CORPORATE BONDS

Fall 2000

Corporate Bonds

Spread depends on:

1. **Default Premium**
2. **State Taxes**
3. **Risk Premium**
4. **Liquidity**

Major Problems

1. Valuation
2. Size of Risk Premium
3. Classification

Valuation

Value = $\sum_{t=1}^{T} \frac{cf(t)}{\left(1+r_{00t}^{c}\right)^{t}}$

where:

1. $cf(t)$ **is cash flow in** t **(Promised).**

2. r_{00t}^{c} **is corporate spot rate.**

Why Moodies' grouping might be homogeneous:

A. Different Default Risk

   1. **Gradations**
   2. **Different rankings across agencies**

B. Different Liquidity

C. Different Tax Liability

D. Different Recovery Rates

E. Bond Age

$$\textbf{Model Price} = \sum_{t=1}^{T} \frac{cf(t)}{(1+r^{c}_{00t})^{t}} + \textbf{adj.}$$

for AA

adj = +.135 (if less than one year) - . 059 (if company rating above bond)

+….

Determining Risk Premium

Basic Idea: If no risk premium, would discount expected cash flow at riskless rate and on average get invoice price. Risk premium is thus extra return so that on average invoice price is correct.

Illustration

Let $E[cf(t)]$ be expected cash flow in t then if no risk premium

$$\text{Model Price} = \sum_{t=1}^{T} \frac{E[cf(t)]}{\left(1 + r_{00t}^{G}\right)^{t}}$$

where:

r_{00t}^{G} **is riskless rate**

and Model Price = invoice price on average

Let *P* be Premium then find *P* such that

Model Price = Invoice Price

Model Price = $$\sum_{t=1}^{T} \frac{E[cf(t)]}{\left(1+r_{00t}^{G}+P_{t}\right)^{t}}$$

Note actual estimate

Model Price = $$\sum_{t=1}^{T} \frac{E[cf(t)]}{\left(1+r_{00t}^{c}\right)^{t}}$$

and

$$P_{t}=r_{00t}^{c}-r_{00t}^{G}$$

Determining Expected Cash Flow

A. Ignoring state taxes

Consider one Period Bond

State	**Cash Flow**
Doesn't Default	**Principle + Interest**
default	**a * Principle**

where a = recovery rate

$$E[cf(1)] = \left(1 - P_1\right)(c + 100) + P_1 a \bullet 100$$

Consider two Period Bond

in one $\left(1-P_1\right)c+P_1\left(a\bullet 100\right)$

in two $\left(1-P_1\right)\left[\left(1-P_2\right)\left(c+100\right)+P_2\left(a\bullet 100\right)\right]$

Consider three Period Bond

in one $\left(1-P_1\right)c+P_1\left(a\bullet 100\right)$

in two $\left(1-P_1\right)\left(\left(1-P_2\right)c+P_2a\bullet 100\right)$

in three $\left(1-P_1\right)\left(1-P_2\right)\left(\left(c+100\right)\left(1-P_3\right)+P_3a\bullet 100\right)$

B. Including state taxes

State taxes are deductable at federal lever.

Therefore, effective rate is $t_s \bullet \left(1 - t_g\right)$

Also note cash flows are changed because of capital loss if bankrupt

Consider One Period Bond

$$E\left[cf(1)\right] = (1-P_1)\left[ct_s(1-t_g)+100\right] + P_1(a \bullet 100) + \bullet P_1(1-a)(100)t_s\left(1-t_g\right)$$

tax saving on capital loss

Consider Two Period Bond

in one

$$\left(1-P_1\right)ct_s\left(1-t_g\right)+P_1\left(a\bullet 100\right)+P_1\left(1-a\right)100t_s\left(1-t_g\right)$$

in two

$$\left(1-P_1\right)\left[\left(1-P_2\right)\left(ct_s\left(1-t_g\right)+100\right)+P_2\left(a\bullet 100\right)\right]$$
$$+P_2\left(1-a\right)100t_s\left(1-t_g\right)$$

If options use

$$V_{opt}=V_{no\ opt}+\text{option value}$$