

Chapter 10¹

Accounting for Long-Term or Non-Current Liabilities

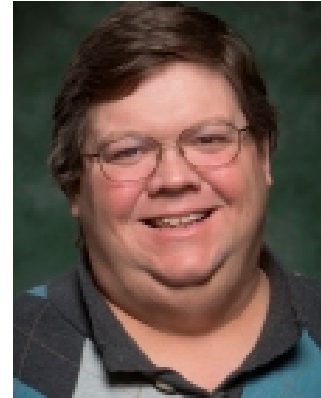
Learning Objectives

- Describe the varying forms of debt financing and bonds.
- Prepare a loan amortization schedule for a long-term note payable.
- Prepare journal entries to account for notes payable.
- Explain the advantages and disadvantages of stock versus debt financing.
- Prepare journal entries to record bond issues and bond interest payments.
- Prepare bond amortization schedules and record amortization of bond premium and bond discount.
- Value bonds issued at par, premium and discount values, applying both straight-line and the effective interest method to amortize bond premiums and discounts.
- Distinguish between the straight-line and effective interest methods of bond premium or discount amortization.
- Prepare journal entries to record bond retirement.
- Describe the process and mechanics of journal entries made for bond issues between bond interest payment dates.
- Compute the debt-to-equity ratio and discuss its relevance.
- Describe accounting for leases.
- Describe accounting for pensions.

¹ Acknowledgement: An earlier version of this chapter was provided to all accounting faculty on October 31, 2014, for review notes, comments, and recommendations for improvement. Work on this text began in early 2014. The completion of this text was made possible through a spring 2015 sabbatical from West Chester University.

Introductory Financial Accounting – Cataldo (WCU ACC201)

Anthony Meder, Assistant Professor of Accounting at Binghamton University in the SUNY system met Professor Cataldo at Oakland University; Professor Cataldo taught Professor Meder's Masters' level Tax Accounting and Cost Accounting courses during his M.Acc. program. Professor Cataldo required papers to be submitted to practice journals; Professor Meder's tax paper was subsequently published in the *Tax Adviser* in 2004. Professor Meder followed that love of the research and the publication process to the Accounting Ph.D. program at The Ohio State University and graduated from there in 2011; the program was 5 years long – typically 60-80 weeks. The final 2 years was spent completing and defending his dissertation.



He joined Binghamton – SUNY upon graduation where he teaches 80 to 110 audit students each semester. He has published in *Accounting Horizons* and *Accounting Education: An International Journal* but his most prestigious publication is in *The Accounting Review*. *The Accounting Review* is the flagship journal of the American Accounting Association; it accepts less than 10% of submitted articles for publication. It is one of the three premier accounting research journals.

The article he published, *the interaction between accounting standards and monetary policy: the effect of SFAS 115*, was part of his dissertation and the result of 5+ years of work and revisions. This is quite an accomplishment; hundreds of articles are submitted to the top 3 accounting journals annually and 90% (or more) are rejected and never published in those journals. In addition, dissertation-based articles are rarely published in these journals. With this achievement, Professor Meder establishes himself as a promising researcher and budding expert in his area.

- B.B.A. with and Accounting concentration, University of Michigan—Flint
- M.Acc. Oakland University
- Ph.D. Accounting and MIS, graduate minors in Microeconomic Theory and Statistics, The Ohio State University



In February 2009, Sirius XM Holdings, Inc. (NASDAQGS: SIRI) stock hit a low of \$0.05 per share. A ten year price per share chart is provided, below. The decline in the stock price was a function of the high level of debt taken to complete a merger and concerns that the firm would be unable to service its debt and be forced into bankruptcy.

As recently as October 2014, the firm had only \$0.02 cash per share, debt at nearly \$5 billion, and cash of only \$100 million. Liquidity remains an issue, but market share leadership is likely the cause of the very significant rebound in the firm's stock price. In October, 2014, the firm's current ratio remained at less than 1.0, at approximately 0.46.



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This chapter examines the basics of long-term note and bond financing.

Debt Financing

Notes and bonds are debt instruments issued to finance projects requiring large amounts of money. Debt financing is not restricted to for-profit corporations. The Federal Government, states, cities, and school districts issue debt, including bonds, for long-term financing.

Sometimes, debtors become insolvent and default on their notes or bonds. Detroit, for example, was the largest municipal bankruptcy in the history of the U.S., at \$18 billion.

At issue, in the case of Detroit, was their ability to pay for bonds issued. Detroit entered Chapter 9 bankruptcy in late 2013.



Long-Term Notes (or Mortgages) Payable

Notes (or mortgages) are often issued to provide for the long-term cash needs for a



firm. A corporation might sign a note and borrow from a bank or financial institution for these long-term financing needs.

To illustrate, the following table provides what is referred to as a *loan amortization schedule* for a \$100,000 mortgage or loan or note. This note requires the payment of 12 percent interest, per year, with annual payments of \$17,700. Due to rounding, it is common for a final payment for a note, loan or mortgage to

be slightly different from earlier payments amounts.

Assume that the note was signed and \$100,000 cash was received on January 1, 2013 (time period 0). The annual payments are due on January 1st of each year (2014 through 2023, or time periods 1 through 10), as follows:

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Time	12%			
Period	Payment	Interest	Principal	Balance
0				\$100,000.00
1	\$17,700.00	\$12,000.00	\$5,700.00	\$94,300.00
2	\$17,700.00	\$11,316.00	\$6,384.00	\$87,916.00
3	\$17,700.00	\$10,549.92	\$7,150.08	\$80,765.92
4	\$17,700.00	\$9,691.91	\$8,008.09	\$72,757.83
5	\$17,700.00	\$8,730.94	\$8,969.06	\$63,788.77
6	\$17,700.00	\$7,654.65	\$10,045.35	\$53,743.42
7	\$17,700.00	\$6,449.21	\$11,250.79	\$42,492.63
8	\$17,700.00	\$5,099.12	\$12,600.88	\$29,891.75
9	\$17,700.00	\$3,587.01	\$14,112.99	\$15,778.76
10	\$17,672.21	\$1,893.45	\$15,778.76	\$0.00
		<u>\$76,972.21</u>	<u>\$100,000.00</u>	

First, record the note payable and the receipt of cash on January 1, 2013:

Jan. 1, 2013	Cash	\$100,000.00	
	Note payable		\$100,000.00

The journal entry to accrue interest payable and match interest expense to the period must be made on December 31, 2013 (see above table):

Dec. 31, 2013	Interest expense	\$12,000.00	
	Interest payable		\$12,000.00

On January 1, 2014, the first payment of \$17,700 is made (see above table):

Jan. 1, 2014	Note payable	\$5,700.00	
	Interest payable	\$12,000.00	
	Cash		\$17,700.00

After the first payment of principal and interest is made, the principal balance on the note payable is \$94,300 (see above table).

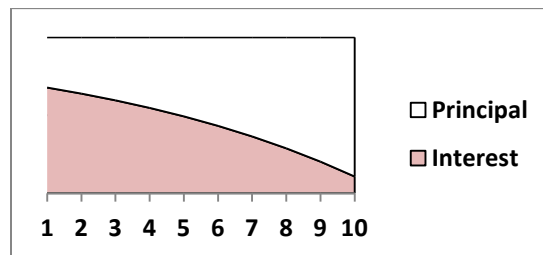
The loan amortization table provides for the interest and principal breakdown and the source of the journal entries for the entire life of the note payable. Journal entries for the accrual of interest on December 31, 2014 and the second cash payment for January 1, 2015, both developed from the above table, follow:

Dec. 31, 2014	Interest expense	\$11,316.00	
	Interest payable		\$11,316.00

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Jan. 1, 2015	Note payable	\$6,384.00
	Interest payable	\$11,316.00
	Cash	\$17,700.00

Note that the principal portion of the payment increases with each payment. A graphic, developed from the above table, illustrates the decreasing component of interest and the increasing component of principal for each of the ten, annual payments:



A *note* or *bond* is issued and represents a promise to pay interest during the life of the debt instrument, and, in the case of bonds, repays the original principal amount borrowed at the end of the life of the bond. The original principal amount of the bond is referred to as the *par value*, *face amount* or *face value* of the bond. The end of the life of the bond is referred to as the *maturity date* of the bond.

Most bonds pay interest. These interest payments are usually paid semiannually. You can compute the amount of interest to be paid each semiannual period by multiplying the par value of the bond by the bond's *contract rate* or *stated rate* of interest for that period, as follows:

$$\text{Par value} \times \text{Stated rate} = \text{Interest}$$

Another Loan Amortization Schedule

Understanding how to generate a loan amortization schedule is a skill useful and helpful in understanding the mechanics illustrated in this chapter. Below is a loan amortization schedule for a 15 year mortgage, at 3.125%, with an original principal balance of \$160,000. Only the first 13 months is presented in the table.

In the example and table that follows, at the date of the mortgage and time period "0," the current portion of the mortgage is \$8,496 and the non-current portion is \$151,504. The current portion represents the principal component of the \$1,115 monthly payment for the next 12 months (e.g., \$698 + \$700 + ... + \$718 or \$160,000 less \$151,504).

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	Monthly	3.125%		
	Payment	Interest	Principal	Balance
0				\$160,000
1	\$1,115	\$417	\$698	\$159,302
2	\$1,115	\$415	\$700	\$158,602
3	\$1,115	\$413	\$702	\$157,901
4	\$1,115	\$411	\$703	\$157,197
5	\$1,115	\$409	\$705	\$156,492
6	\$1,115	\$408	\$707	\$155,785
7	\$1,115	\$406	\$709	\$155,076
8	\$1,115	\$404	\$711	\$154,366
9	\$1,115	\$402	\$713	\$153,653
10	\$1,115	\$400	\$714	\$152,939
11	\$1,115	\$398	\$716	\$152,222
12	\$1,115	\$396	\$718	\$151,504
13	\$1,115	\$395	\$720	\$150,784

Bond Issues

Loan amortization schedules are produced to represent the amortization of bond discounts and premiums and using what is referred to as the “effective interest” method of bond discount or premium amortization. An alternative method, straight line amortization, is covered later in the chapter. The next section describes both advantages and disadvantages of bond financing.

Advantages of Bonds

1. Bonds can increase return on equity. Referred to as **financial leverage** or **trading on equity**, if a firm can generate a higher return on borrowed funds, when compared to the amounts paid on those borrowed funds, the firm is increasing its return on equity. This is most likely to occur during periods of economic growth and rising revenues and income.
2. Bonds have no impact on common stock-based ownership or control or voting rights. Typically, common shareholders retain and represent the equity ownership, control and voting rights for a for-profit firm. For example, an investor contributing \$10,000 of a firm’s \$100,000 equity financing controls one-tenth or ten percent of all ownership decisions or votes. The same \$10,000, invested in the firm’s bonds, results in no ownership, control or voting rights. Instead, the bondholder is entitled to receive a contract or state rate of interest during the life of the bond and the return of principal at the end of the life of the bond or maturity date. The owner of \$10,000 in bonds, with a contract or state rate of 10 percent, would receive interest payments of \$1,000 each year, and the return of his or her \$10,000 principal at the end of the life or maturity date of the bond. Alternatively, the Common Stockholder does not receive interest payment, but might receive dividend payments and might also enjoy some appreciation in stock price or equity value, if, after all expenses, including interest expenses, are paid and the firm is profitable.

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3. Bond interest is tax deductible. Dividends paid to Common Stockholders are not tax deductible, but interest payments to bondholders are tax deductible. For example, assume that a for-profit corporation, generating a profit, before bond interest and taxes, at \$25,000, pays taxes at a 40 percent corporate tax rate or bracket. If the firm issued \$100,000 in bonds at a 10 percent contract or stated rate, the \$10,000 bond interest would be tax deductible. Therefore, \$25,000 less \$10,000 in deductible bond interest expense leaves \$15,000 subject to the corporate income tax. \$15,000 after interest expense, but before the 40 percent rate of corporate income tax, results in \$6,000 (60 percent) in corporate income tax and net income of \$9,000, as follows:

	<u>with</u> <u>Bonds</u>	<u>without</u> <u>Bonds</u>	<u>Difference</u>
Income Before Bond Interest or Corporate Income Tax	\$25,000	\$25,000	\$0
Less: Bond Interest Expense (10% of \$100,000)	<u>\$10,000</u>	<u>\$0</u>	<u>\$10,000</u>
Equals: Income Before Corporate Income Tax	\$15,000	\$25,000	(\$10,000)
Less: Corporate Income Tax (40%)	<u>\$6,000</u>	<u>\$10,000</u>	<u>(\$4,000)</u>
Equals: Net Income After Tax (100% - 40% = 60%)	<u>\$9,000</u>	<u>\$15,000</u>	<u>(\$6,000)</u>

Disadvantages of Bonds

1. Bonds can decrease return on equity. Referred to as **financial leverage** or **trading on equity**, if a firm generates a lower return on borrowed funds, when compared to the amounts paid on those borrowed funds, the firm is decreasing its return on equity. This is most likely to occur during periods of economic contraction and declining revenues and income.
2. Bonds require payments for periodic interest and the return of principal or par value at their maturity date. The interest payments, in particular, result in required cash outflows. Equity financing, or issuing Common Stock, does not. While the board of directors might decide to issue cash dividends to Common Stockholders, these cash outflows are discretionary. Bond interest payments are not discretionary, as they represent contractual obligations. Failure to make a bond payment (for the firm) is not unlike failing to make a home mortgage interest payment (for the individual). Failure to make a payment results in default and can result in Chapter 11 or 7 bankruptcy for a firm, just as it might result in a home foreclosure for an individual.

Bond Trading

Bonds are issued and trade at par, above par (premium) or below par (discount). Bond values are expressed as a percent of their par or face value. For example, bonds issued at 103 are selling at 103 percent (premium) of their par or face value and bonds issued or trading at 97 are selling at 97 percent (discount) of their par or face value.



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Bonds Payable – Issued at Par (Contract Rate 10% = 10% Market Rate)

When bonds are issued at par, there is no premium or discount to amortize. The market requires a rate of interest for the bonds. This market-based rate of return or yield is precisely the same as the *stated rate* or *face rate* of interest to be paid on the bonds.

Assume that Colaiezzi Corporation issued \$1,000,000 of 10 percent, 30 year bonds on January 1, 2014, at par, in exchange for cash, as follows:

Jan. 1	Cash	\$1,000,000	
	Bonds Payable		\$1,000,000
To record the sale of \$1 million in bonds.			

Further assume that interest is paid, semi-annually, on July 1 and January 1, each year. The first interest payment of \$50,000 (\$1,000,000 multiplied by 10 percent and divided by 2) is paid on July 1, 2014, as follows:

Jul. 1	Interest Expense	\$50,000	
	Cash		\$50,000
To record interest expense paid for the first six months of interest on bonds.			

On December 31st, Colaiezzi Corporation must make the necessary adjusting journal entries, prior to preparing their financial statements for year end. The accrual made on December 31st follows:

Dec. 31	Interest Expense	\$50,000	
	Interest Payable		\$50,000
To record interest expense for the second six months of interest on bonds.			

On January 1st, 2015, the second interest payment is made, eliminating the balance in the interest payable account, as follows:

Jan. 1	Interest Payable	\$50,000	
	Cash		\$50,000
To record interest expense paid for the second six months of interest on bonds.			

The impact on the interest payable account is shown, below, in T-account form:

Interest Payable	
Jan. 1 \$50,000	Dec. 31 \$50,000
	Balance <u>\$-0-</u>

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The following table illustrates this first case. There is no premium or discount associated with the bonds issued at par value, as follows:

10%				10%					
	<u>Payment</u>	<u>Interest</u>	<u>Principal</u>	<u>Balance</u>		<u>Payment</u>	<u>Interest</u>	<u>Principal</u>	<u>Balance</u>
				\$1,000,000					\$1,000,000
1	\$50,000	\$50,000	\$0	\$1,000,000	31	\$50,000	\$50,000	\$0	\$1,000,000
2	\$50,000	\$50,000	\$0	\$1,000,000	32	\$50,000	\$50,000	\$0	\$1,000,000
3	\$50,000	\$50,000	\$0	\$1,000,000	33	\$50,000	\$50,000	\$0	\$1,000,000
4	\$50,000	\$50,000	\$0	\$1,000,000	34	\$50,000	\$50,000	\$0	\$1,000,000
5	\$50,000	\$50,000	\$0	\$1,000,000	35	\$50,000	\$50,000	\$0	\$1,000,000
6	\$50,000	\$50,000	\$0	\$1,000,000	36	\$50,000	\$50,000	\$0	\$1,000,000
7	\$50,000	\$50,000	\$0	\$1,000,000	37	\$50,000	\$50,000	\$0	\$1,000,000
8	\$50,000	\$50,000	\$0	\$1,000,000	38	\$50,000	\$50,000	\$0	\$1,000,000
9	\$50,000	\$50,000	\$0	\$1,000,000	39	\$50,000	\$50,000	\$0	\$1,000,000
10	\$50,000	\$50,000	\$0	\$1,000,000	40	\$50,000	\$50,000	\$0	\$1,000,000
11	\$50,000	\$50,000	\$0	\$1,000,000	41	\$50,000	\$50,000	\$0	\$1,000,000
12	\$50,000	\$50,000	\$0	\$1,000,000	42	\$50,000	\$50,000	\$0	\$1,000,000
13	\$50,000	\$50,000	\$0	\$1,000,000	43	\$50,000	\$50,000	\$0	\$1,000,000
14	\$50,000	\$50,000	\$0	\$1,000,000	44	\$50,000	\$50,000	\$0	\$1,000,000
15	\$50,000	\$50,000	\$0	\$1,000,000	45	\$50,000	\$50,000	\$0	\$1,000,000
16	\$50,000	\$50,000	\$0	\$1,000,000	46	\$50,000	\$50,000	\$0	\$1,000,000
17	\$50,000	\$50,000	\$0	\$1,000,000	47	\$50,000	\$50,000	\$0	\$1,000,000
18	\$50,000	\$50,000	\$0	\$1,000,000	48	\$50,000	\$50,000	\$0	\$1,000,000
19	\$50,000	\$50,000	\$0	\$1,000,000	49	\$50,000	\$50,000	\$0	\$1,000,000
20	\$50,000	\$50,000	\$0	\$1,000,000	50	\$50,000	\$50,000	\$0	\$1,000,000
21	\$50,000	\$50,000	\$0	\$1,000,000	51	\$50,000	\$50,000	\$0	\$1,000,000
22	\$50,000	\$50,000	\$0	\$1,000,000	52	\$50,000	\$50,000	\$0	\$1,000,000
23	\$50,000	\$50,000	\$0	\$1,000,000	53	\$50,000	\$50,000	\$0	\$1,000,000
24	\$50,000	\$50,000	\$0	\$1,000,000	54	\$50,000	\$50,000	\$0	\$1,000,000
25	\$50,000	\$50,000	\$0	\$1,000,000	55	\$50,000	\$50,000	\$0	\$1,000,000
26	\$50,000	\$50,000	\$0	\$1,000,000	56	\$50,000	\$50,000	\$0	\$1,000,000
27	\$50,000	\$50,000	\$0	\$1,000,000	57	\$50,000	\$50,000	\$0	\$1,000,000
28	\$50,000	\$50,000	\$0	\$1,000,000	58	\$50,000	\$50,000	\$0	\$1,000,000
29	\$50,000	\$50,000	\$0	\$1,000,000	59	\$50,000	\$50,000	\$0	\$1,000,000
30	\$50,000	\$50,000	\$0	\$1,000,000	60	\$50,000	\$50,000	\$0	\$1,000,000

Bonds Payable – Issued at a Premium (Contract Rate 10% > 8% Market Rate)

When bonds are issued at par, there is no premium or discount to amortize. The market required a rate of interest for the bonds. This market-based rate of return or yield was precisely the same as the stated or face rate of interest to be paid on the bonds. This section examines an alternative. It assumes that the stated or face rate of interest to be paid on the bonds is above the yield required by the market. The table that follows

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produces a loan amortization schedule where the bonds are issued with a 10% face rate or stated rate, but at a time when the market requires a market-based rate of return of only 8 percent, as follows:²

	8%				8%				
	<u>Payment</u>	<u>Interest</u>	<u>Premium</u>	<u>Balance</u>	<u>Payment</u>	<u>Interest</u>	<u>Premium</u>	<u>Balance</u>	
				\$1,131,175				\$864,603	
1	\$50,000	\$45,247	\$4,753	\$1,126,422	31	\$50,000	\$34,584	\$15,416	\$849,187
2	\$50,000	\$45,057	\$4,943	\$1,121,479	32	\$50,000	\$33,967	\$16,033	\$833,155
3	\$50,000	\$44,859	\$5,141	\$1,116,338	33	\$50,000	\$33,326	\$16,674	\$816,481
4	\$50,000	\$44,654	\$5,346	\$1,110,992	34	\$50,000	\$32,659	\$17,341	\$799,140
5	\$50,000	\$44,440	\$5,560	\$1,105,431	35	\$50,000	\$31,966	\$18,034	\$781,106
6	\$50,000	\$44,217	\$5,783	\$1,099,648	36	\$50,000	\$31,244	\$18,756	\$762,350
7	\$50,000	\$43,986	\$6,014	\$1,093,634	37	\$50,000	\$30,494	\$19,506	\$742,844
8	\$50,000	\$43,745	\$6,255	\$1,087,380	38	\$50,000	\$29,714	\$20,286	\$722,558
9	\$50,000	\$43,495	\$6,505	\$1,080,875	39	\$50,000	\$28,902	\$21,098	\$701,460
10	\$50,000	\$43,235	\$6,765	\$1,074,110	40	\$50,000	\$28,058	\$21,942	\$679,519
11	\$50,000	\$42,964	\$7,036	\$1,067,074	41	\$50,000	\$27,181	\$22,819	\$656,699
12	\$50,000	\$42,683	\$7,317	\$1,059,757	42	\$50,000	\$26,268	\$23,732	\$632,967
13	\$50,000	\$42,390	\$7,610	\$1,052,148	43	\$50,000	\$25,319	\$24,681	\$608,286
14	\$50,000	\$42,086	\$7,914	\$1,044,234	44	\$50,000	\$24,331	\$25,669	\$582,618
15	\$50,000	\$41,769	\$8,231	\$1,036,003	45	\$50,000	\$23,305	\$26,695	\$555,922
16	\$50,000	\$41,440	\$8,560	\$1,027,443	46	\$50,000	\$22,237	\$27,763	\$528,159
17	\$50,000	\$41,098	\$8,902	\$1,018,541	47	\$50,000	\$21,126	\$28,874	\$499,286
18	\$50,000	\$40,742	\$9,258	\$1,009,282	48	\$50,000	\$19,971	\$30,029	\$469,257
19	\$50,000	\$40,371	\$9,629	\$999,654	49	\$50,000	\$18,770	\$31,230	\$438,027
20	\$50,000	\$39,986	\$10,014	\$989,640	50	\$50,000	\$17,521	\$32,479	\$405,548
21	\$50,000	\$39,586	\$10,414	\$979,225	51	\$50,000	\$16,222	\$33,778	\$371,770
22	\$50,000	\$39,169	\$10,831	\$968,394	52	\$50,000	\$14,871	\$35,129	\$336,641
23	\$50,000	\$38,736	\$11,264	\$957,130	53	\$50,000	\$13,466	\$36,534	\$300,107
24	\$50,000	\$38,285	\$11,715	\$945,415	54	\$50,000	\$12,004	\$37,996	\$262,111
25	\$50,000	\$37,817	\$12,183	\$933,232	55	\$50,000	\$10,484	\$39,516	\$222,595
26	\$50,000	\$37,329	\$12,671	\$920,561	56	\$50,000	\$8,904	\$41,096	\$181,499
27	\$50,000	\$36,822	\$13,178	\$907,384	57	\$50,000	\$7,260	\$42,740	\$138,759
28	\$50,000	\$36,295	\$13,705	\$893,679	58	\$50,000	\$5,550	\$44,450	\$94,310
29	\$50,000	\$35,747	\$14,253	\$879,426	59	\$50,000	\$3,772	\$46,228	\$48,082
30	\$50,000	\$35,177	\$14,823	\$864,603	60	\$50,000	\$1,923	\$48,077	\$5

In this second case, assume that Colaiezzi Corporation issued \$1,000,000 of 10 percent, 30 year bonds on January 1, 2014, to yield 8 percent, in exchange for cash, as follows:

² Note that there is a \$5 rounding error at the end of the table and life of the bond.

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Jan. 1	Cash	\$1,131,175	
	Bond premium		\$131,175
	Bonds payable		\$1,000,000
	To record the sale of \$1 million in bonds.		

Again, assume that payments are made, semi-annually, on July 1 and January 1, each year. The first payment of \$50,000 is made on July 1, 2014, as follows:

Jul. 1	Interest expense	\$45,247	
	Bond premium	\$4,753	
	Cash		\$50,000
	To record first bond payment for the first six months of interest on bonds.		

On December 31st, Colaiezzi Corporation must make the necessary adjusting journal entries, prior to preparing their financial statements for year end. The accrual made on December 31st follows:

Dec. 31	Interest expense	\$45,057	
	Interest payable		\$45,057
	To record interest expense for the second six months of interest on bonds.		

On January 1st, 2015, the second interest payment is made, eliminating the balance in the interest payable account, as follows:

Jan. 1	Interest payable	\$45,057	
	Bond premium	\$4,943	
	Cash		\$50,000
	To record interest expense paid for the second six months of interest on bonds.		

Bonds Payable – Issued at a Discount (Contract Rate 10% < 12% Market Rate)

When bonds are issued at par, there is no premium or discount to amortize. The market required a rate of interest for the bonds. This market-based rate of return or yield was precisely the same as the stated or face rate of interest to be paid on the bonds. This section examines an alternative. It assumes that the stated or face rate of interest to be paid on the bonds is below the yield required by the market. The table that follows produces a loan amortization schedule where the bonds are issued with a 10% face rate or stated rate, but where the market requires a market-based rate of return of 12 percent, as follows:³

³ Note that there is a \$9 rounding error at the end of the table and life of the bond.

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12%				12%					
	Payment	Interest	Discount	Balance		Payment	Interest	Discount	Balance
				\$838,386					\$862,353
1	\$50,000	\$50,303	\$303	\$838,689	31	\$50,000	\$51,741	\$1,741	\$864,094
2	\$50,000	\$50,321	\$321	\$839,011	32	\$50,000	\$51,846	\$1,846	\$865,940
3	\$50,000	\$50,341	\$341	\$839,351	33	\$50,000	\$51,956	\$1,956	\$867,897
4	\$50,000	\$50,361	\$361	\$839,712	34	\$50,000	\$52,074	\$2,074	\$869,970
5	\$50,000	\$50,383	\$383	\$840,095	35	\$50,000	\$52,198	\$2,198	\$872,169
6	\$50,000	\$50,406	\$406	\$840,501	36	\$50,000	\$52,330	\$2,330	\$874,499
7	\$50,000	\$50,430	\$430	\$840,931	37	\$50,000	\$52,470	\$2,470	\$876,969
8	\$50,000	\$50,456	\$456	\$841,387	38	\$50,000	\$52,618	\$2,618	\$879,587
9	\$50,000	\$50,483	\$483	\$841,870	39	\$50,000	\$52,775	\$2,775	\$882,362
10	\$50,000	\$50,512	\$512	\$842,382	40	\$50,000	\$52,942	\$2,942	\$885,304
11	\$50,000	\$50,543	\$543	\$842,925	41	\$50,000	\$53,118	\$3,118	\$888,422
12	\$50,000	\$50,575	\$575	\$843,500	42	\$50,000	\$53,305	\$3,305	\$891,727
13	\$50,000	\$50,610	\$610	\$844,110	43	\$50,000	\$53,504	\$3,504	\$895,231
14	\$50,000	\$50,647	\$647	\$844,757	44	\$50,000	\$53,714	\$3,714	\$898,945
15	\$50,000	\$50,685	\$685	\$845,442	45	\$50,000	\$53,937	\$3,937	\$902,881
16	\$50,000	\$50,727	\$727	\$846,169	46	\$50,000	\$54,173	\$4,173	\$907,054
17	\$50,000	\$50,770	\$770	\$846,939	47	\$50,000	\$54,423	\$4,423	\$911,477
18	\$50,000	\$50,816	\$816	\$847,755	48	\$50,000	\$54,689	\$4,689	\$916,166
19	\$50,000	\$50,865	\$865	\$848,621	49	\$50,000	\$54,970	\$4,970	\$921,136
20	\$50,000	\$50,917	\$917	\$849,538	50	\$50,000	\$55,268	\$5,268	\$926,404
21	\$50,000	\$50,972	\$972	\$850,510	51	\$50,000	\$55,584	\$5,584	\$931,988
22	\$50,000	\$51,031	\$1,031	\$851,541	52	\$50,000	\$55,919	\$5,919	\$937,908
23	\$50,000	\$51,092	\$1,092	\$852,633	53	\$50,000	\$56,274	\$6,274	\$944,182
24	\$50,000	\$51,158	\$1,158	\$853,791	54	\$50,000	\$56,651	\$6,651	\$950,833
25	\$50,000	\$51,227	\$1,227	\$855,019	55	\$50,000	\$57,050	\$7,050	\$957,883
26	\$50,000	\$51,301	\$1,301	\$856,320	56	\$50,000	\$57,473	\$7,473	\$965,356
27	\$50,000	\$51,379	\$1,379	\$857,699	57	\$50,000	\$57,921	\$7,921	\$973,278
28	\$50,000	\$51,462	\$1,462	\$859,161	58	\$50,000	\$58,397	\$8,397	\$981,674
29	\$50,000	\$51,550	\$1,550	\$860,711	59	\$50,000	\$58,900	\$8,900	\$990,575
30	\$50,000	\$51,643	\$1,643	\$862,353	60	\$50,000	\$59,434	\$9,434	\$1,000,009

In this third case, assume that Colaiezzi Corporation issued \$1,000,000 of 10 percent, 30 year bonds on January 1, 2014, to yield 12 percent, in exchange for cash, as follows:

Jan. 1	Cash	\$838,386
	Bond discount	\$161,614
	Bonds payable	\$1,000,000
	To record the sale of \$1 million in bonds.	

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Again, assume that payments are made, semi-annually, on July 1 and January 1, each year. The first payment of \$50,000 is made on July 1, 2014, as follows:

Jul. 1	Interest expense	\$50,303	
	Bond discount		\$303
	Cash		\$50,000
	To record first bond payment for the first six months of interest on bonds.		

On December 31st, Colaiezzi Corporation must make the necessary adjusting journal entries, prior to preparing their financial statements for year end. The accrual made on December 31st follows:

Dec. 31	Interest expense	\$50,321	
	Interest payable		\$50,321
	To record interest expense for the second six months of interest on bonds.		

On January 1st, 2015, the second interest payment is made, eliminating the balance in the interest payable account, as follows:

Jan. 1	Interest payable	\$50,321	
	Bond discount		\$321
	Cash		\$50,000
	To record interest expense paid for the second six months of interest on bonds.		

Long-Term Liabilities and Bonds Payable

Long-Term debt includes bonds or bonds payable. Other examples of long-term debt include notes payable, mortgages payable, pension liabilities, and leases.

Long-Term debt usually involves formality and fees or commissions for their sale, and may include a review or amendments to articles of incorporation or corporate bylaws, as well as approval by the firm's board of directors. Long-Term debts may have a variety of covenants and/or restrictions to protect both lenders and borrowers, as stated in the bond indenture or debt agreement. Explicitly stated terms are likely to include amounts authorized for issuance, interest rate, due date(s), call provisions, property pledged as security, any applicable sinking fund requirements, working capital, dividend and additional debt assumption restrictions during the life of the bond.⁴

⁴ Significant covenants are disclosed in the body of the financial statements.

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A bond originates from a bond indenture.⁵ Bonds provide a repayment of principle at the end of the life of the bond and periodic payments of interest. They may have a variety of face values or maturity amounts (e.g., \$1,000 or \$10,000). Frequently, corporate bonds make interest payments semiannually. Bonds may be secured⁶, unsecured⁷, term⁸, serial⁹, callable¹⁰, convertible¹¹, commodity-backed¹², deep discount¹³, registered¹⁴, bearer (coupon)¹⁵, income¹⁶ or revenue¹⁷.

Valuation of Bonds

Bonds sell at prices based on supply and demand, where they are valued at the present value of their future cash flows for (1) interest and (2) principal. The stated, coupon or nominal rate of interest is the interest rate printed or specified on the bond certificate. The principal amount of the bond is also referred to as the *par value*, *face value* or *maturity value*.



It takes quite a bit of preparation to issue bonds.

Underwriters are arranged, Securities and Exchange

Commission approval may be necessary, audits and/or issuance of a prospectus may be required, and the physical certificates must be printed. Once printed, the market rate of interest may change, and the stated rate of interest on the printed bond certificate may be higher or lower than the rate required by potential buyers of the bonds. If no changes in required interest rates occur, the bonds are issued at par. However, if the

⁵ If you would like to see examples, purchase and review a copy of the *Wall Street Journal*, where underwriters frequently advertise large bond indentures in ¼- or ½-page advertisements.

⁶ Secured bonds are backed by a specific asset or pledge (e.g., a new automobile manufacturing plant).

⁷ Unsecured bonds are not secured by any specific asset (e.g., junk bonds).

⁸ Term bond issues mature on a single date.

⁹ Serially maturing bonds are often used by municipalities or governmental entities.

¹⁰ Callable bonds allow the issuer to “call” or buy back the bonds prior to their maturity date.

¹¹ Convertible bonds contain a feature that allows the purchaser to convert the financial instrument into an alternative financial instrument (e.g., convertible into 5 shares of the firm’s common stock at 5 shares per \$1,000, effectively establishing a “strike price” of \$200 per share of stock).

¹² These asset-linked bonds follow commodities such as gold, silver, and so on.

¹³ These are sold at a discount and are also referred to as zero-interest bonds

¹⁴ Registered bonds are issued in the name of the buyer.

¹⁵ Bearer bonds are not issued in the name of the buyer or owner and may be transferred from owner to owner by mere delivery. The film, *Die Hard*, is about a robbery involving the theft of bearer bonds.

¹⁶ Income bonds pay interest only when the issuing firm is profitable.

¹⁷ Revenue bonds are paid from proceeds arising from a specific source (e.g., toll-roads and air-ports).

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desired rate of interest rises, the bonds must be issued at a discount to yield the desired rate of return. If interest rates fall and the desired rate of interest declines, the bonds may be issued at a premium to their stated or face or par value. The market interest rate and the price of bonds are inversely related, as follows:

↑ market interest rates = ↓ market price of bonds
 ↓ market interest rates = ↑ market price of bonds

To illustrate how the above interactions and changing market conditions impact bonds, a simple fact pattern will be used. Assume that \$100,000 in bonds are issued on January 1, 20X0, with a face or stated interest rate of 10%. Semiannual payments of interest are made on June 30 and December 31 of each year for these 5-year bonds, as follows:

	Bonds Payable	\$100,000
<i>multiplied by:</i>	Annual Interest Rate	<u>X 10%</u>
<i>equals:</i>	Annual Cash Payments for Interest	\$10,000
<i>divided by:</i>	2 Payments per year (semiannual)	<u>÷ 2</u>
<i>equals:</i>	June 30 & December 31 Cash Payments for Interest	<u>\$5,000</u>

Valuation of Bonds – Issued at Par

Assume that there have been no changes between market-based interest rates and the stated interest rate of 10%. In this case, the bonds are said to have been issued at par. The valuation or present value (PV) of the (1) interest payments (*r* per period or *n*) and (2) the principal balance to be repaid and maturity follows:

		<u>PV Factor</u>	<u>PV</u>	<u>n</u>	<u>r</u>
PV of Principal at Bond Maturity	\$100,000	0.61391	\$61,391	10	5%
PV of Semiannual Interest Payments	\$5,000	7.72173	<u>\$38,609</u>	10	5%
PV of Bonds			<u>\$100,000</u>		

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The above table can be verified by computing the PV of cash outflows for interest (r) and principal payments, both separately and combined, as follows:

	A	B	C	D	E
			A+B		CXD
			Cash		PV Cash
	<u>Interest</u>	<u>Principal</u>	<u>Outflows</u>	<u>PV Factor</u>	<u>Outflows</u>
6/30/20X0	\$5,000	\$0	\$5,000	0.95238	\$4,762
12/31/20X0	\$5,000	\$0	\$5,000	0.90703	\$4,535
6/30/20X1	\$5,000	\$0	\$5,000	0.86384	\$4,319
12/31/20X1	\$5,000	\$0	\$5,000	0.82270	\$4,114
6/30/20X2	\$5,000	\$0	\$5,000	0.78353	\$3,918
12/31/20X2	\$5,000	\$0	\$5,000	0.74622	\$3,731
6/30/20X3	\$5,000	\$0	\$5,000	0.71068	\$3,553
12/31/20X3	\$5,000	\$0	\$5,000	0.67684	\$3,384
6/30/20X4	\$5,000	\$0	\$5,000	0.64461	\$3,223
12/31/20X4	<u>\$5,000</u>	<u>\$100,000</u>	<u>\$105,000</u>	0.61391	<u>\$64,461</u>
	<u>\$50,000</u>	<u>\$100,000</u>	<u>\$150,000</u>		<u>\$100,000</u>

The journal entry required when the proceeds from the sale are received follows:

1/1/20X0	Cash		\$100,000
	Bonds Payable		\$100,000

On June 30, 20X0, the first interest payment will be due on the bonds. The JE to record this cash payment of interest expense follows:

6/30/20X0	Bond Interest Expense		\$5,000
	Cash		\$5,000

The above journal entry will be repeated, as cash payments for interest are made every June 30 and December 31 for the life of the bonds.

If financial statements were prepared on March 31, 20X0, the following JE would be made to record the accrual for 3 months of bond interest payable, as follows:

3/31/20X0	Bond Interest Expense		\$2,500
	Bond Interest Payable		\$2,500

When the bonds are retired on December 31, 20X4, repayment of their principal balance or face value will be recorded with the following journal entry:

12/31/20X4	Bonds Payable		\$100,000
	Cash		\$100,000

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Valuation of Bonds – Issued at a Premium

Assume that there have been decreases in market-based interest rates to 8%, while and the stated interest rate is 10%. In this case, the bonds will be issued at a premium and to yield 8%. The valuation or present value (PV) of the (1) interest payments (r per period or n) and (2) the principal balance to be repaid and maturity follows:

		<u>PV Factor</u>	<u>PV</u>	<u>n</u>	<u>r</u>
PV of Principal at Bond Maturity	\$100,000	0.67556	\$67,556	10	4%
PV of Semiannual Interest Payments	\$5,000	8.11090	<u>\$40,555</u>	10	4%
Equals: Cash Inflows from Bond Sales			\$108,111		
Less: Face Value of Bonds			<u>\$100,000</u>		
Equals: Premium to be Amortized			<u>\$8,111</u>		

The journal entry required when the proceeds from the sale are received follows:

1/1/20X0	Cash	\$108,111	
	Premium on Bonds Payable	\$8,111	
	Bonds Payable	\$100,000	

Valuation of Bonds – Issued at a Premium: Straight-Line Amortization

On June 30, 20X0, the first interest payment will be due on the bonds. The journal entry to record this cash payment of interest expense follows:

6/30/20X0	Bond Interest Expense	\$4,188.90	
	Premium on Bonds Payable	\$811.10	
	Cash	\$5,000.00	

The above journal entry will be repeated, as cash payments for interest are made every June 30 and December 31 for the 5-year life of the bonds.

Introductory Financial Accounting – Cataldo (WCU ACC201)

Valuation of Bonds – Issued at a Premium: Effective Interest Amortization

The effective interest method of amortization more closely approximates economic reality. The following table provides an alternative to the straight-line method:

	(1) CR	(2) DR	(1) - (2) DR	
		Interest	Premium	Book
<u>Date</u>	<u>Cash</u>	<u>Expense</u>	<u>Amortized</u>	<u>Value</u>
1/1/20X0				\$108,111
6/30/20X0	\$5,000	\$4,324	\$676	\$107,435
12/31/20X0	\$5,000	\$4,297	\$703	\$106,733
6/30/20X1	\$5,000	\$4,269	\$731	\$106,002
12/31/20X1	\$5,000	\$4,240	\$760	\$105,242
6/30/20X2	\$5,000	\$4,210	\$790	\$104,452
12/31/20X2	\$5,000	\$4,178	\$822	\$103,630
6/30/20X3	\$5,000	\$4,145	\$855	\$102,775
12/31/20X3	\$5,000	\$4,111	\$889	\$101,886
6/30/20X4	\$5,000	\$4,075	\$925	\$100,962
12/31/20X4	<u>\$5,000</u>	<u>\$4,038</u>	<u>\$962</u>	\$100,000
	<u>\$50,000</u>	<u>\$41,889</u>	<u>\$8,111</u>	

On June 30, 20X0, the first interest payment will be due on the bonds. The journal entry to record this cash payment of interest expense, developed from the above table, follows:

6/30/20X0	Bond Interest Expense	\$4,324
	Premium on Bonds Payable	\$676
	Cash	\$5,000

On December 31, 20X0, the second interest payment will be due on the bonds. The journal entry to record this cash payment of interest expense, developed from the above table, follows:

12/31/20X0	Bond Interest Expense	\$4,297
	Premium on Bonds Payable	\$703
	Cash	\$5,000

Valuation of Bonds – Issued at a Discount

Assume that there have been increases in market-based interest rates to 12%, while and the stated interest rate is 10%. In this case, the bonds will be issued at a discount and to yield 12%. The valuation or present value (PV) of the (1) interest payments (r per period or n) and (2) the principal balance to be repaid and maturity follows:

Introductory Financial Accounting – Cataldo (WCU ACC201)

		<u>PV Factor</u>	<u>PV</u>	<u><i>n</i></u>	<u><i>r</i></u>
PV of Principal at Bond Maturity	\$100,000	0.55839	\$55,839	10	6%
PV of Semiannual Interest Payments	\$5,000	7.36009	<u>\$36,800</u>	10	6%
Equals: Cash Inflows from Bond Sales			\$92,639		
Less: Face Value of Bonds			<u>\$100,000</u>		
Equals: Discount to be Amortized			<u>(\$7,361)</u>		

The journal entry required when the proceeds from the sale are received follows:

1/1/20X0	Cash	\$92,639	
	Discount on Bonds Payable	\$7,361	
	Bonds Payable		\$100,000

Valuation of Bonds – Issued at a Discount: Straight-Line Amortization

On June 30, 20X0, the first interest payment will be due on the bonds. The journal entry to record this cash payment of interest expense follows:

6/30/20X0	Bond Interest Expense	\$5,736.10	
	Discount on Bonds Payable		\$736.10
	Cash		\$5,000.00

The above journal entry will be repeated, as cash payments for interest are made every June 30 and December 31 for the 5-year life of the bonds.

Introductory Financial Accounting – Cataldo (WCU ACC201)

Valuation of Bonds – Issued at a Discount: Effective Interest Amortization

The effective interest method of amortization more closely approximates economic reality. The following table provides an alternative to the straight-line method:

	(1)	(2)	(1) - (2)	
	CR	DR	CR	
		Interest	Discount	Book
<u>Date</u>	<u>Cash</u>	<u>Expense</u>	<u>Amortized</u>	<u>Value</u>
1/1/20X0				\$92,639
6/30/20X0	\$5,000	\$5,558	\$558	\$93,198
12/31/20X0	\$5,000	\$5,592	\$592	\$93,790
6/30/20X1	\$5,000	\$5,627	\$627	\$94,417
12/31/20X1	\$5,000	\$5,665	\$665	\$95,082
6/30/20X2	\$5,000	\$5,705	\$705	\$95,787
12/31/20X2	\$5,000	\$5,747	\$747	\$96,534
6/30/20X3	\$5,000	\$5,792	\$792	\$97,326
12/31/20X3	\$5,000	\$5,840	\$840	\$98,166
6/30/20X4	\$5,000	\$5,890	\$890	\$99,056
12/31/20X4	<u>\$5,000</u>	<u>\$5,943</u>	<u>\$943</u>	\$100,000
	<u>\$50,000</u>	<u>\$57,360</u>	<u>\$7,361</u>	

On June 30, 20X0, the first interest payment will be due on the bonds. The journal entry to record this cash payment of interest expense, developed from the above table, follows:

6/30/20X0	Bond Interest Expense	\$5,558
	Discount on Bonds Payable	\$558
	Cash	\$5,000

On December 31, 20X0, the second interest payment will be due on the bonds. The journal entry to record this cash payment of interest expense, developed from the above table, follows:

12/31/20X0	Bond Interest Expense	\$5,592
	Discount on Bonds Payable	\$592
	Cash	\$5,000

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Bond Retirement at Maturity

The carrying value of bonds at maturity always equal par value. Recall, in the case of bonds issued at both premium and discount, the carrying or book value of bonds always equal par value at the end of their term, as follows:

<u>Date</u>	<u>Cash</u>	<u>Interest Expense</u>	<u>Premium Amortized</u>	<u>Book Value</u>
1/1/20X0				\$108,111
6/30/20X0	\$5,000	\$4,324	\$676	\$107,435
12/31/20X0	\$5,000	\$4,297	\$703	\$106,733
6/30/20X1	\$5,000	\$4,269	\$731	\$106,002
12/31/20X1	\$5,000	\$4,240	\$760	\$105,242
6/30/20X2	\$5,000	\$4,210	\$790	\$104,452
12/31/20X2	\$5,000	\$4,178	\$822	\$103,630
6/30/20X3	\$5,000	\$4,145	\$855	\$102,775
12/31/20X3	\$5,000	\$4,111	\$889	\$101,886
6/30/20X4	\$5,000	\$4,075	\$925	\$100,962
12/31/20X4	<u>\$5,000</u>	<u>\$4,038</u>	<u>\$962</u>	\$100,000
	<u>\$50,000</u>	<u>\$41,889</u>	<u>\$8,111</u>	

<u>Date</u>	<u>Cash</u>	<u>Interest Expense</u>	<u>Discount Amortized</u>	<u>Book Value</u>
1/1/20X0				\$92,639
6/30/20X0	\$5,000	\$5,558	\$558	\$93,198
12/31/20X0	\$5,000	\$5,592	\$592	\$93,790
6/30/20X1	\$5,000	\$5,627	\$627	\$94,417
12/31/20X1	\$5,000	\$5,665	\$665	\$95,082
6/30/20X2	\$5,000	\$5,705	\$705	\$95,787
12/31/20X2	\$5,000	\$5,747	\$747	\$96,534
6/30/20X3	\$5,000	\$5,792	\$792	\$97,326
12/31/20X3	\$5,000	\$5,840	\$840	\$98,166
6/30/20X4	\$5,000	\$5,890	\$890	\$99,056
12/31/20X4	<u>\$5,000</u>	<u>\$5,943</u>	<u>\$943</u>	\$100,000
	<u>\$50,000</u>	<u>\$57,360</u>	<u>\$7,361</u>	

Therefore, in all cases, bonds retired at maturity, assuming interest is already paid and the related journal entry already completed and entered, is recorded as follows:

12/31/20X4	Bonds payable	\$100,000	
	Cash		\$100,000

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Bond Retirement before Maturity



Bonds are sometimes retired before maturity. This is most likely to occur when there has been a significant decline in interest rates below the stated rate paid on the bonds. For example, if the bonds are paying 12 percent and market rates for comparable debt instruments decline to 6 percent, early retirement can save the issuer quite a bit in interest expense.

If the bonds are callable, the issuer can merely exercise their call option. This might involve the payment of a *call premium*. Alternatively, they can simply be purchased in the open or secondary market at market rates. Regardless of the method of early retirement, a price other than the bond book or carrying value is likely to be paid. A gain or loss (usually a gain) will be recorded for the difference between book or carrying and market value.

Assume that the bonds, originally issued at a premium, are retired early, through open market purchases, due to a significant decline in interest rates. The open market purchase occurs on December 31, 201X1, immediately after the relevant interest payment and when the market rate for the bonds is \$98,000. The relevant portion of the bond amortization table follows:

<u>Date</u>	<u>Cash</u>	<u>Interest Expense</u>	<u>Premium Amortized</u>	<u>Book Value</u>
1/1/20X0				\$108,111
6/30/20X0	\$5,000	\$4,324	\$676	\$107,435
12/31/20X0	\$5,000	\$4,297	\$703	\$106,733
6/30/20X1	\$5,000	\$4,269	\$731	\$106,002
12/31/20X1	\$5,000	\$4,240	\$760	\$105,242

The journal entry to retire the bonds early, on December 31, 20X1, follows:

12/31/20X1	Bonds payable	\$100,000
	Premium on bonds payable	\$5,242
	Gain on bonds	\$7,242
	Cash	\$98,000

Book or Carrying Value of Bonds	\$105,242
Cost to Repurchase Bonds	\$98,000
Gain on Repurchase of Bonds	\$7,242

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Alternatively, assume that the bonds, originally issued at a discount, are retired early, through open market purchases, due to a significant decline in interest rates. Again, the open market purchase occurs on December 31, 201X1, immediately after the relevant interest payment and when the market rate for the bonds is \$98,000. The relevant portion of the bond amortization table follows:

<u>Date</u>	<u>Cash</u>	<u>Interest Expense</u>	<u>Discount Amortized</u>	<u>Book Value</u>
1/1/20X0				\$92,639
6/30/20X0	\$5,000	\$5,558	\$558	\$93,198
12/31/20X0	\$5,000	\$5,592	\$592	\$93,790
6/30/20X1	\$5,000	\$5,627	\$627	\$94,417
12/31/20X1	\$5,000	\$5,665	\$665	\$95,082

The journal entry to retire the bonds early, on December 31, 20X1, follows:

12/31/20X1	Bonds payable	\$100,000	
	Loss on bonds payable	\$2,918	
	Discount on bonds payable		\$4,918
	Cash		\$98,000

Book or Carrying Value of Bonds	\$95,082
Cost to Repurchase Bonds	\$98,000
Loss on Repurchase of Bonds	(\$2,918)

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Bond Retirement by Conversion to Stock

Some bonds contain a conversion feature allowing the holder to exchange the bonds for stock. When conversion occurs, there is no gain or loss. The carrying value is transferred from the relevant liability to the relevant equity accounts, as follows:

Bonds payable	\$XXX	
Common stock		\$XXX
Paid in capital in excess of par - Common stock		\$XXX

Bond Issuance Costs

Bond issuance involves printing, legal and accounting fees, commissions, advertising and promotion, and other costs. These costs reduce the net proceeds from the sale of these bonds and, effectively, increase the interest rate. Therefore, these costs should be accumulated, capitalized (and treated as an asset) and amortized over the life of these securities. The effective interest method is theoretically preferable, but the below illustrates how these costs might be amortized under the SL method, where the costs of the bond issue on January 1, 20X0 are \$2,000, as follows:

1/1/20X0	Unamortized Bond Issuance Expense	\$2,000	
	Cash		\$2,000

The journal entry for the first interest payment date, 6 months after these 5-year bonds are issued, follows:

6/30/20X0	Bond Issuance Expense	\$200	
	Unamortized Bond Issuance Expense		\$200

Appendix A

Present Value

In broad terms, the present value of an investment requires the capitalization of an income or net cash inflow stream, plus the present value of the residual. In the case of the latter, the PRESENT VALUE OF \$1 table is contained in Appendix F. In the case of the former, the PRESENT VALUE OF AN ANNUITY OF \$1 IN AREARS table is contained in Appendix G.

Present value is used in accounting and by accountants, but most of an undergraduate's training in present value and valuation occurs in an undergraduate finance or corporate finance course, where the present value of a security is often the focus for application of present value techniques. They are covered in terms of "net present value" and/or "internal rate of return," where the former is more broadly applied. These and a variety of "discounted cash flow" (DCF) techniques must be mastered by today's students completing undergraduate degrees in any business discipline.

Appendix B

Effective Interest

The below tables were first introduced in the body of the chapter.

First, the valuation of bonds – issued at a premium is provided, using the effective interest method:

<u>Date</u>	<u>Cash</u>	<u>Interest Expense</u>	<u>Premium Amortized</u>	<u>Book Value</u>
1/1/20X0				\$108,111
6/30/20X0	\$5,000	\$4,324	\$676	\$107,435

6/30/20X0	Bond Interest Expense	\$4,324.00	
	Premium on Bonds Payable	\$676.00	
	Cash		\$5,000.00

If the straight-line method were used, the amortization of the premium on bonds payable would be constant or the same amount for each period, as follows:

6/30/20X0	Bond Interest Expense	\$4,188.90	
	Premium on Bonds Payable	\$811.10	
	Cash		\$5,000.00
To record straight-line amortization of premium:			
$\$108,111 - \$100,000 = \$8,111 \div 10 = \$811.10.$			
$\$5,000 - \$811.10 = \$4,188.90.$			

Both effective interest method and straight-line method amortize or allocate the same \$8,111 bond premium over the life of the bonds, but the effective interest method most closely approximates economic reality, matching the more precise measure to each period.

Second, the valuation of bonds – issued at a discount is provided, also using the effective interest method:

<u>Date</u>	<u>Cash</u>	<u>Interest Expense</u>	<u>Discount Amortized</u>	<u>Book Value</u>
1/1/20X0				\$92,639
6/30/20X0	\$5,000	\$5,558	\$558	\$93,198

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6/30/20X0	Bond Interest Expense	\$5,558.00
	Discount on Bonds Payable	\$558.00
	Cash	\$5,000.00

If the straight-line method were used, the amortization of the discount on bonds payable would be constant or the same amount for each period, as follows:

6/30/20X0	Bond Interest Expense	\$5,736.10
	Discount on Bonds Payable	\$736.10
	Cash	\$5,000.00
To record straight-line amortization of discount:		
	$\$100,000 - \$92,639 = \$7,361 \div 10 = \$736.10.$	
	$\$5,000 + \$736.10 = \$5,736.10.$	

Both effective interest method and straight-line method amortize or allocate the same \$7,361 bond discount over the life of the bonds, but the effective interest method most closely approximates economic reality, matching the more precise measure to the income statement for each period.

Tabular comparisons between the effective interest and straight-line methods

The following tables provide a comparison of the effective interest and straight-line methods for the entire life of the bond examples used in the body of the chapter, for both premiums and discounts, respectively:

Date	Cash	Effective			Cash	Straight-line		
		Interest Expense	Premium Amortized	Book Value		Interest Expense	Premium Amortized	Book Value
1/1/20X0				\$108,111				\$108,111
6/30/20X0	\$5,000	\$4,324	\$676	\$107,435	\$5,000	\$4,189	\$811	\$107,300
12/31/20X0	\$5,000	\$4,297	\$703	\$106,733	\$5,000	\$4,189	\$811	\$106,489
6/30/20X1	\$5,000	\$4,269	\$731	\$106,002	\$5,000	\$4,189	\$811	\$105,678
12/31/20X1	\$5,000	\$4,240	\$760	\$105,242	\$5,000	\$4,189	\$811	\$104,867
6/30/20X2	\$5,000	\$4,210	\$790	\$104,452	\$5,000	\$4,189	\$811	\$104,056
12/31/20X2	\$5,000	\$4,178	\$822	\$103,630	\$5,000	\$4,189	\$811	\$103,244
6/30/20X3	\$5,000	\$4,145	\$855	\$102,775	\$5,000	\$4,189	\$811	\$102,433
12/31/20X3	\$5,000	\$4,111	\$889	\$101,886	\$5,000	\$4,189	\$811	\$101,622
6/30/20X4	\$5,000	\$4,075	\$925	\$100,962	\$5,000	\$4,189	\$811	\$100,811
12/31/20X4	<u>\$5,000</u>	<u>\$4,038</u>	<u>\$962</u>	\$100,000	<u>\$5,000</u>	<u>\$4,189</u>	<u>\$811</u>	\$100,000
	<u>\$50,000</u>	<u>\$41,889</u>	<u>\$8,111</u>		<u>\$50,000</u>	<u>\$41,889</u>	<u>\$8,111</u>	

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Date	Effective				Straight-line			
	Cash	Interest Expense	Discount Amortized	Book Value	Cash	Interest Expense	Discount Amortized	Book Value
1/1/20X0				\$92,639				\$92,639
6/30/20X0	\$5,000	\$5,558	\$558	\$93,198	\$5,000	\$5,736	\$736	\$93,375
12/31/20X0	\$5,000	\$5,592	\$592	\$93,790	\$5,000	\$5,736	\$736	\$94,111
6/30/20X1	\$5,000	\$5,627	\$627	\$94,417	\$5,000	\$5,736	\$736	\$94,847
12/31/20X1	\$5,000	\$5,665	\$665	\$95,082	\$5,000	\$5,736	\$736	\$95,583
6/30/20X2	\$5,000	\$5,705	\$705	\$95,787	\$5,000	\$5,736	\$736	\$96,320
12/31/20X2	\$5,000	\$5,747	\$747	\$96,534	\$5,000	\$5,736	\$736	\$97,056
6/30/20X3	\$5,000	\$5,792	\$792	\$97,326	\$5,000	\$5,736	\$736	\$97,792
12/31/20X3	\$5,000	\$5,840	\$840	\$98,166	\$5,000	\$5,736	\$736	\$98,528
6/30/20X4	\$5,000	\$5,890	\$890	\$99,056	\$5,000	\$5,736	\$736	\$99,264
12/31/20X4	<u>\$5,000</u>	<u>\$5,943</u>	<u>\$943</u>	\$100,000	<u>\$5,000</u>	<u>\$5,736</u>	<u>\$736</u>	\$100,000
	<u>\$50,000</u>	<u>\$57,360</u>	<u>\$7,360</u>		<u>\$50,000</u>	<u>\$57,360</u>	<u>\$7,360</u>	

Appendix C

Bond Issues between Interest Payment Dates

Bonds may be issued between interest payment dates. If this occurs, accrued interest must be accounted for.

Assume that a firm makes \$100,000 bonds available for sale on January 1, 2014. They pay 12% interest per year, but with semi-annual payments on July 1 and January 1, each year. Only \$40,000 (40%) of the bonds were sold on January 1, 2014, but many were not. Regardless, the bonds will pay \$12,000 (12%) per year; \$6,000 (6%) per semi-annual period. Effectively, 1% accrues each month.

Assume that \$10,000 in bonds was sold on February 1, at par value. Interest for 1 month has accrued, and must be paid to the seller, as follows:

2/1/2014	Cash	\$10,100	
	Interest payable		\$100
	Bonds payable		\$10,000

Assume that \$10,000 in bonds was sold on March 1, at par value. Interest for 2 months has accrued, and must be paid to the seller, as follows:

3/1/2014	Cash	\$10,200	
	Interest payable		\$200
	Bonds payable		\$10,000

Assume that \$10,000 in bonds was sold on April 1, at par value. Interest for 3 months has accrued, and must be paid to the seller, as follows:

4/1/2014	Cash	\$10,300	
	Interest payable		\$300
	Bonds payable		\$10,000

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Assume that \$10,000 in bonds was sold on May 1, at par value. Interest for 4 months has accrued, and must be paid to the seller, as follows:

5/1/2014	Cash	\$10,400	
	Interest payable		\$400
	Bonds payable		\$10,000

Assume that \$10,000 in bonds was sold on June 1, at par value. Interest for 5 months has accrued, and must be paid to the seller, as follows:

6/1/2014	Cash	\$10,500	
	Interest payable		\$500
	Bonds payable		\$10,000

Assume that \$10,000 in bonds was sold on June 16, at par value. Interest for 5 ½ months has accrued, and must be paid to the seller, as follows:

6/15/2014	Cash	\$10,550	
	Interest payable		\$550
	Bonds payable		\$10,000

On July 1, 2014, the interest must be paid on the \$100,000 bonds. Recall that the cash to be paid will be \$100,000 multiplied by 12% multiplied by ½ of one year, or \$6,000, as follows:

7/1/2014	Interest payable	\$2,050	
	Interest expense	\$3,950	
	Cash		\$6,000

Effectively, the \$6,000 includes the accrued interest we charged the purchaser of the bonds, at the date of sale (i.e., \$100+\$200+\$300+\$400+\$500+\$550=\$2,050).

Appendix D

Leases

A lease is a contractual agreement between a lessor (asset owner) and lessee (asset renter or tenant). The lessor receives cash payments, classified as rent revenue or income. The lessee makes cash payments, classified as rent expense. Leases fall into two broad categories: operating leases or capital leases.



Operating Leases

Operating leases are short-term leases. The lessor records receipts as rent revenue, as follows:

Cash	\$xxx
Rent revenue	\$xxx

The lessee records payments as rent expense, as follows:

Rent expense	\$xxx
Cash	\$xxx

Leases are classified as operating leases when the facts and circumstances or terms of the lease agreement suggest that the lessee has no intention of, effectively, purchasing the asset.

Capital Leases

Capital leases are long-term leases. Leases are classified as capital leases when the facts and circumstances or terms of the lease agreement suggest that the lessee has every intention of, effectively, purchasing the asset. In fact, the rules regarding the distinction and accounting treatment of a lease as a capital lease arose from something referred to as “off balance sheet financing.” If the lease is, effectively, a purchase, the capital lease must be recorded and presented as though the lease is a purchase, placing the leased asset and related liability on the firm’s book and balance sheet.

Appendix E

Pensions

Some firms, municipal, state and federal employers provide their employees with pension plans. A pension plan is a contractual agreement between employers and employees, providing for benefits or payments to employees after they retire. The employer may pay part or all of the cost of the pension, where the employer debits pension expense and credits cash for payments into the pension plan, as follows:

Pension expense	\$xxx
Cash	\$xxx

Plan administrators receive employer payments, invest in assets, and make payments to retirees or beneficiaries. Pension plans are frequently administered by insurance and trust companies, making these services available for a fee.



In recent years, municipalities have had to enter into bankruptcy, due, largely, to the behaviors of politicians, promising more than was possible to get elected, followed by their inability to pay retirees the pensions they were promised. Some examples follow:

Notable Chapter 9 bankruptcies

- 1999: Prichard, Alabama, partly due to inability to pay pensions.
- 2008: Vallejo, California, partly due to inability to pay pensions.
- 2009: Prichard, Alabama, partly due to inability to pay pensions, especially state mandated pensions increases.
- 2011: Central Falls, Rhode Island, partly due to inability to pay pensions.
- 2013: Detroit, Michigan, partly due to inability to pay pensions.

Pensions can be *defined benefit* or *defined contribution* plans. These plans are funded based on actuarial assumptions, used to determine if a pension plan is overfunded, fully-funded, or underfunded, determined, as follows:

Overfunded:	Plan assets > Accumulated benefit obligation (liability)
Fully funded:	Plan assets = Accumulated benefit obligation (liability)
Underfunded:	Plan assets < Accumulated benefit obligation (liability)

This topic is covered in great detail in intermediate financial accounting courses. If you would like to watch some films where the funding of pension plans for for-profit corporations is addressed, watch the film, **Wall Street** (1987) or **Other People's Money** (1991). Both films make reference to the firm's fully funded pension plans.

Appendix F

Present Value of \$1

Present Value (PV) of \$1 = $1 \div (1 + r)^n$, where r = discount rate & n = number of periods.

How to use the table and communicate the results – Example 1

As the below table suggests, *the present value of the right to receive \$1.00, 1 period from today, discounted at 1% per period is \$0.99010. Alternatively, \$0.99010 invested today, and generating a return of 1% per period, and invested for 1 period, will be worth \$1.00 (i.e., future value), or $\$0.99010 \times (1.01)^1 = \1.00 , as follows:*

PV of a \$1										
Periods	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.99010	0.98039	0.97087	0.96154	0.96154	0.94340	0.93458	0.92593	0.91743	0.90909

	\$0.99010
<i>multiplied by:</i>	<u>1.01</u>
<i>equals:</i>	<u>\$1.00000</u>

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PV of a \$1

<u>Prd</u>	<u>1%</u>	<u>2%</u>	<u>3%</u>	<u>4%</u>	<u>5%</u>	<u>6%</u>	<u>7%</u>	<u>8%</u>	<u>9%</u>	<u>10%</u>
1	0.99010	0.98039	0.97087	0.96154	0.95238	0.94340	0.93458	0.92593	0.91743	0.90909
2	0.98030	0.96117	0.94260	0.92456	0.90703	0.89000	0.87344	0.85734	0.84168	0.82645
3	0.97059	0.94232	0.91514	0.88900	0.86384	0.83962	0.81630	0.79383	0.77218	0.75131
4	0.96098	0.92385	0.88849	0.85480	0.82270	0.79209	0.76290	0.73503	0.70843	0.68301
5	0.95147	0.90573	0.86261	0.82193	0.78353	0.74726	0.71299	0.68058	0.64993	0.62092
6	0.94205	0.88797	0.83748	0.79031	0.74622	0.70496	0.66634	0.63017	0.59627	0.56447
7	0.93272	0.87056	0.81309	0.75992	0.71068	0.66506	0.62275	0.58349	0.54703	0.51316
8	0.92348	0.85349	0.78941	0.73069	0.67684	0.62741	0.58201	0.54027	0.50187	0.46651
9	0.91434	0.83676	0.76642	0.70259	0.64461	0.59190	0.54393	0.50025	0.46043	0.42410
10	0.90529	0.82035	0.74409	0.67556	0.61391	0.55839	0.50835	0.46319	0.42241	0.38554
11	0.89632	0.80426	0.72242	0.64958	0.58468	0.52679	0.47509	0.42888	0.38753	0.35049
12	0.88745	0.78849	0.70138	0.62460	0.55684	0.49697	0.44401	0.39711	0.35553	0.31863
13	0.87866	0.77303	0.68095	0.60057	0.53032	0.46884	0.41496	0.36770	0.32618	0.28966
14	0.86996	0.75788	0.66112	0.57748	0.50507	0.44230	0.38782	0.34046	0.29925	0.26333
15	0.86135	0.74301	0.64186	0.55526	0.48102	0.41727	0.36245	0.31524	0.27454	0.23939
16	0.85282	0.72845	0.62317	0.53391	0.45811	0.39365	0.33873	0.29189	0.25187	0.21763
17	0.84438	0.71416	0.60502	0.51337	0.43630	0.37136	0.31657	0.27027	0.23107	0.19784
18	0.83602	0.70016	0.58739	0.49363	0.41552	0.35034	0.29586	0.25025	0.21199	0.17986
19	0.82774	0.68643	0.57029	0.47464	0.39573	0.33051	0.27651	0.23171	0.19449	0.16351
20	0.81954	0.67297	0.55368	0.45639	0.37689	0.31180	0.25842	0.21455	0.17843	0.14864
21	0.81143	0.65978	0.53755	0.43883	0.35894	0.29416	0.24151	0.19866	0.16370	0.13513
22	0.80340	0.64684	0.52189	0.42196	0.34185	0.27751	0.22571	0.18394	0.15018	0.12285
23	0.79544	0.63416	0.50669	0.40573	0.32557	0.26180	0.21095	0.17032	0.13778	0.11168
24	0.78757	0.62172	0.49193	0.39012	0.31007	0.24698	0.19715	0.15770	0.12640	0.10153
25	0.77977	0.60953	0.47761	0.37512	0.29530	0.23300	0.18425	0.14602	0.11597	0.09230
26	0.77205	0.59758	0.46369	0.36069	0.28124	0.21981	0.17220	0.13520	0.10639	0.08391
27	0.76440	0.58586	0.45019	0.34682	0.26785	0.20737	0.16093	0.12519	0.09761	0.07628
28	0.75684	0.57437	0.43708	0.33348	0.25509	0.19563	0.15040	0.11591	0.08955	0.06934
29	0.74934	0.56311	0.42435	0.32065	0.24295	0.18456	0.14056	0.10733	0.08215	0.06304
30	0.74192	0.55207	0.41199	0.30832	0.23138	0.17411	0.13137	0.09938	0.07537	0.05731
31	0.73458	0.54125	0.39999	0.29646	0.22036	0.16425	0.12277	0.09202	0.06915	0.05210
32	0.72730	0.53063	0.38834	0.28506	0.20987	0.15496	0.11474	0.08520	0.06344	0.04736
33	0.72010	0.52023	0.37703	0.27409	0.19987	0.14619	0.10723	0.07889	0.05820	0.04306
34	0.71297	0.51003	0.36604	0.26355	0.19035	0.13791	0.10022	0.07305	0.05339	0.03914
35	0.70591	0.50003	0.35538	0.25342	0.18129	0.13011	0.09366	0.06763	0.04899	0.03558
36	0.69892	0.49022	0.34503	0.24367	0.17266	0.12274	0.08754	0.06262	0.04494	0.03235
37	0.69200	0.48061	0.33498	0.23430	0.16444	0.11579	0.08181	0.05799	0.04123	0.02941
38	0.68515	0.47119	0.32523	0.22529	0.15661	0.10924	0.07646	0.05369	0.03783	0.02673
39	0.67837	0.46195	0.31575	0.21662	0.14915	0.10306	0.07146	0.04971	0.03470	0.02430
40	0.67165	0.45289	0.30656	0.20829	0.14205	0.09722	0.06678	0.04603	0.03184	0.02209

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PV of a \$1 (continued)

<u>Prd</u>	<u>11%</u>	<u>12%</u>	<u>13%</u>	<u>14%</u>	<u>15%</u>	<u>16%</u>	<u>17%</u>	<u>18%</u>	<u>19%</u>	<u>20%</u>
1	0.90090	0.89286	0.88496	0.87719	0.86957	0.86207	0.85470	0.84746	0.84034	0.83333
2	0.81162	0.79719	0.78315	0.76947	0.75614	0.74316	0.73051	0.71818	0.70616	0.69444
3	0.73119	0.71178	0.69305	0.67497	0.65752	0.64066	0.62437	0.60863	0.59342	0.57870
4	0.65873	0.63552	0.61332	0.59208	0.57175	0.55229	0.53365	0.51579	0.49867	0.48225
5	0.59345	0.56743	0.54276	0.51937	0.49718	0.47611	0.45611	0.43711	0.41905	0.40188
6	0.53464	0.50663	0.48032	0.45559	0.43233	0.41044	0.38984	0.37043	0.35214	0.33490
7	0.48166	0.45235	0.42506	0.39964	0.37594	0.35383	0.33320	0.31393	0.29592	0.27908
8	0.43393	0.40388	0.37616	0.35056	0.32690	0.30503	0.28478	0.26604	0.24867	0.23257
9	0.39092	0.36061	0.33288	0.30751	0.28426	0.26295	0.24340	0.22546	0.20897	0.19381
10	0.35218	0.32197	0.29459	0.26974	0.24718	0.22668	0.20804	0.19106	0.17560	0.16151
11	0.31728	0.28748	0.26070	0.23662	0.21494	0.19542	0.17781	0.16192	0.14757	0.13459
12	0.28584	0.25668	0.23071	0.20756	0.18691	0.16846	0.15197	0.13722	0.12400	0.11216
13	0.25751	0.22917	0.20416	0.18207	0.16253	0.14523	0.12989	0.11629	0.10421	0.09346
14	0.23199	0.20462	0.18068	0.15971	0.14133	0.12520	0.11102	0.09855	0.08757	0.07789
15	0.20900	0.18270	0.15989	0.14010	0.12289	0.10793	0.09489	0.08352	0.07359	0.06491
16	0.18829	0.16312	0.14150	0.12289	0.10686	0.09304	0.08110	0.07078	0.06184	0.05409
17	0.16963	0.14564	0.12522	0.10780	0.09293	0.08021	0.06932	0.05998	0.05196	0.04507
18	0.15282	0.13004	0.11081	0.09456	0.08081	0.06914	0.05925	0.05083	0.04367	0.03756
19	0.13768	0.11611	0.09806	0.08295	0.07027	0.05961	0.05064	0.04308	0.03670	0.03130
20	0.12403	0.10367	0.08678	0.07276	0.06110	0.05139	0.04328	0.03651	0.03084	0.02608
21	0.11174	0.09256	0.07680	0.06383	0.05313	0.04430	0.03699	0.03094	0.02591	0.02174
22	0.10067	0.08264	0.06796	0.05599	0.04620	0.03819	0.03162	0.02622	0.02178	0.01811
23	0.09069	0.07379	0.06014	0.04911	0.04017	0.03292	0.02702	0.02222	0.01830	0.01509
24	0.08170	0.06588	0.05323	0.04308	0.03493	0.02838	0.02310	0.01883	0.01538	0.01258
25	0.07361	0.05882	0.04710	0.03779	0.03038	0.02447	0.01974	0.01596	0.01292	0.01048
26	0.06631	0.05252	0.04168	0.03315	0.02642	0.02109	0.01687	0.01352	0.01086	0.00874
27	0.05974	0.04689	0.03689	0.02908	0.02297	0.01818	0.01442	0.01146	0.00912	0.00728
28	0.05382	0.04187	0.03264	0.02551	0.01997	0.01567	0.01233	0.00971	0.00767	0.00607
29	0.04849	0.03738	0.02889	0.02237	0.01737	0.01351	0.01053	0.00823	0.00644	0.00506
30	0.04368	0.03338	0.02557	0.01963	0.01510	0.01165	0.00900	0.00697	0.00541	0.00421
31	0.03935	0.02980	0.02262	0.01722	0.01313	0.01004	0.00770	0.00591	0.00455	0.00351
32	0.03545	0.02661	0.02002	0.01510	0.01142	0.00866	0.00658	0.00501	0.00382	0.00293
33	0.03194	0.02376	0.01772	0.01325	0.00993	0.00746	0.00562	0.00425	0.00321	0.00244
34	0.02878	0.02121	0.01568	0.01162	0.00864	0.00643	0.00480	0.00360	0.00270	0.00203
35	0.02592	0.01894	0.01388	0.01019	0.00751	0.00555	0.00411	0.00305	0.00227	0.00169
36	0.02335	0.01691	0.01228	0.00894	0.00653	0.00478	0.00351	0.00258	0.00191	0.00141
37	0.02104	0.01510	0.01087	0.00784	0.00568	0.00412	0.00300	0.00219	0.00160	0.00118
38	0.01896	0.01348	0.00962	0.00688	0.00494	0.00355	0.00256	0.00186	0.00135	0.00098
39	0.01708	0.01204	0.00851	0.00604	0.00429	0.00306	0.00219	0.00157	0.00113	0.00082
40	0.01538	0.01075	0.00753	0.00529	0.00373	0.00264	0.00187	0.00133	0.00095	0.00068

Appendix 10G

Present Value of an Annuity of \$1 in Arrears

Present Value (PV) of an Annuity of \$1 in Arrears = $(1 \div r) [1 - (1 \div (1 + r)^n)]$, where r = the discount rate and n = the number of periods.

How to use the table and communicate the results – Example 1

As the below table suggests, *the present value of the right to receive \$1.00, 1 period from today, discounted at 1% per period is \$0.99010. The present value of the right to receive \$1.00 per period for 10 periods, discounted at 1% per period is \$9.47130, or $\$9.47130 \times (\$1.00) = \$9.47$, as follows:*

PV of an Annuity of \$1 in Arrears

<u>Prd</u>	<u>1%</u>
1	0.99010
2	1.97040
3	2.94099
4	3.90197
5	4.85343
6	5.79548
7	6.72819
8	7.65168
9	8.56602
10	9.47130

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PV of an Annuity of \$1 in Arrears

<u>Prd</u>	<u>1%</u>	<u>2%</u>	<u>3%</u>	<u>4%</u>	<u>5%</u>	<u>6%</u>	<u>7%</u>	<u>8%</u>	<u>9%</u>	<u>10%</u>
1	0.99010	0.98039	0.97087	0.96154	0.95238	0.94340	0.93458	0.92593	0.91743	0.90909
2	1.97040	1.94156	1.91347	1.88609	1.85941	1.83339	1.80802	1.78326	1.75911	1.73554
3	2.94099	2.88388	2.82861	2.77509	2.72325	2.67301	2.62432	2.57710	2.53129	2.48685
4	3.90197	3.80773	3.71710	3.62990	3.54595	3.46511	3.38721	3.31213	3.23972	3.16987
5	4.85343	4.71346	4.57971	4.45182	4.32948	4.21236	4.10020	3.99271	3.88965	3.79079
6	5.79548	5.60143	5.41719	5.24214	5.07569	4.91732	4.76654	4.62288	4.48592	4.35526
7	6.72819	6.47199	6.23028	6.00205	5.78637	5.58238	5.38929	5.20637	5.03295	4.86842
8	7.65168	7.32548	7.01969	6.73274	6.46321	6.20979	5.97130	5.74664	5.53482	5.33493
9	8.56602	8.16224	7.78611	7.43533	7.10782	6.80169	6.51523	6.24689	5.99525	5.75902
10	9.47130	8.98259	8.53020	8.11090	7.72173	7.36009	7.02358	6.71008	6.41766	6.14457
11	10.36763	9.78685	9.25262	8.76048	8.30641	7.88687	7.49867	7.13896	6.80519	6.49506
12	11.25508	10.57534	9.95400	9.38507	8.86325	8.38384	7.94269	7.53608	7.16073	6.81369
13	12.13374	11.34837	10.63496	9.98565	9.39357	8.85268	8.35765	7.90378	7.48690	7.10336
14	13.00370	12.10625	11.29607	10.56312	9.89864	9.29498	8.74547	8.24424	7.78615	7.36669
15	13.86505	12.84926	11.93794	11.11839	10.37966	9.71225	9.10791	8.55948	8.06069	7.60608
16	14.71787	13.57771	12.56110	11.65230	10.83777	10.10590	9.44665	8.85137	8.31256	7.82371
17	15.56225	14.29187	13.16612	12.16567	11.27407	10.47726	9.76322	9.12164	8.54363	8.02155
18	16.39827	14.99203	13.75351	12.65930	11.68959	10.82760	10.05909	9.37189	8.75563	8.20141
19	17.22601	15.67846	14.32380	13.13394	12.08532	11.15812	10.33560	9.60360	8.95011	8.36492
20	18.04555	16.35143	14.87747	13.59033	12.46221	11.46992	10.59401	9.81815	9.12855	8.51356
21	18.85698	17.01121	15.41502	14.02916	12.82115	11.76408	10.83553	10.01680	9.29224	8.64869
22	19.66038	17.65805	15.93692	14.45112	13.16300	12.04158	11.06124	10.20074	9.44243	8.77154
23	20.45582	18.29220	16.44361	14.85684	13.48857	12.30338	11.27219	10.37106	9.58021	8.88322
24	21.24339	18.91393	16.93554	15.24696	13.79864	12.55036	11.46933	10.52876	9.70661	8.98474
25	22.02316	19.52346	17.41315	15.62208	14.09394	12.78336	11.65358	10.67478	9.82258	9.07704
26	22.79520	20.12104	17.87684	15.98277	14.37519	13.00317	11.82578	10.80998	9.92897	9.16095
27	23.55961	20.70690	18.32703	16.32959	14.64303	13.21053	11.98671	10.93516	10.02658	9.23722
28	24.31644	21.28127	18.76411	16.66306	14.89813	13.40616	12.13711	11.05108	10.11613	9.30657
29	25.06579	21.84438	19.18845	16.98371	15.14107	13.59072	12.27767	11.15841	10.19828	9.36961
30	25.80771	22.39646	19.60044	17.29203	15.37245	13.76483	12.40904	11.25778	10.27365	9.42691
31	26.54229	22.93770	20.00043	17.58849	15.59281	13.92909	12.53181	11.34980	10.34280	9.47901
32	27.26959	23.46833	20.38877	17.87355	15.80268	14.08404	12.64656	11.43500	10.40624	9.52638
33	27.98969	23.98856	20.76579	18.14765	16.00255	14.23023	12.75379	11.51389	10.46444	9.56943
34	28.70267	24.49859	21.13184	18.41120	16.19290	14.36814	12.85401	11.58693	10.51784	9.60857
35	29.40858	24.99862	21.48722	18.66461	16.37419	14.49825	12.94767	11.65457	10.56682	9.64416
36	30.10751	25.48884	21.83225	18.90828	16.54685	14.62099	13.03521	11.71719	10.61176	9.67651
37	30.79951	25.96945	22.16724	19.14258	16.71129	14.73678	13.11702	11.77518	10.65299	9.70592
38	31.48466	26.44064	22.49246	19.36786	16.86789	14.84602	13.19347	11.82887	10.69082	9.73265
39	32.16303	26.90259	22.80822	19.58448	17.01704	14.94907	13.26493	11.87858	10.72552	9.75696
40	32.83469	27.35548	23.11477	19.79277	17.15909	15.04630	13.33171	11.92461	10.75736	9.77905

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PV of an Annuity of \$1 in Arrears (continued)

<u>Prd</u>	<u>11%</u>	<u>12%</u>	<u>13%</u>	<u>14%</u>	<u>15%</u>	<u>16%</u>	<u>17%</u>	<u>18%</u>	<u>19%</u>	<u>20%</u>
1	0.90090	0.89286	0.88496	0.87719	0.86957	0.86207	0.85470	0.84746	0.84034	0.83333
2	1.71252	1.69005	1.66810	1.64666	1.62571	1.60523	1.58521	1.56564	1.54650	1.52778
3	2.44371	2.40183	2.36115	2.32163	2.28323	2.24589	2.20958	2.17427	2.13992	2.10648
4	3.10245	3.03735	2.97447	2.91371	2.85498	2.79818	2.74324	2.69006	2.63859	2.58873
5	3.69590	3.60478	3.51723	3.43308	3.35216	3.27429	3.19935	3.12717	3.05763	2.99061
6	4.23054	4.11141	3.99755	3.88867	3.78448	3.68474	3.58918	3.49760	3.40978	3.32551
7	4.71220	4.56376	4.42261	4.28830	4.16042	4.03857	3.92238	3.81153	3.70570	3.60459
8	5.14612	4.96764	4.79877	4.63886	4.48732	4.34359	4.20716	4.07757	3.95437	3.83716
9	5.53705	5.32825	5.13166	4.94637	4.77158	4.60654	4.45057	4.30302	4.16333	4.03097
10	5.88923	5.65022	5.42624	5.21612	5.01877	4.83323	4.65860	4.49409	4.33893	4.19247
11	6.20652	5.93770	5.68694	5.45273	5.23371	5.02864	4.83641	4.65601	4.48650	4.32706
12	6.49236	6.19437	5.91765	5.66029	5.42062	5.19711	4.98839	4.79322	4.61050	4.43922
13	6.74987	6.42355	6.12181	5.84236	5.58315	5.34233	5.11828	4.90951	4.71471	4.53268
14	6.98187	6.62817	6.30249	6.00207	5.72448	5.46753	5.22930	5.00806	4.80228	4.61057
15	7.19087	6.81086	6.46238	6.14217	5.84737	5.57546	5.32419	5.09158	4.87586	4.67547
16	7.37916	6.97399	6.60388	6.26506	5.95423	5.66850	5.40529	5.16235	4.93770	4.72956
17	7.54879	7.11963	6.72909	6.37286	6.04716	5.74870	5.47461	5.22233	4.98966	4.77463
18	7.70162	7.24967	6.83991	6.46742	6.12797	5.81785	5.53385	5.27316	5.03333	4.81219
19	7.83929	7.36578	6.93797	6.55037	6.19823	5.87746	5.58449	5.31624	5.07003	4.84350
20	7.96333	7.46944	7.02475	6.62313	6.25933	5.92884	5.62777	5.35275	5.10086	4.86958
21	8.07507	7.56200	7.10155	6.68696	6.31246	5.97314	5.66476	5.38368	5.12677	4.89132
22	8.17574	7.64465	7.16951	6.74294	6.35866	6.01133	5.69637	5.40990	5.14855	4.90943
23	8.26643	7.71843	7.22966	6.79206	6.39884	6.04425	5.72340	5.43212	5.16685	4.92453
24	8.34814	7.78432	7.28288	6.83514	6.43377	6.07263	5.74649	5.45095	5.18223	4.93710
25	8.42174	7.84314	7.32998	6.87293	6.46415	6.09709	5.76623	5.46691	5.19515	4.94759
26	8.48806	7.89566	7.37167	6.90608	6.49056	6.11818	5.78311	5.48043	5.20601	4.95632
27	8.54780	7.94255	7.40856	6.93515	6.51353	6.13636	5.79753	5.49189	5.21513	4.96360
28	8.60162	7.98442	7.44120	6.96066	6.53351	6.15204	5.80985	5.50160	5.22280	4.96967
29	8.65011	8.02181	7.47009	6.98304	6.55088	6.16555	5.82039	5.50983	5.22924	4.97472
30	8.69379	8.05518	7.49565	7.00266	6.56598	6.17720	5.82939	5.51681	5.23466	4.97894
31	8.73315	8.08499	7.51828	7.01988	6.57911	6.18724	5.83709	5.52272	5.23921	4.98245
32	8.76860	8.11159	7.53830	7.03498	6.59053	6.19590	5.84366	5.52773	5.24303	4.98537
33	8.80054	8.13535	7.55602	7.04823	6.60046	6.20336	5.84928	5.53197	5.24625	4.98781
34	8.82932	8.15656	7.57170	7.05985	6.60910	6.20979	5.85409	5.53557	5.24895	4.98984
35	8.85524	8.17550	7.58557	7.07005	6.61661	6.21534	5.85820	5.53862	5.25122	4.99154
36	8.87859	8.19241	7.59785	7.07899	6.62314	6.22012	5.86171	5.54120	5.25312	4.99295
37	8.89963	8.20751	7.60872	7.08683	6.62881	6.22424	5.86471	5.54339	5.25472	4.99412
38	8.91859	8.22099	7.61833	7.09371	6.63375	6.22779	5.86727	5.54525	5.25607	4.99510
39	8.93567	8.23303	7.62684	7.09975	6.63805	6.23086	5.86946	5.54682	5.25720	4.99592
40	8.95105	8.24378	7.63438	7.10504	6.64178	6.23350	5.87133	5.54815	5.25815	4.99660

