T-bond and Wal-mart Rate of Return Example

• Imagine buying these bonds at the current prices today. A year later, assume the yield to maturity for each bond increases by 0.5 percentage point.
• What is the expected price of each bond and what would be the rate of return for each bond if they were sold a year from today?

Interest Rate Risk

• Measures Bond Price Sensitivity to changes in interest rates.
• In general, long-term bonds have more interest rate risk than short-term bonds.
Interest Rate Risk Example

- Recall from our earlier Krustyburger example, the 20-year, 7% annual coupon bond has the following values at \( r = 5\% \), 7\%, & 9\%. Let’s compare with a 2-yr, 7\% annual coupon bond.

- **20-year bond**
  - \( r = 5\% \): \( PV = $1,249.24 \)
  - \( r = 7\% \): \( PV = $1,000 \)
  - \( r = 9\% \): \( PV = $817.43 \)

- **2-year bond**
  - \( PV = $1,037.19 \)
  - \( PV = $1,000 \)
  - \( PV = $964.82 \)

Bond Price Sensitivity Graph

Bond Values for 7\% Annual Coupon Bonds

- **2-yr Bond**
- **20-yr Bond**
Bond Value Changes Over Time

- Returning to the Krustyburger bond example for Homer, where \( r = 5\% \), \( N = 20 \), \( \text{cpn (PMT)} = \$70 \), \( \text{par (FV)} = \$1000 \), & \( \text{PV} = \$1249.24 \).
- What is bond value one year later when \( N = 19 \) if \( r \) is still = 5\%?

Bond Prices over time approach par value as maturity date approaches assuming same YTM
Default Risk

- Credit risk
- Default premium
- Investment grade
- Junk bonds

<table>
<thead>
<tr>
<th>Moody's</th>
<th>Standard &amp; Poor's</th>
<th>Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aaa</td>
<td>AAA</td>
<td>The strongest rating; ability to repay interest and principal is very strong.</td>
</tr>
<tr>
<td>Aa</td>
<td>AA</td>
<td>Very strong likelihood that interest and principal will be repaid</td>
</tr>
<tr>
<td>A</td>
<td>A</td>
<td>Strong ability to repay, but some vulnerability to changes in circumstances</td>
</tr>
<tr>
<td>Baa</td>
<td>BBB</td>
<td>Adequate capacity to repay; more vulnerability to changes in economic circumstances</td>
</tr>
<tr>
<td>Ba</td>
<td>BB</td>
<td>Considerable uncertainty about ability to repay.</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>Likelihood of interest and principal payments over sustained periods is questionable.</td>
</tr>
<tr>
<td>Caa</td>
<td>CCC</td>
<td>Bonds in the Caa/CCC and Ca/CC classes may already be in default or in danger of imminent default</td>
</tr>
<tr>
<td>Ca</td>
<td>CC</td>
<td>C-rated bonds offer little prospect for interest or principal on the debt ever to be repaid.</td>
</tr>
</tbody>
</table>
Callable Bonds

• Callable Bonds: Company can buy back the bonds before maturity for a call price. More likely as interest rates fall.
  – Yield to Call: calculate like yield to maturity but use time to earliest call date as N, and call price as FV.

YTC Example

• Burns Enterprises annual coupon $1000 par value bonds currently sell for $1,045 and have a coupon rate of 9.5%. These bonds have 25 years to maturity, but can be called in 5 years at a price of $1,050.
• What is the yield to call?
Other Types of Bonds

- **Zero Coupon Bonds**: no coupon payments, just par value.
- **Convertible Bonds**: can be converted into (fixed # of) shares of stock.
- **Floating Rate (Indexed) Bonds**: coupon payments and/or par value indexed to inflation.
  - TIPs: Indexed US Treasury coupon bond, fixed coupon rate, face value indexed.