of average risk, you believe the new technology is riskier than the projects the firm normally invests in. How will this affect your evaluation of the new technology?
five years (60 payments). Based on these data, what monthly interest rate is your bank charging you? What is the equivalent annual rate?
12. You put money into an investment that is expected to pay 8.0% interest annually. At this annual interest rate, how many years will it take for you to double your money?
13. You get an offer for a credit card that charges 13.99% interest APR, compounded monthly. What effective annual interest rate does this credit card charge?
14. You borrow $22,500 from your bank, to be repaid in monthly payments over four years (48 payments), starting at the end of the month. If the bank charges you 6.5% interest APR, compounded monthly, what will your monthly payment be?
15. You are expecting to receive the following cash flows: $1,000 one year from now, $1,500 two years from now, $2,500 three years from now, $4,000 four years from now and $5,000 five years from now. If your discount rate is 4.5%, what is the present value of these cash flows?
16. You intend to deposit the following cash flows into your bank: $750 one year from now, $1,000 two years from now, $1,250 three years from now, $1,500 four years from now, $1,750 five years from now and $2,000 six years from now. Assuming the bank pays you 6.25% interest APR, compounded annually, how much will be in your account at the end of six years (when the final payment is made)?
17. You plan to take a Caribbean cruise in five years. The cruise will cost you $15,000, with payment due exactly five years from today. You have a savings account that pays 5.5% APR, compounded monthly. The savings account currently has $4,500 in it, which you will leave in the account to help pay for the cruise. How much more must you deposit into the savings account today in order to have exactly $15,000 in the account five years from today?

Bibliography


18. Stock A’s returns have a standard deviation of 7.0%, while Stock B’s returns have a standard deviation of 9.0%. The correlation coefficient between Stocks A and B is 0.45. Use these data to calculate the standard deviation of a portfolio that contains 40% Stock A and 60% Stock B.

**Excel Project**

**Table 3.4 Income Statements for Petrosian Consolidated LLC 2015–2019**

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>48,560</td>
<td>51,235</td>
<td>54,310</td>
<td>56,483</td>
<td>60,437</td>
</tr>
<tr>
<td>Cost of Goods Sold</td>
<td>22,338</td>
<td>23,566</td>
<td>24,851</td>
<td>25,686</td>
<td>26,516</td>
</tr>
<tr>
<td>Operating Expenses</td>
<td>10,683</td>
<td>11,480</td>
<td>11,996</td>
<td>11,983</td>
<td>12,015</td>
</tr>
<tr>
<td>Depreciation</td>
<td>1,457</td>
<td>1,486</td>
<td>1,493</td>
<td>1,521</td>
<td>1,535</td>
</tr>
<tr>
<td>EBIT</td>
<td>14,082</td>
<td>14,703</td>
<td>15,970</td>
<td>17,293</td>
<td>20,371</td>
</tr>
<tr>
<td>Interest</td>
<td>2,350</td>
<td>2,350</td>
<td>2,375</td>
<td>2,400</td>
<td>2,425</td>
</tr>
<tr>
<td>Taxes</td>
<td>4,691</td>
<td>4,941</td>
<td>5,221</td>
<td>5,451</td>
<td>5,866</td>
</tr>
<tr>
<td>Net Income</td>
<td>7,041</td>
<td>7,412</td>
<td>8,374</td>
<td>9,442</td>
<td>12,080</td>
</tr>
</tbody>
</table>

The table above contains abbreviated income statements for Petrosian Consolidated LLC for the period 2015–2019. Enter the data into an Excel spreadsheet to do a full risk analysis. Calculate the following metrics for Petrosian:

- The coefficient of variation (CV) of EBIT for the entire five-year period;
- The CV of the operating margin for the entire five-year period;
- The degree of operating leverage (DOL) for the years 2016–2019;
- The CV of net income for the entire five-year period;
- The CV of the net margin for the entire five-year period;
- The degree of financial leverage (DFL) for the years 2016–2019;
- The degree of combined leverage (DCL) for the years 2016–2019.

Use the metrics you calculate, and any other trends you may find in the data, to analyze the level of risk for Petrosian. Submit a one-page write-up of your findings (not including tables). What is happening with Petrosian’s risk during this period of time?

**Note**


**Bibliography**


The Term Structure of Interest Rates

c. The relationship between short-term and long-term interest rates.
d. The relationship between risk and return.
e. The relationship between yield and price.

Use the following data to answer questions 10–18.
Assume the following premiums reflect current market conditions:

\[ r^* = 3.15\%; \]
\[ IP(1\text{-year bonds}) = 2.35\%; \]
\[ IP(3\text{-year bonds}) = 2.65\%; \]
\[ IP(5\text{-year bonds}) = 2.90\%; \]
\[ DRP(\text{AAA corporate bonds}) = 0.60\%; \]
\[ DRP(\text{AA+ corporate bonds}) = 0.85\%; \]
\[ LP(\text{AAA corporate bonds}) = 0.22\%; \]
\[ LP(\text{AA+ corporate bonds}) = 0.30\%; \]
\[ MRP = 0.1\% \times (t - 1) \text{ where } t \text{ is the number of years to maturity.} \]

10. Calculate the interest rate for a 1-year AA+ corporate bond.
11. Calculate the interest rate for a 3-year AA+ corporate bond.
12. Calculate the interest rate for a 5-year AA+ corporate bond.
13. Calculate the interest rate for a 1-year AAA corporate bond.
14. Calculate the interest rate for a 3-year AAA corporate bond.
15. Calculate the interest rate for a 5-year AAA corporate bond.
16. Calculate the interest rate for a 1-year Treasury security.
17. Calculate the interest rate for a 3-year Treasury security.
18. Calculate the interest rate for a 5-year Treasury security.
19. The current 1-year interest rate is 6.40%, while the current 2-year interest rate is 5.80%.
   Given these rates, what is the expected 1-year interest rate one year from now?
20. The current 1-year interest rate is 4.74% and the expected 1-year interest rate one year
    from now is 5.12%. If the current 3-year interest rate is 5.22%, what is the expected
    1-year rate two years from now?

Notes

Bibliography


12. For your four-year anniversary of owning the bond, calculate the market price, the current yield, the capital gains yield and the total yield for the bond for the past year. What has changed? To what do you attribute the change (specifically, not “the change in the YTM”)?

13. For your five-year anniversary of owning the bond, calculate the market price, the current yield, the capital gains yield and the total yield for the bond for the past year. What has changed? To what do you attribute the change (specifically, not “the change in the YTM”)?

14. You bought a 10-year, 6.20% semiannual coupon bond three years ago for its face value of $1,000. When you attempted to sell the bond today, you were told that the market price being offered today is $985.00. What is the current yield to maturity for this bond?

15. You are interested in purchasing a newly issued $1,000 par, 20-year, 4.80% semiannual coupon bond. While reading the indenture you see that the bond has five years of call protection, and that the call premium is one interest payment. What is the yield to call for this bond?

16. You are interested in purchasing a newly issued $1,000 par, 20-year, 4.80% semiannual coupon bond. Calculate the duration and the modified duration for the bond.

17. You are interested in purchasing a newly issued $1,000 par, 20-year, 4.80% semiannual coupon bond. You believe that the yield to maturity on the bond will increase to 4.90% during the first year that you own the bond. Use the duration and modified duration that you calculated in problem 16 to estimate the percent change in the price if your belief in the YTM proves accurate.

Bibliography


19. Use the data above and your calculations from questions 15 through 18 to estimate the intrinsic value per share of the firm’s common stock as of the end of 2018.

**Note**


**Bibliography**


Excel Project

Replacement Project Analysis

This case discusses a replacement project—the firm is considering replacing an existing asset that is still productive with a new asset that uses a new technology that will save on production costs. Since the old asset is still productive, the cash flows from that old asset must be considered in the analysis (they are an opportunity cost).

Peterman Plastics uses a lathe for trimming molded plastics. The lathe was purchased ten years ago at a cost of $7,500. It has an expected economic life of 15 years, and the salvage value at the end of that 15 years is expected to be zero. The current lathe has been depreciated on a straight-line basis (@ $500 per year) and currently has a book value of $2,500. The firm’s engineers report that a new machine can be purchased for $12,000 (including S&H), and over its five-year economic life it will reduce labor and material costs by $3,000 per year. The new machine falls into the MACRS 3-year depreciation class, which depreciates the equipment over four years (33% in the first year, 45% in the second, 15% in the third and 7% in the fourth year). Salvage value for the new machine at the end of five years is expected to be $2,000. The old machine’s current market value is $1,000 and it will be sold if the new machine is purchased. Net working capital will need to increase by $1,000 (for parts and supplies) if the new machine is purchased. The firm’s marginal tax rate is 40.0%. The appropriate cost of capital for the new machine is 11.5%.

Do a complete incremental cash flow analysis and capital budgeting analysis for this project. Use the capital budgeting analysis as the basis for a recommendation to your boss on the project. Write a one-page memo to your boss giving your recommendation and supporting it with the capital budgeting analysis.

Bibliography


calculation—just change the format of the number, not its value. Format all dollar figures to the dollar (no cents).

Turn in a one-page paper addressing the five issues indicated above. Format your spreadsheet so that all of your analysis can be printed on one page, and attach it to your one-page write-up. Email your spreadsheet to the instructor before turning in the hard copy.

Bibliography


However, in 2018, the firm was unable to increase the dividend, and yet also had a negative addition to retained earnings (i.e., retained earnings on the balance sheet fell in 2018). The CFO would like to increase the dividend by 5% in 2019, and so she needs you to analyze the firm’s financial statements over the past five years, and to forecast the pro forma financial statements for 2019 and analyze them as well.

You are to recreate the financial statements in Table 9.3 in an Excel spreadsheet, then do a complete ratio and metrics analysis, similar to what was done for Marquardt Manufacturing. Include all the ratios included in the chapter and the value metrics MVA, EVA and ROIC. Create common-size statements and do a percent change analysis as well. The CFO needs you to determine two things:

1. What drove the results that made it impossible to increase the dividend in 2018?
2. Are we on track to be able to afford growing the dividend by 5% in 2019?

Make the following assumptions during the analysis:

- In 2019, sales growth will be in line with growth in 2015–2018;
- No new net fixed assets will be required to meet the 2019 sales forecast;
- The 2019PF dividend will be $2.44 per share.

Use the percent of sales method as taught in the chapter to forecast the 2019 pro forma statements. Write a concise (one page) paper outlining the results of your analysis and answering the two questions posed to you by the CFO.

Bibliography


c. General partnership.
d. Limited partnership.
e. Sole proprietorship.

12. A business owned by two or more individuals, with some owners having different amounts of liability in the firm’s debt, is called a:
   a. Corporation.
   b. S corporation.
   c. General partnership.
   d. Limited partnership.
   e. Sole proprietorship.

13. Which of the following statements is correct?
   a. Corporations can have an unlimited life.
   b. Corporate profits are taxable income to the shareholders when earned.
   c. Shareholders are protected from all potential losses.
   d. The majority of firms in the US are organized as corporations.
   e. Retained earnings are double-taxed.

14. Which of the following statements is correct?
   a. A limited partnership is legally the same as a corporation.
   b. Partnerships are the most complex type of organization to form.
   c. Earnings from sole proprietorships and partnerships are taxed at the individual level.
   d. Only sole proprietorships have limited lives.
   e. Limited partnerships are required to restate the liability to each partner annually when they file their financial reports with the SEC.

Notes

Bibliography
require pressure from within the industries as well as the firms themselves. Business schools must promote the teaching of ethics in business and finance that includes stakeholder theory and corporate sustainability. They must show students the value to society in recognizing the importance of all the stakeholders, so that future generations of new managers can change the culture from within.

End of Chapter Problems

1. What unusual step did the board of directors at WorldCom take to avoid lowering the stock price?
2. What legal accounting tool did Enron’s CFO use to make earnings look better than they were?
3. How does a Ponzi scheme work?
4. What other firm did the Enron scandal bring down, and for what reason?
5. What circumstance made it possible for Charles Keating to quintuple Lincoln Savings and Loan’s assets in a short period of time?
6. Who were the Keating five?
7. In what way was Proctor and Gamble’s interest rate swap deal unethical?
8. What particular form of debt did Robert Citron use to leverage up the returns to the Orange County Investment Pool?
9. What circumstance in the economy made Robert Citron’s investment strategy change from a winner to a loser?
10. What circumstance allowed Robert Citron to put the Orange County Investment Pool’s funds at risk?
11. What circumstance allowed Nick Leeson to put Barings Bank’s funds at risk?
12. What strategy that Nick Leeson tried only made things worse?
13. What part of the strategy made things worse for both Orange County and Long Term Capital Management when returns started going negative?
14. What situation that arose due to the S&L crisis caused the federal government to bail out Wall Street and the big banks in the 2007 financial crisis?
15. What risk metric proved insufficient for Long Term Capital Management?

Notes


Bibliography


Online archives, www.chicagotribune.com
Online archives, www.washingtonpost.com
16. What are the three tasks mandated to the Federal Reserve Bank?
17. What does the Federal Open Market Committee do?
18. What is the difference between a defined benefit retirement plan and a defined contribution retirement plan?

Notes
1 Pensions & Investments, April 25, 2017.
2 Ibid.

Bibliography