Introduction

Bond Alphabet Soup and the Basic Price Formula
Bonds

1 Introduction

2 Bond Alphabet Soup and the Basic Price Formula
Vocabulary

Assignment: Read thoroughly Section 6.1

- **Bonds** are financial products that are issued by and can be purchased from a government bureau or a financial company that guarantees future payments.
- The time of purchase of the bond is called the **issue date**.
- The life of a bond is **finite**; there is a **maturity date** (or **redemption date**) when the last payment occurs.
- The maturity date is fixed, but there may be a stipulation that the bond may be **called** earlier and the redemption amount must be given to the holder of the bond; such bonds are referred to as **callable bonds**.
- The **term** of the bond is the interval between the issue date and the maturity date (or the length of that interval, depending on the context).
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Zero-coupon bonds (or pure discount bonds) have only a single payment at the fixed maturity date.

- The bonds that have intermediate payments are called coupon bonds.
- The time periods between two consecutive payments that occur before maturity are referred to as coupon periods.
- The indenture is the legal document (contract) that specifies all of the above.
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What’s printed on the bond?

- $F$ . . . the **face (or par) value** of a bond
- The par value is used to calculate the **size of the coupon payments**
- Assume that $m$ is the number of coupons issued during a year and that $\alpha$ is the nominal rate convertible $m$ times per year; then, $r = \alpha/m$ is the effective rate per coupon period
- Then, the amount of a coupon payment equals

  \[ Fr = \frac{F \alpha}{m} \]

- **Caveat:** Both $\alpha$ and $r$ can be referred to as **coupon rates**
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Modified coupon rate

- \( n \) ... the number of coupon periods in the term of a bond
- So, if a bond is an \( N \)-year bond, then \( Nm = n \)
- \( C \) ... the redemption amount
- IF \( C = F \), then the bond is called a par-value bond (or redeemable at par)
- Convention: If it is not specified otherwise, one should assume that \( F = C \)
- \( g \) ... the modified coupon rate, i.e.,

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g := \frac{Fr}{C}
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- Note that the coupon amount equals \( Fr = Cg \)
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Investor’s effective yield rate

- $i$ . . . the investor’s effective yield rate per year
- $j$ . . . the investor’s effective yield rate per coupon period
- $v_j$ . . . the discount factor per coupon period, i.e.,

$$v_j = \frac{1}{1+j}$$

- $G$ . . . the base amount, i.e.,

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Basic price formula

• $K$ ... the value of the redemption amount at the issue date, i.e.,

$$K = C v_j^n$$

• $P$ ... the price paid for the bond by the investor if $j$ is the desired yield rate per period, i.e.,

$$P = (Fr) \cdot a_{m\vert j} + C v_j^n = (Fr) \cdot a_{m\vert j} + K$$

• All the notation is collected in Table 6.2.4 in the book - keep it handy as you do the problems until you get used to all the vocabulary and notation ... 

• Assignment: Do all the examples is Section 6.2.
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An Example: Finding the T-bill price

• A 13–week Treasury Bill matures for $10,000 and is bought at discount to yield 7.5%. Find the “fair” price of this bond.

⇒ T-bills are particular in that their yields are usually computed as rates of discount and not as rates of interest.
Moreover, usually simple discount is used.
Also, the basis is assumed to be “actual/360”
Since the bill term is 13 weeks, we express it as 91/360 years.
There are no coupons, and so the price is

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10000 \cdot \left[ 1 - \frac{91}{360} \cdot 0.075 \right] = 9810.42
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