

## CHAPTER 15

### Financial Microeconomics: Interest, Investment, and the Cost of Capital

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**I**n this chapter, we consider intertemporal choices or the optimal allocation of resources *over time*. We examine the choice between consuming now or saving a portion of this year's income in order to consume more in the future. The alternative is borrowing against future income to increase present consumption. An individual's ability to exchange present income for future income or consumption (by lending or borrowing) enables the individual to maximize the total or joint satisfaction of present and future income and consumption. For example, people individually and collectively (through the Social Security system) save during their working lives to provide for retirement, and by doing so, they maximize the lifetime satisfaction from their earnings. On the other hand, students often borrow against their future income (i.e., they dissave).

Another way by which present income can be exchanged for future income is to free some resources from the production of final commodities for present consumption (i.e., save) to produce more capital goods (i.e., invest in machinery, factories, and so on), which will lead to larger output and consumption in the future. The ability of individuals and firms to trade present for future income and output and vice versa (through lending and borrowing, saving and investing) is crucial in all societies. Indeed, a great deal of the increase in the standards of living in modern societies is the result of investments in physical capital (machinery, factories, etc.) and human capital (education, skills, health, and so on).

An individual usually requires a reward for postponing present consumption (i.e., saving) and lending a portion of this year's income. The reward takes the form of a repayment that exceeds the amount lent. This premium is the interest

payment. The alternative would be the borrowing of a given sum today and the repaying of a larger sum in the future (the principal plus the interest). Similarly, individuals and firms will only invest in machinery, factories, or in acquiring or providing skills if they can expect a return on their investment in the form of higher future incomes or outputs than the amounts invested.

In this chapter, we examine the determination of the rate of interest that will balance the quantity of resources lent and borrowed and that equilibrates saving and investment. We also analyze the criteria used by individuals, business firms, and government agencies in their investment decisions. Subsequently, we discuss the reasons for differences in interest rates in the same nation, in different nations, and over time. The chapter also explains how to measure the cost of capital and describes the effects of foreign investments. Since capital is a crucial input, its cost is very important to a firm's production decisions. Finally, several important applications of the theory introduced in the chapter are presented. These range from investment in human capital to the pricing and management of renewable and nonrenewable resources. These applications, together with the numerous examples and the "At the Frontier" section on derivatives, add an important element of realism to the analysis.

## 15.1 LENDING-BORROWING EQUILIBRIUM

In this section, we examine how an individual maximizes the total or joint satisfaction from spending his or her present and future income by lending or borrowing. We also show how the equilibrium market rate of interest is determined at the level at which the total quantity demanded of loans (borrowings) equals the total quantity supplied of loans (lendings).

### *Lending*

We begin by considering how a consumer can maximize satisfaction over time by lending. For simplicity, we assume that the consumer's income is measured in terms of the quantity of a commodity (say, corn) that he or she has or expects to receive. Also, to simplify matters, we will deal with only two time periods: this year and the next year. (This assumption is relaxed in section 15.4.) We also begin by assuming that the consumer has an **endowment position**, or receives  $Y_0 = 7.5$  units of corn this year and  $Y_1 = 3$  units of corn next year (point A in the left panel of Figure 15.1)<sup>1</sup>.

The consumer, However, is not bound to consume the  $Y_0 = 7.5$  units of corn this year and the  $Y_1 = 3$  units of corn next year, because he or she can lend part of

<sup>1</sup>Uncertainty is ruled out here so that the consumer knows exactly how much of the commodity he or she gets this year and next year. This assumption is relaxed in section 15.4. In what follows, subscripts 0 and 1 denote, respectively, this year (or the present) and next year (or the future).