Types of Risk Embodied in the Yields of YBFAs

- **Market risk** (which we have already seen)
  - due to capital gains and losses when interest rates fluctuate
  - the longer the maturity, the higher the risk
  - common to all YBFAs, including Treasuries
- **Default risk**
  - reflected in corporate and municipal YBFAs
  - not present in Treasuries
- **Credit risk**
  - risk that the underlying agency, government, or corporation that has issued the YBFA experiences a downgrade
- **Economic risk**
  - due to inflation or similar economic or political shocks
  - Treasuries may experience "flight to safety" during political shocks.

... and these overlap a lot. A rise in credit risk made evident by a ratings downgrade will also raise default risk and possibly market risk.
Corporate Bonds and Notes (CBNs)

- Major funding source for corporations
- Thousands of listings at every maturity
- Unlike Treasuries, CBNs also subject to default risk
- Hence, CBNs are risk-rated by credit agencies
  - primarily Moody’s, Standard and Poors, and Fitch
- Ratings and changes in ratings have a large impact upon yields
- Even the highest-rated CBNs have higher yields than Treasuries of equivalent maturities.
- This is a playground only for professionals, except maybe ETFs
- Diversified CBN mutual funds, however, can be a nice supplement to a balanced mutual fund portfolio.

Corporate Bond Ratings for Risk

Because of the possibility of default, corporate, municipal, and international bonds are rated for risk by agencies like Standard and Poors. Shown here are the ratings grades. The lower the rating the higher the risk and the higher the effective yield, which may be represented by a deep discount in the bond price.

<table>
<thead>
<tr>
<th>Moody's</th>
<th>S&amp;P</th>
<th>Fitch</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aaa</td>
<td>AAA</td>
<td>AAA</td>
<td>Prime. Maximum Safety</td>
</tr>
<tr>
<td>Aa1</td>
<td>AA+</td>
<td>AA+</td>
<td>High Grade High Quality</td>
</tr>
<tr>
<td>Aa2</td>
<td>AA</td>
<td>AA</td>
<td>Lower Medium Grade</td>
</tr>
<tr>
<td>Aa3</td>
<td>AA-</td>
<td>AA-</td>
<td>Investment grade</td>
</tr>
<tr>
<td>A1</td>
<td>A+</td>
<td>A+</td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>A</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>A-</td>
<td>A-</td>
<td></td>
</tr>
<tr>
<td>Baa1</td>
<td>BBB+</td>
<td>BBB+</td>
<td>Non Investment Grade</td>
</tr>
<tr>
<td>Baa2</td>
<td>BBB</td>
<td>BBB</td>
<td>Speculative</td>
</tr>
<tr>
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<td>BBB-</td>
<td>BBB-</td>
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<tr>
<td>Ba1</td>
<td>BB+</td>
<td>BB+</td>
<td></td>
</tr>
<tr>
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<td>BB</td>
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</tr>
<tr>
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<td>BB-</td>
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<td></td>
</tr>
<tr>
<td>B1</td>
<td>B+</td>
<td>B+</td>
<td></td>
</tr>
<tr>
<td>B2</td>
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<td>B</td>
<td></td>
</tr>
<tr>
<td>B3</td>
<td>B-</td>
<td>B-</td>
<td></td>
</tr>
<tr>
<td>Caa1</td>
<td>CCC+</td>
<td>CCC+</td>
<td>Substantial Risk</td>
</tr>
<tr>
<td>Caa2</td>
<td>CCC</td>
<td>CCC</td>
<td>In Poor Standing</td>
</tr>
<tr>
<td>Caa3</td>
<td>CCC-</td>
<td>CCC-</td>
<td></td>
</tr>
<tr>
<td>Ca</td>
<td>-</td>
<td>-</td>
<td>Extremely Speculative</td>
</tr>
<tr>
<td>C</td>
<td>-</td>
<td>-</td>
<td>May be in Default</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>DDD</td>
<td>Default</td>
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</table>

Source: www.bondsonline.com
Corporate Yield Spreads
June 30, 2004

Reuters Corporate Spreads for Industrials*

<table>
<thead>
<tr>
<th>Rating</th>
<th>1 yr</th>
<th>2 yr</th>
<th>3 yr</th>
<th>5 yr</th>
<th>7 yr</th>
<th>10 yr</th>
<th>30 yr</th>
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<tr>
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<td>10</td>
<td>15</td>
<td>22</td>
<td>27</td>
<td>30</td>
<td>55</td>
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<tr>
<td>Aa1/AA+</td>
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<td>15</td>
<td>20</td>
<td>32</td>
<td>37</td>
<td>40</td>
<td>60</td>
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<tr>
<td>Aa2/AA</td>
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<td>30</td>
<td>37</td>
<td>44</td>
<td>50</td>
<td>65</td>
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<tr>
<td>Aa3/AA-</td>
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<td>35</td>
<td>45</td>
<td>53</td>
<td>55</td>
<td>70</td>
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<tr>
<td>A1/A+</td>
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<td>40</td>
<td>45</td>
<td>58</td>
<td>62</td>
<td>65</td>
<td>79</td>
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<tr>
<td>A2/A</td>
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<td>57</td>
<td>65</td>
<td>71</td>
<td>75</td>
<td>90</td>
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<td>A3/A-</td>
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<td>65</td>
<td>79</td>
<td>89</td>
<td>82</td>
<td>86</td>
<td>108</td>
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<td>Baa1/BBB+</td>
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<td>75</td>
<td>90</td>
<td>97</td>
<td>100</td>
<td>107</td>
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<td>Baa2/BBB</td>
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<td>80</td>
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<td>95</td>
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<td>Baa3/BBB-</td>
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<td>105</td>
<td>112</td>
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<td>Ba1/BB+</td>
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<td>100</td>
<td>115</td>
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<td>370</td>
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<td>290</td>
<td>300</td>
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<td>B1/B+</td>
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<td>525</td>
<td>600</td>
<td>425</td>
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<td>375</td>
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<td>B2/B</td>
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<td>550</td>
<td>600</td>
<td>500</td>
<td>450</td>
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<tr>
<td>B3/B-</td>
<td>725</td>
<td>800</td>
<td>775</td>
<td>800</td>
<td>750</td>
<td>775</td>
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<td>Caa/CCC</td>
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<td>1600</td>
<td>1550</td>
<td>1400</td>
<td>1300</td>
<td>1375</td>
<td>1500</td>
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</tbody>
</table>

Source: www.bondsonline.com

This shows spread above underlying Treasury Issue in basis points.

How default risk impacts bond values

As time passes, these become random variables with special properties:

\[
MV = \sum_{i=1}^{n} \frac{C}{(1 + r)^i} + \frac{Par}{(1 + r)^n}
\]

Each value has an a-priori probability of default, with the special condition that a fault at times 't' insures default for all value past that time, plus default of Par. Therefore expected future cashflow must take this into account.
Standard & Poor’s Estimated Average Cumulative Default Rates for various credit ratings

... showing their estimates of the estimated cumulative default rate (e.g. the estimate of a CCC/C junk bond defaulting within 2 years is above 30%, within 7 years is above 45%).


Standard & Poor’s Credit Ratings of General Motors, Lehman Brothers, and WaMu:

Standard & Poor’s scenario of the impact of economic risk upon default rates:

This is “idealized,” meaning mostly conceptual but still loosely valid. You cannot estimate cardinal probabilities for events like this.


Composite yields of AAA, BBB, and CCC rated bonds
Jan 2, 1997 – October 21, 2011, daily

Source: FRED Economic Data, Federal Reserve Bank of St. Louis, BofA Merrill Lynch Effective Yield for the three yields shown.
Composite spreads between of AAA, BBB, and CCC rated bonds and Treasuries
Jan 2, 1997 – October 21, 2011, daily

Source: FRED Economic Data, Federal Reserve Bank of St. Louis, BofA Merrill Lynch Option Adjusted spreads for the three ratings shown.

Spread between investment grade AAA and USTs
Jan 2, 1997 – October 21, 2011, daily

Source: FRED Economic Data, Federal Reserve Bank of St. Louis, BofA Merrill Lynch Option-Adjusted AAA Spread.
Investment Grade and BBB rated bonds

various maturities, November 4, 2013

<table>
<thead>
<tr>
<th>Maturity</th>
<th>Yield</th>
<th>Yesterday</th>
<th>Last Week</th>
<th>Last Month</th>
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</thead>
<tbody>
<tr>
<td>2yr AA</td>
<td>0.58</td>
<td>0.58</td>
<td>0.59</td>
<td>0.59</td>
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<tr>
<td>2yr A</td>
<td>0.76</td>
<td>0.75</td>
<td>0.76</td>
<td>0.77</td>
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<tr>
<td>5yr BBB</td>
<td>-</td>
<td></td>
<td>5.82</td>
<td>5.82</td>
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<tr>
<td>5yr AAA</td>
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<td>1.64</td>
<td>1.57</td>
<td>1.71</td>
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<tr>
<td>5yr AA</td>
<td>1.87</td>
<td>1.88</td>
<td>1.88</td>
<td>1.87</td>
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<tr>
<td>5yr A</td>
<td>2.06</td>
<td>2.06</td>
<td>2.00</td>
<td>2.18</td>
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<tr>
<td>10yr BBB</td>
<td>-</td>
<td></td>
<td>6.42</td>
<td>6.42</td>
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<tr>
<td>10yr AAA</td>
<td>3.42</td>
<td>3.43</td>
<td>3.37</td>
<td>3.44</td>
</tr>
<tr>
<td>10yr AA</td>
<td>3.37</td>
<td>3.39</td>
<td>3.27</td>
<td>3.48</td>
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<tr>
<td>10yr A</td>
<td>3.68</td>
<td>3.71</td>
<td>3.59</td>
<td>3.76</td>
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<tr>
<td>20yr BBB</td>
<td>-</td>
<td>8.80</td>
<td>8.80</td>
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<tr>
<td>20yr AAA</td>
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<td>4.94</td>
<td>5.22</td>
<td>4.91</td>
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<tr>
<td>20yr AA</td>
<td>4.36</td>
<td>4.36</td>
<td>4.33</td>
<td>4.50</td>
</tr>
<tr>
<td>20yr A</td>
<td>4.69</td>
<td>4.69</td>
<td>4.98</td>
<td>4.86</td>
</tr>
</tbody>
</table>

Source: bondsonline.com

Select Fixed Income ETFs

Most fixed-income ETFs distribute “dividends” that reflect interest earned, so their NAV reflects market value discount or premium from par.

PIMCO Investment Grade Corporate Bond Index - CORP

For a sample of the kind of info you get from research into a FI ETF:
http://www.pimcoetfs.com/Funds/Pages/CORP.aspx

SPDR Barclays High Yield Bond - JNK
Municipal Bonds

- Issued by state and local governments, or agencies of these.
- Two types
  - General obligation (State of California)
  - Agency (School district)
  - Revenue bonds (secured by revenues or taxes)
- Tax free (many restrictions)
  - Tax free federal always
  - Tax free state if resident of state issuing bonds
- Have lower yields reflecting tax free status.

A typical selection of munis ...

<table>
<thead>
<tr>
<th>Issue</th>
<th>Coupon</th>
<th>Maturity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butler Cnty OH hosp facs rev bds Ser 11</td>
<td>5.625</td>
<td>04-01-41</td>
<td>100.925</td>
</tr>
<tr>
<td>CA State var purp gen</td>
<td>5.250</td>
<td>11-01-40</td>
<td>102.087</td>
</tr>
<tr>
<td>CA State var purp gen</td>
<td>5.000</td>
<td>09-01-41</td>
<td>99.840</td>
</tr>
<tr>
<td>California St Univ system wide rev bds Ser</td>
<td>5.000</td>
<td>11-01-37</td>
<td>104.499</td>
</tr>
<tr>
<td>California State Comm Dev Auth rev &amp; ref</td>
<td>5.000</td>
<td>12-01-41</td>
<td>99.225</td>
</tr>
<tr>
<td>Chicago Bd of Ed IL gen oblig unded.tax</td>
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<td>12-01-31</td>
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<tr>
<td>Chicago IL gen arpt 3rd lien rev bds Ser</td>
<td>5.750</td>
<td>01-01-30</td>
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<tr>
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<td>5.625</td>
<td>01-01-35</td>
<td>108.147</td>
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<tr>
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<td>02-01-41</td>
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<tr>
<td>Delaware River Port Auth PA &amp; NJ rev bds</td>
<td>5.000</td>
<td>01-01-35</td>
<td>103.94</td>
</tr>
</tbody>
</table>

Source: Online *Wall Street Journal* for the date shown.
Tax features of bonds and notes

- Generally
  - Cap gain from trading taxed in year of sale
  - Principal redemption at maturity not taxed
- Treasuries
  - Coupon interest is taxed
  - but tax-free at state and local level
  
  interest earned on TIPS is not taxed at the state and local level. However, capital appreciation to the inflation adjustment is taxed each year as normal income. This, in fact, is reported by the Treasury to the IRS on a 1090-OID.
- Munis
  - capital gains always taxed
  - interest income not taxed at federal level
  - . nor state level if issued in state of residence
- Corporate
  - all interest and cap gains taxable