Part I

Value and Capital Budgeting

...in a Perfect Market under Risk Neutrality

The two primary goals of this first part of the book (Chapters 2–6) are to explain how to work with rates of return and how to decide whether to accept or reject investment projects. We assume in this part that there is a *perfect market*—one with no taxes, no transaction costs, no disagreements, and no limits as to the number of sellers and buyers in the market. This assumption will make it easier to understand finance first before applying it to the messy real world.

What You Want to Learn in this Part

- In Chapter 2, we start with the most basic possible scenario. In addition to a perfect market, we assume that there is no uncertainty: You know everything. We also assume that all rates of return in the economy are the same: A 1-year investment pays the same and perfectly known rate of return per annum as a 10-year investment. Under these assumptions, you learn how 1-year returns translate into multiyear returns and when you should accept or reject a project. The chapter introduces the important concept of "present value."

  Typical questions: If you earn 5% per year, how much will you earn over 10 years? If you earn 100% over 10 years, how much will you earn per year? What is the value of a project that will deliver $1,000,000 in 10 years? Should you buy this project if it costs you $650,000? What inputs do you need to make your decision?

- In Chapter 3, you learn how to value particular kinds of projects—perpetuities and annuities—if the economy-wide interest rate remains constant. You then learn how to apply the formulas to the valuation of stocks and bonds. The popular Gordon dividend growth model for valuing stocks assumes that dividends are a simple growing perpetuity cash flow stream, which makes it a perfect application of the perpetuity formula. Mortgages and other bonds are good applications of pricing using the annuities formulas.

  Typical questions: If a firm pays $1/share dividends next year, growing by 3% per year forever, then what should its stock price be? What is the monthly payment for a $300,000 mortgage bond if the interest rate is 4% per year?

- In Chapter 4, you learn more about capital budgeting methods. Although net present value (NPV) is the correct method, at least one other common method often comes to the correct result: the internal rate of return. In the real world, a number of other plainly incorrect methods are also widely used. You should know why you should be wary of them. This chapter also tells you what CFOs actually rely on.

  Typical questions: If a project has one investment outflow and two return inflows, how would you compute a "rate of return"? Can you accept projects whose rates of return are above their cost of capital? How bad is it when you use incorrect estimates—as you inevitably will—in your calculations? What are the big problems with a rule that accepts those projects that return money most quickly?

- In Chapter 5, you abandon the assumption that annual rates of return are the same for projects with different durations. For example, 1-year investments may pay 1% per year, while 30-year investments may pay 3% per year. The scenario of time-varying rates

of return is more realistic, but the questions that you want to answer still remain the same as those in Chapter 2. (The chapter then also explains more advanced aspects of bonds, such as the Treasury yield curve.)

Typical questions: If you earn 5% in the first year and 10% in the second year, how much will you earn over both years? What is the meaning of a 4% annualized interest rate? What is the meaning of a 4% yield-to-maturity? How can you value projects if appropriate rates of return depend on different time horizons?

- In Chapter 6, you abandon the assumption that you know the future. To be able to study uncertainty in the real world, you must first learn how to describe it. This is done with statistics, the necessary aspects of which are also explained here. The chapter then introduces risk neutrality, which is an assumption that can make it easier to understand some concepts in finance under uncertainty. Perhaps the two most important concepts are the difference between promised and expected rates of return and the difference between debt and equity. Under uncertainty, a project may not return the promised amount. ("Promised" can also be called "quoted" or "stated.") Because of the possibility of default, the *stated* rate of return must be higher than the *expected* rate of return. Although you are interested in the latter, it is almost always only the former that you are quoted (promised). It is important that you always draw a sharp distinction between promised=quoted=stated rates of return and expected rates of return. The second concept that this chapter explains is the difference between debt and equity—corporate claims that have a meaningful difference only under uncertainty.

  Typical questions: If there is a 2% chance that your borrower will not return the money, how much extra interest should you charge? From an investment perspective, what is the difference between debt and equity? What is financing priority? What is a residual claim?

Looking ahead, Part II will continue with uncertainty scenarios in which investors are risk-averse. Part III will explain what happens when financial markets or decision rules are not perfect.