Bond Pricing

First Half of RWJ Ch. 5

Bonds

How do we get the price of an asset?

Stocks and Bonds are claims against the firm's assets.

- Bonds are paid first
- Stocks are residual claimants

- Bonds can also have covenants

Bond Terminology

- Face Value
- Maturity
- Coupon
- Coupon Rate

Cash flows for different types of Bonds:

Month	0	6	12	18	24	30	36	…
Zero-Coupon							F	
Coupon Bond		C	C	C	C	C	C+F	
Consol		C	C	C	C	C	C	C

$$NPV(ZC) = \frac{F}{(1+r)^T} \qquad NPV(Consol) = \frac{C}{r}$$

$$NPV(Coupon) = C \cdot A_r^T + \frac{F}{(1+r)^T}$$

Bonds are <u>not</u> risk-free

Elements of Risk:

- Default
- Inflation
- Price

Bond rating agencies assign grades to bonds. As the rating decreases, the required return increases.

A Quick Example:

From RWJ, page 110 (modified slightly). Consider a bond that has a 10% coupon that will mature in two years. If the SAIR is 10%, the value of the bond is

$$PV = \frac{\$50}{1.05} + \frac{\$50}{(1.05)^2} + \frac{\$50}{(1.05)^3} + \frac{\$50 + \$1000}{(1.05)^4} = \$1000$$

If the interest rate falls to a SAIR of 8%, the bond will be worth

$$PV = \frac{\$50}{1.04} + \frac{\$50}{(1.04)^2} + \frac{\$50}{(1.04)^3} + \frac{\$50 + \$1000}{(1.04)^4} = \$1036.30$$

A little more terminology

Since this bond is selling at a higher price than it's face value, it is said to be selling at a **premium**.

If it was selling at a lower price, it would be selling at a **discount**, and it would be selling at **par** if it cost $1,000 exactly

Yield to Maturity (YTM)

Now, if we have that same bond selling at \$1036.60, what is the discount rate that equates the NPV and the price?

$$\$1036.30 = \frac{50}{(1+x)} + \frac{50}{(1+x)^2} + \frac{50}{(1+x)^3} + \frac{50+1000}{(1+x)^4}$$

The solution is x = 4%. This can be stated as the **yield to maturity** of the bond is 8% (SAIR).

Bond reporting

An example of bond reporting that you could see in the newspaper is as follows:

Bond	Cur.Yld	Vol	Close
ATT 6s09	6.7	40	89

This is an ATT Bond with a coupon rate of 6.0%. It matures in 2009. The Close is the price of the stock (in percent), so this ATT bond would sell at $890. The Current Yield is just the coupon of the bond divided by the current price. This is **not** the YTD of the bond.

Conceptual questions

- Do we need to use the formula in this lecture?
- What happens to the price of a bond if the interest rate increases? Why?
- Are bonds riskless?