



# Accounting for Long-Term Debt

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**15.511 Corporate Accounting**  
Summer 2004

**Professor S. P. Kothari**

**Sloan School of Management  
Massachusetts Institute of Technology**

**July 2, 2004**





# Agenda – Long-Term Debt

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- Extend our understanding of valuation methods beyond simple present value calculations.
- Understand the terminology of long-term debt
  - Bonds – coupon and zero-coupon bonds
  - At Par vs. Discount vs. Premium
    - Market interest rate versus coupon rate
  - Mortgages – Interest plus Principal paid each period
- Practice bookkeeping for debt issuance, interest accruals, periodic payments, and debt retirement.
- Understand how long-term debt affects financial statements over time.



# Bonds

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- Bonds
  - Periodic interest payments and face value due at maturity
- Face value (amount)
  - (Principal) Amount due at maturity
- Interest payments
  - Coupon rate times the face value of debt
  - Coupon rate is the interest rate stated in the note. It's used to calculate interest payments
- Market rate of interest
  - The rate of interest demanded in the market place given the risk characteristics of a bond
  - Can be higher or lower than the coupon rate



# Bonds

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- Consider a loan with
  - principal of \$10,000
  - initiated on 1/1/01
  - The market interest rate is 6%
  - Final payment is to be made at the end of the third year, i.e., on 12/31/03.
- What annual payments are required under the following three alternatives?
  - Annual interest payment at the end of each year and repayment of principal at the end of the third year (typical bond terms).
  - A single payment (of principal and interest) at the end of year 3 (Zero-Coupon bond).
  - Three equal payments at the end of each year (mortgage / new car loan terms).



# Bonds - alternative payment streams

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	<b>Coupon</b>	<b>Zero</b>	<b>Mortgage</b>
<b>End of Year 1</b>	<b>Int</b>	<b>0</b>	<b>Int + P</b>
<b>End of Year 2</b>	<b>Int</b>	<b>0</b>	<b>Int + P</b>
<b>End of Year 3</b>	<b>Int + P</b>	<b>Int + P</b>	<b>Int + P</b>



# Accounting for a Bond issued at par

## Coupon Rate 6% = Market Rate 6%

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- At the time of the bond issue
  - Dr Cash 10,000
  - Cr Bond Payable 10,000
- Periodically thereafter
  - Cash interest payments = Face Value x Coupon rate
  - Bond payable at the present value of cash flows, i.e., the present value of interest and principal
  - Interest expense = Bond payable x market interest rate
  - Difference between interest expense and cash interest payment is added to Bond Payable
- At maturity
  - Pay interest and entire principal balance



# Accounting for a Bond issued at par

## Coupon Rate 6% = Market Rate 6%

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- What is the present value of the bond?
- Payment stream
  - Three annual coupon payments of \$600 each
  - Principal payment of \$10,000 at the end of three years
- Present value
  - PV of ordinary annuity,  $n = 3$ ,  $r = 6\%$ , Table 4
  - $\$600 \times 2.67301 = \$1603.81$
  - PV of \$10,000,  $n = 3$ ,  $r = 6\%$ , Table 2
  - $\$10,000 \times 0.83962 = \$8396.20$
  - $PV = \$1603.81 + \$8396.20 = \$10,000$



# Accounting for a Bond issued at par

## Coupon Rate 6% = Market Rate 6%

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- End of year 1

- Interest expense =  $\$10,000 \times 6\%$
- Coupon payment =  $\$100,000 \times 6\%$

■ Dr Interest expense	600	
■ Cr Cash		600

- End of year 2

■ Dr Interest expense	600	
■ Cr Cash		600

- End of year 3

■ Dr Interest expense	600	
■ Cr Cash		600
■ Dr Bond Payable	10,000	
■ Cr Cash		10,000





# Accounting for a Bond issued at par

Coupon Rate 6% = Market Rate 6%

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	<b>Cash</b>	=	<b>Bond Payable</b>
<i>Issuance</i>	10,000	=	10,000

	<b>Cash</b>	=	<b>Bond Payable</b>	+	<b>Ret Erngs</b>
<i>2001</i>	(600)	=			(600)
<i>2002</i>	(600)	=			(600)
<i>2003</i>	(600)	=			(600)
	(10,000)		(10,000)		



# Accounting for a Zero-Coupon Bond

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- The zero-coupon bond pays \$10,000 at the end of three years.
- How much will it sell for? That is, how much cash proceed will the firm receive at the time of issuing the zero-coupon bond?
  - What is the present value of such a bond at the time of issue?
  - PV of \$10,000,  $n = 3$ ,  $r = 6\%$ , Table 2
  - $\$10,000 \times 0.83962 = \$8396.20$



# Accounting for a Zero-Coupon Bond

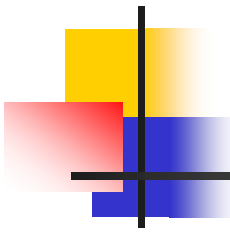
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- At the time of the bond issue

■ Dr Cash	8,396.20
■ Dr Discount on bonds payable	1,603.80
■ Cr Bond Payable	10,000.00

- Balance sheet presentation

■ Bond payable, gross	\$10,000.00
■ Less Discount	(\$1603.80)
■ <b>Net Bond Payable</b>	<b>\$8396.20</b>



# Accounting for a Bond issued at par

## Coupon Rate 6% = Market Rate 6%

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- Over time, the discount is reduced so that at maturity the net bond payable equals the face value of the bonds, \$10,000
- Periodically after issuance
  - Cash interest payments = 0
  - Interest expense = Bond payable x market interest rate
  - Difference between interest expense and cash interest payment reduces Discount Account
- At maturity
  - Pay interest and entire principal balance
  - Remove Bonds Payable



# Accounting for a Bond issued at par

## Coupon Rate 6% = Market Rate 6%

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- End of year 1
  - Interest expense =  $\$8,396.2 \times 6\% = 503.77$
  - No cash interest payment, so add the interest to Bond Payable
  - **Dr Interest expense** **503.77**
  - **Cr Discount** **503.77**
- Balance in Discount Account =  $\$(1603.80 - 503.77)$   
 $= \$ 1100.03$
- Net Bonds Payable =  $\$8396.20 + 503.77 = \$8899.97$
- *OR*
- Net Bonds Payable =  $\$10,000 - (1100.03) = \$8899.97$



# Accounting for a Bond issued at par

Coupon Rate 6% = Market Rate 6%

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- End of year 2
  - Interest expense =  $\$8,899.97 \times 6\% = 534.00$
  - No cash interest payment, so add the interest to Bond Payable
  - Dr Interest expense 534.00
  - Cr Discount 534.00
  - Balance in Discount Account =  $\$ (1100.03 - 534.00)$   
 $= \$ 566.03$
  - Net Bonds Payable =  $\$8899.97 + 534.00 = \$9433.97$
  - OR
  - Net Bonds Payable =  $\$10,000 - 566.03 = \$9433.97$



# Accounting for a Bond issued at par

## Coupon Rate 6% = Market Rate 6%

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- End of year 3
  - Interest expense =  $\$9433.97 \times 6\% = 566.03$
  - No cash interest payment, so add the interest to Bond Payable

■ Dr Interest expense	566.03	
■ Cr Discount		566.03

- Balance in Discount Account = 0

- Net Bonds Payable =  $\$9433.97 + 566.04 = \$10,000$

- *OR*

- Net Bonds Payable =  $\$10,000 - 0 = \$10,000$

- Pay off the bond at maturity

■ Dr Bond Payable	10,000	
■ Cr Cash		10,000

# Accounting for a Zero-Coupon Bond

	Cash	=	[Bond Payable – Discount =]	NBP	
<i>Issue</i>	10,000	=	[ 10,000 - 1,603.80 =]	8,396.20	
	Cash	=	[Bond Payable - Discount =]	NBP +	RE
<i>2001</i>	0	=	503.77		(503.77)
<i>EB</i>			<i>10,000 - 1,100.03</i>	<i>8899.97</i>	
<i>2002</i>	0	=	534		(534)
<i>EB</i>			<i>10,000 - 566.03</i>	<i>9433.97</i>	
<i>2003</i>	0	=	566.03		(566.03)
<i>EB</i>			<i>10,000 0</i>	<i>10,000</i>	
	Pay off the bond				
	(10,000)			(10,000)	





# Accounting for a Mortgage

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- In a mortgage, you make equal payments each period until maturity.
- Each payment represents interest and some principal repayment.
- PV of an ordinary annuity of three payments = \$10,000
  - $N = 3, r = 6\%$ , Table 4
  - $\$10,000 = PVOA (n= 3, r = 6\%) \times \text{Mortgage Payment}$
  - $\text{Mortgage Payment} = \$10,000/2.67301 = \$3741.10$



# Accounting for a Bond issued at par

Coupon Rate 6% = Market Rate 6%

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- At the time of the mortgage

- Dr Cash 10,000
- Cr Mortgage Payable 10,000

- Periodically thereafter until maturity

- Cash mortgage payment equals
  - Interest expense = Outstanding mortgage balance x Market interest rate
  - The excess of mortgage payment over interest expense reduces the Mortgage Principal balance



# Accounting for a Mortgage

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	<b>Cash</b>	=	<b>Mortgage Payable</b>
<b>Signing</b>	10,000	=	10,000

	<b>Cash</b>	=	<b>Mortgage</b>	+	<b>Ret Earnings</b>
2001	(3,741)	=	(3,141)		(600)
<b>EB01</b>			<b>6,859</b>		
2002	(3,741)	=	(3,329)		(412)
<b>EB02</b>			<b>3,530</b>		
2003	(3,741)	=	(3,530)		(211)
<b>EB03</b>			<b>0</b>		

# Bond issued at a Discount

Coupon rate 6% < Market rate at issuance 8%

- Cash flows to the bondholder
    - Interest payments = Coupon rate x Face Value = \$600
    - Principal at maturity = \$10,000
  - Proceeds from bond issue
    - PV of cash flows discounted at the MARKET interest rate of 8%
    - PVOA ( $n = 3, r = 8\%$ ) x \$600 =  $2.57710 \times 600 = \$1546.26$
    - PV of (10,000,  $n = 3, r = 8\%$ ) =  $0.79383 \times 10,000 = \$7938.30$
    - Total = \$9484.56
- 
- |                    |             |
|--------------------|-------------|
| ■ Bond Payable     | \$10,000.00 |
| ■ Less Discount    | (515.44)    |
| ■ Net Bond Payable | \$09,484.56 |

# Bond issued at a Discount

Coupon rate 6% < Market rate at issuance 8%

- At the end of first year
- Interest expense
  - Net Bond Payable x 8%
  - $\$9484.56 \times 8\% = \$758.77$
  - Dr Interest expense 758.77
  - Cr Cash 600.00
  - Cr Discount on Bond Payable 158.77
  - Net Bond Payable =  $\$9484.56 + 158.77 = \$9643.33$

# Bond issued at a Discount

Coupon rate 6% < Market rate at issuance 8%

<i>Issue</i>	<b>Cash</b>	=	<b>[Bond Payable – Discount =]</b>	<b>NBP</b>	
	9,485	=	[ 10,000 - 515 = ]	9,485	
	<b>Cash</b>	=	<b>[Bond Payable - Discount = ]</b>	<b>NBP</b>	<b>+ RE</b>
<i>2001</i>	(600)	=	159	9,643	(759)
<i>2002</i>	(600)	=	171	9,815	(771)
<i>2003</i>	(600)	=	185	10,000	(785)
	(10,000)			(10,000)	

# Bond issued at a Premium

Coupon rate 6% > Market rate at issuance 4%

	Cash	=	[Bond Payable + Premium =]	NBP	
<i>Issue</i>	9,485	=	[ 10,000 + 555 =]	10,555	
	<b>Cash</b>	<b>=</b>	<b>[Bond Payable + Premium =]</b>	<b>NBP +</b>	<b>RE</b>
<i>2001</i>	(600)	=	(178)	10,377	(422)
<i>2002</i>	(600)	=	(185)	10,192	(415)
<i>2003</i>	(600)	=	(192)	10,000	(408)
	(10,000)			(10,000)	



# Bonds - disclosures

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- **Balance sheet**
  - Current portion of L-T debt in current liabilities
  - Long-term debt
  
- **Income Statement**
  - Interest expense
  
- **Indirect SCF**
  - Operations - interest accruals not yet paid, amortization of discount/premium
  - Investing - purchase / sale of available for sale debt
  - Financing - proceeds, repayment + supplemental disclosure of cash paid for interest
  
- **Notes**
  - Details on all of the above



# Does the Balance Sheet Represent the Market Value of Debt?

## Shoney's, 1999

Subordinated zero-coupon  
debentures, due April 2004

1999

\$122,520,712

1998

\$112,580,014

## What is the effective interest rate Shoney has used?

Zero coupon bond value<sub>t</sub> = value<sub>t-1</sub> × (1+r)

$$\begin{aligned} \Rightarrow r &= 122,520,712 / 112,580,014 - 1 \\ &= 8.83\% \end{aligned}$$

**What is the market interest rate of the debt? The Wall Street Journal reported in 1999 that Shoney's debt was selling for 210 per thousand, with 5 years until maturity.**

$$FV_n = PV_0 \times (1+r)^n$$

$$1000 = 210 \times (1+r)^5 \quad \Rightarrow \quad (1000/210)^{1/5} - 1 = 36.6\%$$

# Shoney's Statement of Cash Flows: Effect of Discount Amortization

Years Ended	Oct 31, 1999	Oct 25, 1998
Operating activities		
Net loss	\$ (28,826,398)	\$ (107,703,920)
Adjustments to reconcile net loss to net cash provided by operating activities:		
...		
<b>Interest expense on zero coupon convertible debentures and other noncash charges</b>	<b>16,329,932</b>	<b>18,508,713</b>
...		
Net cash provided by operating activities	34,521,046	55,063,923

The annual discount amortization on the zeros (which is equal to the annual interest expense on the zeros) is a non-cash expense and is added back to NI to reconcile to OCF.

# Early Retirement of Debt

You repurchase Zero-Coupon bonds (Face Value = \$ 11,190) in the open market at the start of 2002 (2 years to maturity) when the market rate is 5%.

**What is the market price of the bonds at that time?**

$$\begin{aligned} PV_0 &= FV_n / (1+r)^n \\ PV_0 &= 11,190 / (1.05)^2 = 10,803 \end{aligned}$$

**What is the effect on the BSE and financial statements?**

	Cash (A)	=	Bond Principal	-	Discount	+	RE
BB			11,190	-	1,310		
	10,803		(11,910)		(1,310)		(203)

The gain or loss on early retirement of debt is reported as an **extraordinary item** on the income statement.



# Bonds - debt covenants (TCBY)

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- Borrower will at all times maintain
  - a ratio of Current Assets to Current Liabilities ... that is greater than 2.0...
  - a Profitability ratio greater than 1.5 ... [defined as] the ratio of Net Income for the immediately preceding period of 12 calendar months to Current Maturities of Long Term Debt ...
  - a Fixed Coverage Ratio greater than 1.0 ... [defined as] the ratio of Net Income ... plus noncash Charges to Current Maturities of Long Term Debt ... plus cash dividends ... plus Replacement CapEx of the Borrower
- [Borrower will not] sell, lease, transfer, or otherwise dispose of any assets ... except for the sale of inventory ... and disposition of obsolete equipment ... [to] repurchase the stock of TCBY
- [Borrower agrees it will not take on new loans if] the aggregate amount of all such loans ... would exceed 25% of the consolidated Tangible Net Worth of the Borrower...