Accounting for Long-Term Debt

15.511 Corporate Accounting
Summer 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.
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
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).
## Bonds - alternative payment streams

<table>
<thead>
<tr>
<th></th>
<th>Coupon</th>
<th>Zero</th>
<th>Mortgage</th>
</tr>
</thead>
<tbody>
<tr>
<td>End of Year 1</td>
<td>Int</td>
<td>0</td>
<td>Int + P</td>
</tr>
<tr>
<td>End of Year 2</td>
<td>Int</td>
<td>0</td>
<td>Int + P</td>
</tr>
<tr>
<td>End of Year 3</td>
<td>Int + P</td>
<td>Int + P</td>
<td>Int + P</td>
</tr>
</tbody>
</table>
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
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
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
Accounting for a Bond issued at par
Coupon Rate 6% = Market Rate 6%

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash</th>
<th>=</th>
<th>Bond Payable</th>
<th>+</th>
<th>Ret Erngs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>(600)</td>
<td>=</td>
<td>(600)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>(600)</td>
<td>=</td>
<td>(600)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>(600)</td>
<td>=</td>
<td>(600)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Issuance

Cash = Bond Payable

10,000 = 10,000
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
Accounting for a Bond issued at par
Coupon Rate 6% = Market Rate 6%

- 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%

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

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

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
# Accounting for a Zero-Coupon Bond

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash</th>
<th>Bond Payable - Discount</th>
<th>NBP</th>
<th>RE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>0</td>
<td>503.77</td>
<td></td>
<td>(503.77)</td>
</tr>
<tr>
<td>EB</td>
<td>0</td>
<td>10,000 - 1,100.03</td>
<td>8899.97</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>0</td>
<td>534</td>
<td></td>
<td>(534)</td>
</tr>
<tr>
<td>EB</td>
<td>0</td>
<td>10,000 - 566.03</td>
<td>9433.97</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>0</td>
<td>566.03</td>
<td></td>
<td>(566.03)</td>
</tr>
<tr>
<td>EB</td>
<td>0</td>
<td>10,000 - 0</td>
<td>10,000</td>
<td></td>
</tr>
</tbody>
</table>

Pay off the bond (10,000)
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
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 \times Market interest rate
    - The excess of mortgage payment over interest expense reduces the Mortgage Principal balance
Accounting for a Mortgage

\[
\begin{align*}
\text{Cash} & \quad = \quad \text{Mortgage Payable} \\
\text{Signing} & \quad 10,000 \quad = \quad 10,000 \\
\text{Cash} & \quad = \quad \text{Mortgage} + \text{Ret Earnings} \\
2001 & \quad (3,741) \quad = \quad (3,141) \quad + \quad (600) \\
\text{EB01} & \quad 6,859 \\
2002 & \quad (3,741) \quad = \quad (3,329) \quad + \quad (412) \\
\text{EB02} & \quad 3,530 \\
2003 & \quad (3,741) \quad = \quad (3,530) \quad + \quad (211) \\
\text{EB03} & \quad 0
\end{align*}
\]
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 \( (n = 3, r = 8\%) \times 600 = 2.57710 \times 600 = $1546.26 \)
  - 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 $9,484.56
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 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
**Bond issued at a Discount**

**Coupon rate 6% < Market rate at issuance 8%**

<table>
<thead>
<tr>
<th></th>
<th>Cash</th>
<th>=</th>
<th>[Bond Payable – Discount =]</th>
<th>NBP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Issue</strong></td>
<td>9,485</td>
<td>=</td>
<td>[ 10,000 - 515 = ]</td>
<td>9,485</td>
</tr>
<tr>
<td><strong>Cash</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001 (600)</td>
<td>159</td>
<td>=</td>
<td>NBP + RE</td>
<td>9,643 (759)</td>
</tr>
<tr>
<td>2002 (600)</td>
<td>171</td>
<td>=</td>
<td></td>
<td>9,815 (771)</td>
</tr>
<tr>
<td>2003 (600)</td>
<td>185</td>
<td>=</td>
<td></td>
<td>10,000 (785) (10,000)</td>
</tr>
</tbody>
</table>
Bond issued at a Premium
Coupon rate 6% > Market rate at issuance 4%

\[
\begin{align*}
\text{Issue} & \quad 9,485 \quad = \quad [\text{Bond Payable} + \text{Premium} =] \quad \text{NBP} \\
& \quad \quad \quad = \quad [\quad 10,000 \quad + \quad 555 \quad =] \quad 10,555 \\
\text{Cash} & \quad = \quad [\text{Bond Payable} \quad + \quad \text{Premium} \quad =] \quad \text{NBP} \quad + \quad \text{RE} \\
2001 & \quad (600) \quad = \quad (178) \quad 10,377 \quad (422) \\
2002 & \quad (600) \quad = \quad (185) \quad 10,192 \quad (415) \\
2003 & \quad (600) \quad = \quad (192) \quad 10,000 \quad (408) \\
(10,000) & \quad = \quad (10,000)
\end{align*}
\]
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
Does the Balance Sheet Represent the Market Value of Debt?

Shoney’s, 1999

<table>
<thead>
<tr>
<th></th>
<th>1999</th>
<th>1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subordinated zero-coupon debentures, due April 2004</td>
<td>$122,520,712</td>
<td>$112,580,014</td>
</tr>
</tbody>
</table>

What is the effective interest rate Shoney has used?

Zero coupon bond value\(_t\) = value\(_t-1\) \times (1+r)

\[ r = \frac{122,520,712}{112,580,014} - 1 \]

\[ r = 8.83\% \]

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.

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

\[ 1000 = 210 \times (1+r)^5 \]

\[ (1000/210)^{1/5} - 1 = 36.6\% \]

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

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating activities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net loss</td>
<td>$(28,826,398)</td>
<td>$(107,703,920)</td>
</tr>
<tr>
<td>Adjustments to reconcile net loss to net cash provided by operating activities:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest expense on zero coupon convertible debentures and other noncash charges</td>
<td>16,329,932</td>
<td>18,508,713</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net cash provided by operating activities</td>
<td>34,521,046</td>
<td>55,063,923</td>
</tr>
</tbody>
</table>

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.

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?**

\[
P_{V0} = \frac{FV_n}{(1+r)^n}
\]

\[
P_{V0} = \frac{11,910}{(1.05)^2} = 10,803
\]

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

\[
\text{Cash (A)} = \text{Bond Principal} - \text{Discount} + \text{RE}
\]

| 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)

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…