Accounting for Long-Term Debt

15.501/516 **Accounting**
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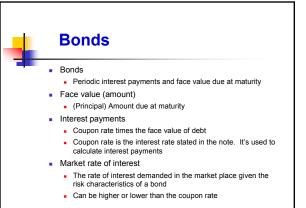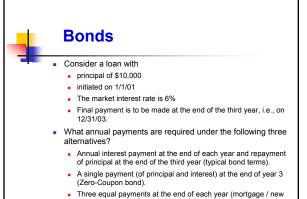**April 5, 2004**

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Agenda – Long-Term Debt

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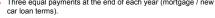- Understand the terminology of long-term debt
  - Bonds – coupon and zero-coupon bonds
  - At Par vs. Discount vs. Premium
    - Market interest rate versus coupon rate
  - Mortgages – Interest plus Principal paid each period
- Practice bookkeeping for debt issuance, interest accruals, periodic payments,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

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Bonds

- 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

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Bonds

- 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).

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Bonds - alternative payment streams

	Coupon	Zero	Mortgage
End of Year 1	Int	0	Int + P
End of Year 2	Int	0	Int + P
End of Year 3	Int + P	Int + P	Int + P

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Accounting for a Bond issued at par
Coupon Rate 6% = Market Rate 6%

- 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

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Accounting for a Bond issued at par
Coupon Rate 6% = Market Rate 6%

- 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 x 2.67301 = $1603.81
  - PV of $10,000, n = 3, r = 6%, Table 2
  - $10,000 x 0.83962 = $8396.20
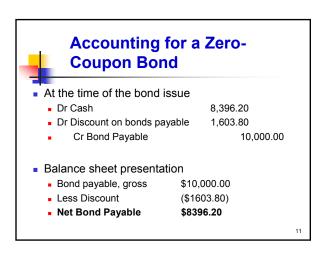 - PV = $1603.81 + $8396.20 = $10,000

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Accounting for a Bond issued at par
Coupon Rate 6% = Market Rate 6%

- End of year 1
  - Interest expense = $10,000 x 6%
  - Coupon payment = $100,000 x 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

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Accounting for a Bond issued at par
Coupon Rate 6% = Market Rate 6%

	Cash	**=**	**Bond Payable**	
Issuance	10,000	=	10,000	

	Cash	**=**	**Bond Payable**	**+**	**Ret Erngs**
2001	(600)	=			(600)
2002	(600)	=			(600)
2003	(600)	=			(600)
	(10,000)		(10,000)		

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Accounting for a Zero-Coupon Bond

- 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?
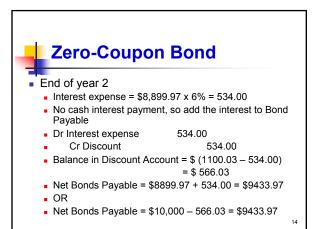 - What is the present value of such a bond at the time of issue?
  - PV of $10,000, n = 3, r = 6%, Table 2
  - $10,000 x 0.83962 = $8396.20

Accounting for a Zero-Coupon Bond

- 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)
  - **Net Bond Payable**   **$8396.20**

Zero-Coupon Bond

- 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

Zero-Coupon Bond

- End of year 1
    - Interest expense = $8,396.2 x 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

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Zero-Coupon Bond

- End of year 2
    - Interest expense = $8,899.97 x 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

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Zero-Coupon Bond

- End of year 3
    - Interest expense = $9433.97 x 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

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Accounting for a Zero-Coupon Bond

	Cash	=	[Bond Payable – Discount =]	NBP
Issue	8,396.20	=	[10,000 - 1,603.80 =]	8,396.20

	Cash	=	[Bond Payable	- Discount =]	NBP +	RE
2001	0	=		503.77		(503.77)
EB			*10,000*	*- 1,100.03*	*8899.97*	
2002	0	=		534		(534)
EB			*10,000*	*- 566.03*	*9433.97*	
2003	0	=		566.03		(566.03)
EB			*10,000*	*0*	*10,000*	

Pay off the bond
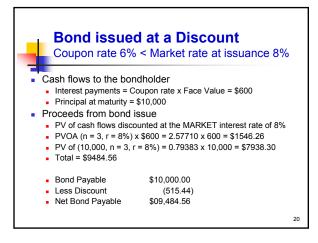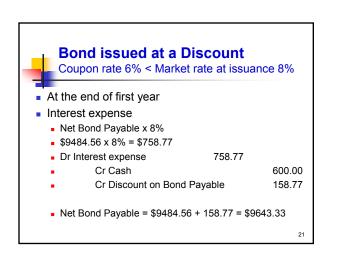| (10,000)				(10,000)

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Accounting for a Mortgage

- 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%) x Mortgage Payment
  - Mortgage Payment = $10,000/2.67301 = $3741.10

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Accounting for a Bond issued at par
Coupon Rate 6% = Market Rate 6%

- 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

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Accounting for a Mortgage

	Cash	=	Mortgage Payable	
Signing	10,000	=	10,000	

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

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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 x 600 = $1546.26
  - PV of (10,000, n = 3, r = 8%) = 0.79383 x 10,000 = $7938.30
  - Total = $9484.56

  - Bond Payable $10,000.00
  - Less Discount   (515.44)
  - Net Bond Payable $09,484.56

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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 x 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

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Bond issued at a Discount
Coupon rate 6% < Market rate at issuance 8%

	Cash	=	[Bond Payable – Discount =]	NBP
Issue	9,485	=	[10,000 – 515 =]	9,485

	Cash	=	[Bond Payable - Discount =]	NBP	+	RE
2001	(600)	=	159	9,643		(759)
2002	(600)	=	171	9,815		(771)
2003	(600)	=	185	10,000		(785)
	(10,000)			(10,000)		

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Bond issued at a Premium
Coupon rate 6% > Market rate at issuance 4%

	Cash	=	[Bond Payable + Premium =]	NBP
Issue	10,555	=	[10,000 + 555 =]	10,555

	Cash	=	[Bond Payable + Premium =]	NBP	+	RE
2001	(600)	=	(178)	10,377		(422)
2002	(600)	=	(185)	10,192		(415)
2003	(600)	=	(192)	10,000		(408)
	(10,000)			(10,000)		

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Bonds - disclosures

- **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

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Bond Disclosures

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UAL, 1997
(8)  Long-Term Debt
A summary of long-term debt, including current maturities, as of December 31
is as follows (interest rates are as of December 31, 1997):

(In Millions)                            1997     1996
                                         ----     ----
Secured notes, 6.13% to 8.90%,
  averaging 7.16%, due through 2014    $ 1,295   $  819
Debentures, 9.00% to 11.21%, averaging
  9.97%, due through 2021                 785      936
Convertible debentures, 7.75%, due 2010    -       16
Promissory notes, 6.33% to 11.00%,
  averaging 6.51%, due through 2000        70       64
Special facility bonds, 5.625%, due 2034  190       -
                                       ----------
                                         2,340    1,835
                                         -----    -----
Less:  Unamortized discount on debt       (13)      (9)
Current maturities                       (235)    (165)
                                         -----    -----
                                       $ 2,092  $ 1,661
                                         =====    =====
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Does the Balance Sheet Represent the Market Value of Debt?

Shoney's, 1999	1999	1998
Subordinated zero-coupon debentures, due April 2004	$122,520,712	$112,580,014

What is the effective interest rate Shoney has used?

Zero coupon bond value$_t$ = value$_{t-1}$ × (1+r)

=> r = 122,520,712 / 112,580,014 – 1
     = 8.83%

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.

$FV_n = PV_0 × (1+r)^n$

1000 = 210 × (1+r)5   =>   (1000/210)1/5 – 1 = 36.6%

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

Years Ended	October 31 1999	October 25 1998
Operating activities		
Net loss	$ (28,826,398)	$ (107,703,920)
Adjustments to reconcile net loss to net cash provided by operating activities:		
Depreciation and amortization	41,162,155	49,340,252
Interest expense on zero coupon convertible debentures and other noncash charges	*16,329,932*	*18,508,713*
Deferred income taxes	(1,890,000)	38,088,000
Gain on disposal of property, plant and equipment	(20,230,756)	(9,417,828)
Impairment of long-lived assets	18,424,046	48,403,158
Changes in operating assets and liabilities:		
Notes and accounts receivable	1,834,878	1,966,717
Inventories	(492,529)	1,236,546
Prepaid expenses	(1,676,202)	1,450,081
Accounts payable	(10,850,662)	2,524,508
Deferred income and other liabilities	(444,616)	4,243,692
	--------------	--------------
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.
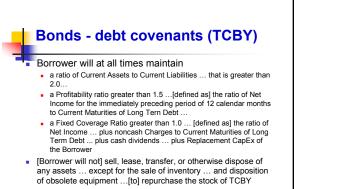
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Early Retirement of Debt

You repurchase Zero-Coupon bonds (Face Value = $ 11,910) in the open market at the start of 2002 (2 years to maturity) when the market rate is 5%. The market rate of interest at time of issue was 6%.
What is the market price of the bonds at that time?
$PV_0 = FV_n / (1+r)^n$
$PV_0 = 11,910 / (1.05)^2 = 10,803$

What is the effect on the BSE and financial statements?

Cash (A)	=	Bond Principal	-	Discount	+	RE
BB		11,910	-	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.

What is the journal entry?

Bonds - debt covenants (TCBY)

- 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 Tern 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...