Economics 330
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Selected Notes on Interest Rates (9/11/06)

Present Value

Let $i = .10$

In one year $\$100 \text{ X } (1+ 0.10) = \$110$

In two years $\$110 \text{ X } (1 + 0.10) = \$121$

or $100 \text{ X } (1 + 0.10)^2$

In three years $\$121 \text{ X } (1 + 0.10) = \$133$

or $100 \text{ X } (1 + 0.10)^3$

In n years

$\$100 \text{ X } (1 + i)^n$

PV = today's (present) value

CF = future cash flow (payment)

i = the interest rate

$$PV = \frac{CF}{(1 + i)^n}$$

Yield to Maturity

Simple loan

PV = amount borrowed = \$100

CF = cash flow in one year = \$110

n = number of years = 1

$$\$100 = \frac{\$110}{(1 + i)^1}$$

$$(1 + i)\ \$100 = \$110$$

$$(1 + i) = \frac{\$110}{\$100}$$

$$i = 0.10 = 10\%$$

For simple loans, the simple interest rate equals the yield to maturity

Fixed payment loan

The same cash flow payment every period throughout the life of the loan

LV = loan value

FP = fixed yearly payment

n = number of years until maturity

$$LV = \frac{FP}{1 + i} + \frac{FP}{(1 + i)^2} + \frac{FP}{(1 + i)^3} + \ . \ . \ . + \frac{FP}{(1 + i)^n}$$

Coupon bond

Using the same strategy used for the fixed-payment loan:

P = price of coupon bond

C = yearly coupon payment

F = face value of the bond

n = years to maturity date

$$P = \frac{C}{1+i} + \frac{C}{(1+i)^2} + \frac{C}{(1+i)^3} + \ . \ . \ . + \frac{C}{(1+i)^n} + \frac{F}{(1+i)^n}$$

Consol

$$P_c = C / i_c$$

P_c = price of the consol
C = yearly interest payment
i_c = yield to maturity of the consol

Can rewrite above equation as $i_c = C / P_c$

For coupon bonds, this equation gives current yieldŃ an easy-to-calculate approximation of yield to maturity

Discount bond

For any one year discount bond

$$i = \frac{F - P}{P}$$

F = Face value of the discount bond

P = current price of the discount bond

The yield to maturity equals the increase in price over the year divided by the initial price. As with a coupon bond, the yield to maturity is negatively related to the current bond price.

Rate of return

The payments to the owner plus the change in value expressed as a fraction of the purchase price

$$RET = \frac{C}{P_t} + \frac{P_{t+1} - P_t}{P_t}$$

RET = return from holding the bond from time t to time $t + 1$

P_t = price of bond at time t

P_{t+1} = price of the bond at time $t + 1$

C = coupon payment

$\frac{C}{P_t}$ = current yield = i_c

$\frac{P_{t+1} - P_t}{P_t}$ = rate of capital gain = g

(a) Treasury bonds and notes

GOVT. BONDS & NOTES

	Rate	Maturity Mo/Yr	Bid	Asked	Chg.	Ask Yld.
T-bond 1	1.875	Jan 06n	99:28	99:29	1	3.76
	5.625	Feb 06n	100:03	100:04	. . .	3.96
	9.375	Feb 06	100:14	100:15	. . .	3.98
	1.625	Feb 06n	99:21	99:22	. . .	4.07
	1.500	Mar 06n	99:12	99:13	. . .	4.24
	2.250	Apr 06n	99:11	99:12	. . .	4.32
	2.000	May 06n	99:06	99:07	1	4.34
	4.625	May 06n	100:01	100:02	. . .	4.36

(b) Treasury bills

TREASURY BILLS

	Maturity	Days to Mat.	Bid	Asked	Chg.	Ask Yld.	Maturity	Days to Mat.	Bid	Asked	Chg.	Ask Yld.
	Jan 19 06	6	4.01	4.00	–0.08	4.06	Apr 20 06	97	4.22	4.21	0.01	4.32
	Jan 26 06	13	4.01	4.00	–0.04	4.06	Apr 27 06	104	4.23	4.22	0.01	4.33
T-bill 1	Feb 02 06	20	4.04	4.03	–0.03	4.10	May 04 06	111	4.23	4.22	0.01	4.34
	Feb 09 06	27	4.06	4.05	–0.02	4.12	May 11 06	118	4.23	4.22	. . .	4.34
	Feb 16 06	34	4.05	4.04	–0.02	4.11	May 18 06	125	4.23	4.22	. . .	4.34
	Feb 23 06	41	4.06	4.05	–0.02	4.13	May 25 06	132	4.23	4.22	–0.01	4.35
	Mar 02 06	48	4.12	4.11	0.01	4.19	Jun 01 06	139	4.24	4.23	. . .	4.36
	Mar 09 06	55	4.13	4.12	0.01	4.20	Jun 08 06	146	4.25	4.24	. . .	4.37
	Mar 16 06	62	4.11	4.10	–0.01	4.19	Jun 15 06	153	4.25	4.24	–0.01	4.38
	Mar 23 06	69	4.17	4.16	0.01	4.25	Jun 22 06	160	4.24	4.23	–0.02	4.37
	Mar 30 06	76	4.19	4.18	0.02	4.28	Jun 29 06	167	4.26	4.25	. . .	4.40
	Apr 06 06	83	4.20	4.19	0.02	4.29	Jul 06 06	174	4.26	4.25	. . .	4.40
	Apr 13 06	**90**	**4.21**	**4.20**	**0.01**	**4.30**	Jul 13 06	181	4.28	4.27	–0.01	4.42

Source: *Wall Street Journal*, Thursday, January 13, 2006.

(c) New York Stock Exchange bonds

CORPORATE BONDS

Thursday, January 12, 2006
Forty most active fixed-coupon corporate bonds

Company (TICKER)	Coupon	Maturity	Last Price	Last Yield	*Est Spread	Ust†	Est $ Vol (000's)
Tyco International Group (TYC)	6.000	Nov 15, 2013	103.104	5.505	110	10	143,116
HSBC Finance Corp (HSBC)	5.250	Jan 14, 2011	100.169	5.211	83	5	101,312
Wells Fargo (WFC)	4.875	Jan 12, 2011	99.851	4.909	54	5	94,719
Bank of America Corp (BAC)	4.875	Sep 15, 2012	99.217	5.014	57	5	93,623
Verizon New York Inc (VZ)	7.000	Dec 01, 2033	97.625	7.198	261	30	85,530

Volume represents total volume for each issue; price/yield data are for trades of $1 million and greater. *Estimated spreads, in basis points (100 basis points is one percentage point), over the 2, 3, 5, 10, or 30-year hot run Treasury note/bond. 2-year: 4.375 12/07; 3-year: 4.375 11/08; 5-year: 4.375 12/10; 10-year: 4.500 11/15; 30-year: 5.375 02/31. †Comparable U.S. Treasury issue.

Source: MarketAxess Corporate BondTicker