

# **GESTÃO FINANCEIRA I & GESTÃO FINANCEIRA**

## **CADERNO DE EXERCÍCIOS 3 – SOLUÇÕES**

Capítulos 6 e 7

Bond Valuation & Stock Valuation

**(de BERK, DEMARZO e HARFORD'S "FUNDAMENTALS OF  
CORPORATE FINANCE")**

**LICENCIATURA**

**2015-2016**

## Chapter 6

### Bond Valuation

- 6-4. The following table summarizes prices of various default-free, zero-coupon bonds (expressed as a percentage of face value):

Maturity (years)	1	2	3	4	5
Price (per \$100 face value)	\$95.51	\$91.05	\$86.38	\$81.65	\$76.51

- a. Compute the yield to maturity for each bond.

Use the following equation.

$$1 + \text{YTM}_n = \left( \frac{\text{FV}_n}{P} \right)^{1/n}$$

$$1 + \text{YTM}_1 = \left( \frac{100}{95.51} \right)^{1/1} \Rightarrow \text{YTM}_1 = 4.70\%$$

$$1 + \text{YTM}_2 = \left( \frac{100}{91.05} \right)^{1/2} \Rightarrow \text{YTM}_2 = 4.80\%$$

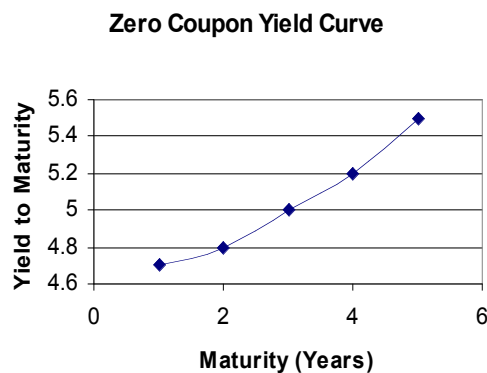
$$1 + \text{YTM}_3 = \left( \frac{100}{86.38} \right)^{1/3} \Rightarrow \text{YTM}_3 = 5.00\%$$

$$1 + \text{YTM}_4 = \left( \frac{100}{81.65} \right)^{1/4} \Rightarrow \text{YTM}_4 = 5.20\%$$

$$1 + \text{YTM}_5 = \left( \frac{100}{76.51} \right)^{1/5} \Rightarrow \text{YTM}_5 = 5.50\%$$

- b. Plot the zero-coupon yield curve (for the first five years).

The yield curve is as shown below.



- c. Is the yield curve upward sloping, downward sloping, or flat?

The yield curve is upward sloping.

6-5. The current zero-coupon yield curve for risk-free bonds is as follows:

Maturity (years)	1	2	3	4	5
YTM	8.23%	8.50%	8.67%	8.95%	9.05%

- What is the price of a \$1000 face value two-year, zero-coupon, risk-free bond?
- Suppose there is a three-year risk-free bond, with face value of \$1000 and annual payment of 9% coupons. If this bond is trading at \$980, do you think there is an arbitrage opportunity? Explain.

- Price =  $\$1000 / (1 + 0.085)^2 = \$849.46$
- The “fair-price” for this bond would be the result of discounting its promised cash flows at the YTM of each period:

$$\text{Price} = \frac{0.09 * 1000}{(1 + 0.0823)^1} + \frac{0.09 * 1000}{(1 + 0.0850)^2} + \frac{0.09 * 1000 + 1000}{(1 + 0.0867)^3} = \$1008.98$$

Since the “theoretical” price  $\$1008.98 > \$980$  (market price), there is an arbitrage opportunity – the bond is “cheap”.

To take advantage of it, one should buy the bond at \$980 and sell an equivalent portfolio of zero-coupon bonds, making a risk-free (arbitrage) profit.

6-10. The yield to maturity of a \$1000 bond with a 7% coupon rate, semiannual coupons, and two years to maturity is 7.6% APR, compounded semi-annually. What must its price be?

Given the yield, we can compute the price using Eq. 6.3. First, note that a 7.6% APR is equivalent to a semiannual rate of 3.8%. Also, recall that the cash flows of this bond are an annuity of four payments of \$35, paid every six months, and one lump-sum cash flow of \$1,000 (the face value), paid in two years (four six-month periods).

$$\text{PV} = \frac{35}{\left(1 + \frac{0.076}{2}\right)} + \frac{35}{\left(1 + \frac{0.076}{2}\right)^2} + \frac{35}{\left(1 + \frac{0.076}{2}\right)^3} + \frac{35 + 1,000}{\left(1 + \frac{0.076}{2}\right)^4}$$

PV = 989.06

6-24. Consider the following four bonds:

Bond	Coupon Rate (annual payments)	Maturity (years)
A	0%	15
B	0%	10
C	4%	15
D	8%	10

Which of the bonds is most sensitive to a 1% drop in interest rates from 6% to 5% and why? Which bond is least sensitive? Provide an intuitive explanation for your answers.

Bond A is most sensitive because it has the longest maturity and no coupons. Bond D is the least sensitive. Intuitively, higher coupon rates and a shorter maturity typically lower a bond's interest rate sensitivity.

6-29. HMK Enterprises would like to raise \$10 million to invest in capital expenditures. The company plans to issue five-year bonds with a face value of \$1000 and a coupon rate of 6.5% (annual payments). The following table summarizes the yield to maturity for five-year (annual pay) coupon corporate bonds of various ratings:

Rating	AAA	AA	A	BBB	BB
YTM	6.20%	6.30%	6.50%	6.90%	7.50%

a. Assuming the bonds will be rated AA, what will the price of the bonds be?

The price will be

$$P = \frac{65}{(1+.063)} + \dots + \frac{65+1000}{(1+.063)^5} = \$1008.36.$$

b. How much total principal amount of these bonds must HMK issue to raise \$10 million today, assuming the bonds are AA rated? (Because HMK cannot issue a fraction of a bond, assume that all fractions are rounded to the nearest whole number.)

Each bond will raise \$1008.36, so the firm must issue:  $\frac{\$10,000,000}{\$1008.36} = 9917.13 \Rightarrow 9918$  bonds.

This will correspond to a principal amount of  $9918 \times \$1000 = \$9,918,000$ .

c. What must the rating of the bonds be for them to sell at par?

For the bonds to sell at par, the coupon must equal the yield. Since the coupon is 6.5%, the yield must also be 6.5%, or A-rated.

d. Suppose that when the bonds are issued, the price of each bond is \$959.54. What is the likely rating of the bonds? Are they junk bonds?

First, compute the yield on these bonds:

$$959.54 = \frac{65}{(1+YTM)} + \dots + \frac{65+1000}{(1+YTM)^5} \Rightarrow YTM = 7.5\%$$

Given a yield of 7.5%, it is likely these bonds are BB rated. Yes, BB-rated bonds are junk bonds.

## Chapter 7

### Valuing Stocks

- 7-4. Assume Evco, Inc. has a current price of \$65 and will pay a \$2.5 dividend in one year, and its equity cost of capital is 12%. What price must you expect it to sell for right after paying the dividend in one year in order to justify its current price?**

We can solve for the price of the stock in one year given the current price of \$50.00, the \$2 dividend, and the 15% cost of capital.

$$65 = \frac{2.5 + X}{1.12}$$

$$X = 70.30$$

At a current price of \$65, we can expect Evco stock to sell for \$70.30 immediately after the firm pays the dividend in one year.

- 7-6. Anle Corporation has a current price of \$20, is expected to pay a dividend of \$1 in one year, and its expected price right after paying that dividend is \$22.**

- a. What is Anle's expected dividend yield?**

$$\text{Div yld} = 1/20 = 5\%$$

- b. What is Anle's expected capital gain rate?**

$$\text{Cap gain rate} = (22-20)/20 = 10\%$$

- c. What is Anle's equity cost of capital?**

$$\text{Equity cost of capital} = 5\% + 10\% = 15\%$$

- 7-12. Summit Systems will pay a dividend of \$2.30 this year. If you expect Summit's dividend to grow by 5% per year, what is its price per share if its equity cost of capital is 18%?**

$$P = 2.30 / (18\% - 5\%) = \$17.69$$

- 7-15. DFB, Inc., expects earnings this year of \$5 per share, and it plans to pay a \$3 dividend to shareholders. DFB will retain \$2 per share of its earnings to reinvest in new projects that have an expected return of 15% per year. Suppose DFB will maintain the same dividend payout rate, retention rate, and return on new investments in the future, and will not change its number of outstanding shares.**

a. **What growth rate of earnings would you forecast for DFB?**

Eq. (7.12):  $g = \text{retention rate} \times \text{return on new invest} = (2/5) \times 15\% = 6\%$ .

b. **If DFB's equity cost of capital is 12%, what price would you estimate for for DFB stock?**

$$P = 3/(12\% - 6\%) = \$50.$$

c. **Suppose instead that DFB paid a dividend of \$4 per share this year and retained only \$1 per share in earnings. That is, it chose to pay a higher dividend instead of reinvesting in as many new projects. If DFB maintains this higher payout rate in the future, what stock price would you estimate for the firm now? Should DFB follow this new policy?**

$$\text{New } g = (1/5) \times 15\% = 3\%, P = 4/(12\% - 3\%) = \$44.44.$$

No, do not raise the dividend (return exceeds cost of capital).

**7-19. Colgate-Palmolive Company has just paid an annual dividend of \$0.96. Analysts are predicting an 11% per year growth rate in earnings over the next five years. After then, Colgate's earnings are expected to grow at the current industry average of 5.2% per year. If Colgate's equity cost of capital is 8.5% per year and its dividend payout ratio remains constant, what price does the dividend-discount model predict Colgate stock should sell for?**

PV of the first 5 dividends:

$$PV_{\text{first 5}} = \frac{0.96(1.11)}{0.085 - 0.11} \left( 1 - \left( \frac{1.11}{1.085} \right)^5 \right) = 5.14217.$$

PV of the remaining dividends in year 5:

$$PV_{\text{remaining in year 5}} = \frac{0.96(1.11)^5 (1.052)}{0.085 - 0.052} = 51.5689.$$

Discounting back to the present

$$PV_{\text{remaining}} = \frac{51.5689}{(1.085)^5} = 34.2957.$$

Thus the price of Colgate is

$$P = PV_{\text{first 5}} + PV_{\text{remaining}} = 39.4378.$$

**7-25. Suppose Cisco Systems pays no dividends but spent \$5 billion on share repurchases last year. If Cisco's equity cost of capital is 12%, and if the amount spent on repurchases is expected to grow by 8% per year, estimate Cisco's market capitalization. If Cisco has 6 billion shares outstanding, to what stock price does this correspond?**

Total payout next year = 5 billion  $\times$  1.08 = \$5.4 billion

Equity Value = 5.4 / (12% - 8%) = \$135 billion

Share price =  $135 / 6 = \$22$