

We take the present value of the interest payments and then add this value to the present value of the principal payment at maturity.

Present Value of Interest Payments In this case, we determine the present value of a \$100 annuity for 20 years.² The discount rate is 10 percent. We can use Formula 9-6 to find the following:

$$PV_A = A \times \frac{1 - \frac{1}{(1+i)^n}}{i}$$

$$PV_A = \$100 \times \frac{1 - \frac{1}{(1.10)^{20}}}{0.10} = \$851.36$$

Present Value of Principal Payment (Par Value) at Maturity This single value of \$1,000 will be received after 20 years. Note the term *principal payment at maturity* is used interchangeably with *par value* or *face value* of the bond. We discount \$1,000 back to the present at 10 percent.

We can use Formula 9-2 to find the following:

$$PV = FV \times \frac{1}{(1+i)^n}$$

$$PV = \$1,000 \times \frac{1}{(1.10)^{20}} = \$148.64$$

The current price of the bond, based on the present value of interest payments and the present value of the principal payment at maturity, is \$1,000.

Present value of interest payments	\$ 851.40
Present value of principal payment at maturity	148.64
Total present value, or price, of the bond	<u>\$1,000.00</u>

The price of the bond in this case is essentially the same as its par, or stated, value to be received at maturity of \$1,000. This is because the annual interest rate is 10 percent (the annual interest payment of \$100 divided by \$1,000) and the yield to maturity, or discount rate, is also 10 percent. When the interest rate on the bond and the yield to maturity are equal, the bond will trade at par value. Later we will examine the mathematical effects of varying the yield to maturity above or below the interest rate on the bond.

Bond Valuation Using a Financial Calculator

Bond values can be found using the **PV** function on a financial calculator. The first calculator solution box in the margin shows the present value of the twenty \$100 coupon

²For now, we are using *annual* interest payments for simplicity. Later in the discussion, we will shift to semiannual payments, and more appropriately determine the value of a bond.