LISBON SCHOOL OF ECONOMICS & MANAGEMENT
UNIVERSIDADE DE LISBOA

GESTÃO FINANCEIRA I GESTÃO FINANCEIRA
CORPORATE FINANCE I **CORPORATE FINANCE**

CADERNO DE EXERCÍCIOS 1 – SOLUÇÕES

Capítulos 1, 3, 4 e 5
Revision of Fundamental Concepts

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

LICENCIATURA

2016-2017

Chapter 1

1-14. What is the difference between a public and a private corporation?

The shares of a public corporation are traded on an exchange (or "over the counter" in an electronic trading system), while the shares of a private corporation are not traded on a public exchange.

1-15. What is the difference between a primary and a secondary stock market?

A primary market is where the company sells shares of itself to investors. The secondary market is where investors can buy and/or sell the company's shares with other investors (but not the company itself).

1-17. Explain why the bid-ask spread is a transaction cost.

Investors always buy at the ask and sell at the bid. Because ask prices always exceed bid prices, investors "lose" this difference. It is one of the costs of transacting. Because the market makers take the other side of the trade, they make up this difference.

1-18. The following quote on Yahoo! Stock appeared on August 26, 2015, on Yahoo! Finance:

Yahoo! Inc. (YHOO) -NasdaqGS ≱ **Watchlist**

31.65 0.09(0.28%) 2:24PM EDT - Nasdaq Real Time Price

Prev Close:	**31.74**
Open:	**32.45**
Bid:	**31.77 x 800**
Ask:	**31.78 x 2500**
1y Target Est:	**51.06**
Beta:	**1.56**
Earnings Date:	**Oct 19 - Oct 23 (Est.)**
Day's Range:	**31.11 - 32.47**
52wk Range:	**29.00 - 52.62**
Volume:	**14,700,620**
Avg Vol (3m):	**12,547,700**

Market Cap:	**29.80B**
P/E (ttm):	**4.39**
EPS (ttm):	**7.20**
Div & Yield:	**N/A (N/A)**

Quotes delayed, except where indicated otherwise. Currency in USD

If you wanted to buy Yahoo!, what price would you pay? How much would you receive if you wanted to sell Yahoo!?

You would need to pay the ask price to buy Yahoo! That price is $31.78 per share. If you sold, you would receive the bid price: $31.77 per share.

Chapter 3
Financial Decision Making and the Law of One Price

3-4. Suppose Bank One offers a risk-free interest rate of 5.5% on both savings and loans, and Bank Enn offers a risk-free interest rate of 6% on both savings and loans.

a. What arbitrage opportunity is available?

With two different interest rates for the same thing (borrowing or saving), you can make a sure profit by borrowing at the lower rate and depositing the money at the higher rate.

Take a loan from Bank One at 5.5% and save the money in Bank Enn at 6%.

b. Which bank would experience a surge in the demand for loans? Which bank would receive a surge in deposits?

Bank One would experience a surge in the demand for loans, while Bank Enn would receive a surge in deposits.

c. What would you expect to happen to the interest rates the two banks are offering?

Bank One would increase the interest rate, and/or Bank Enn would decrease its rate.

Your actions along with those of others would create a surge in demand for loans at the low rate and deposits at the high rate, causing the banks to change the rates until they are equal—the arbitrage opportunity would quickly disappear.

3-5. If the cost of buying a CD and ripping the tracks to your iPod (including your time) is $25, what is the most Apple could charge on iTunes for a whole 15-track CD?

Apple cannot charge more than the cost of doing it yourself, so the maximum is $25, the same as the cost of buying the CD and ripping the tracks to your iPod.

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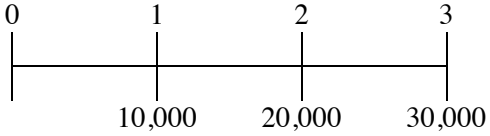
Chapter 4
The Time Value of Money

4-8. **You have just received a windfall from an investment you made in a friend's business. She will be paying you $10,000 at the end of this year, $20,000 at the end of the following year, and $30,000 at the end of the year after that (three years from today). The interest rate is 3.5% per year.**

a. What is the present value of your windfall?

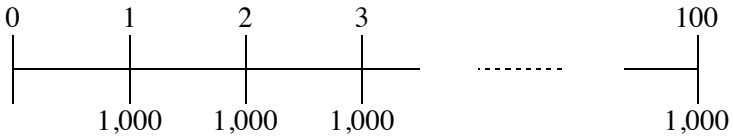


$$PV = \frac{10,000}{1.035} + \frac{20,000}{1.035^2} + \frac{30,000}{1.035^3}$$
$$= 9,662 + 18,670 + 27,058$$
$$= 55,390$$

b. What is the future value of your windfall in three years (on the date of the last payment)?

$$FV = 55,390 \times 1.035^3$$
$$= 61,412$$

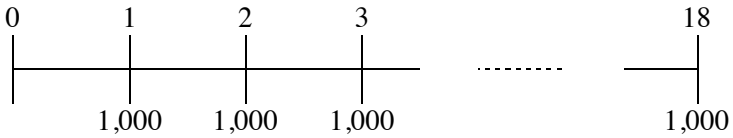
4-15. **What is the present value of $1000 paid at the end of each of the next 100 years if the interest rate is 7% per year?**



The cash flows are a 100-year annuity, so by the annuity formula:

$$PV = \frac{1,000}{0.07}\left(1 - \frac{1}{1.07^{100}}\right)$$
$$= 14,269.25$$

4-16. **Your grandmother has been putting $1000 into a savings account on every birthday since your first (that is, when you turned 1). The account pays an interest rate of 3%. How much money will be in the account on your 18th birthday immediately after your grandmother makes the deposit on that birthday?**



The deposits are an 18-year annuity. Use Eq. 4.6 to calculate the future value of the deposits.

$$FV = C \times \frac{1}{r}\left[(1+r)^N - 1\right] = 1{,}000\,\frac{1}{0.03}\left[(1.03)^{18} - 1\right] = 23{,}414.43$$

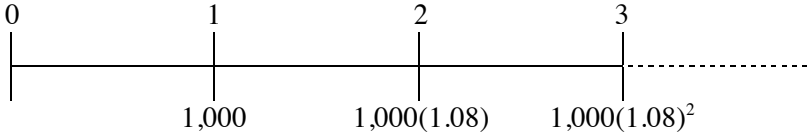
At age 18, you will have $23,414.43 in your account.

The interest on the deposits and interest on that interest adds more than $5,414 to the account.

4-23. A rich relative has bequeathed you a growing perpetuity. The first payment will occur in a year and will be $1000. Each year after that, you will receive a payment on the anniversary of the last payment that is 8% larger than the last payment. This pattern of payments will go on forever. If the interest rate is 12% per year,

a. What is today's value of the bequest?

The bequest is a perpetuity growing at a constant rate.

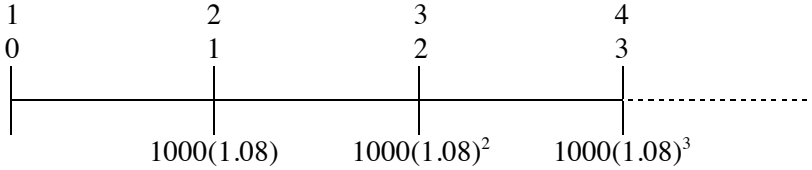


Using the formula for the PV of a growing perpetuity gives

$$\text{PV} = \left(\frac{1{,}000}{0.12 - 0.08}\right)$$
$$= 25{,}000$$

which is the value today of the bequest.

b. What is the value of the bequest immediately after the first payment is made?



Using the formula for the PV of a growing perpetuity gives:

$$\text{PV} = \frac{1{,}000(1.08)}{0.12 - 0.08}$$
$$= 27{,}000$$

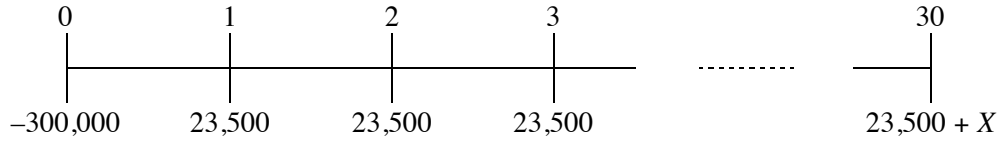
which is the value of the bequest after the first payment is made.

The bequest is worth $25,000 today and will be worth $27,000 in 1 year's time.

4-34. You are thinking of purchasing a house. The house costs $350,000. You have $50,000 in cash that you can use as a down payment on the house, but you need to borrow the rest of the purchase price. The bank is offering a 30-year mortgage

that requires annual payments and has an interest rate of 7% per year. You can afford to pay only $23,500 per year. The bank agrees to allow you to pay this amount each year, yet still borrow $300,000. At the end of the mortgage (in 30 years), you must make a *balloon* payment; that is, you must repay the remaining balance on the mortgage. How much will this balloon payment be?

Draw a timeline to determine when the cash flows occur. Timeline (where X is the balloon payment):



Note that the PV of the loan payments must be equal to the amount borrowed.

$$300{,}000 = \frac{23{,}500}{0.07}\left(1 - \frac{1}{1.07^{30}}\right) + \frac{X}{(1.07)^{30}}$$

Solving for X:

$$X = \left[300{,}000 - \frac{23{,}500}{0.07}\left(1 - \frac{1}{1.07^{30}}\right)\right](1.07)^{30}$$

$$= \$63{,}848$$

The present value of the annuity is $291,612.47, which is $8,387.53 less than the $300,000.00. To make up for this shortfall with a balloon payment in year 30 would require a payment of $63,848.02.

Chapter 5
Interest Rates

5-4. Which do you prefer: a bank account that pays 4% per year (EAR) for six years or

a. an account that pays 2.0% every six months for 6 years?

b. an account that pays 6.0% every 18 months for 6 years?

c. an account that pays 0.25% per month for 6 years?

Because the interest rates are quoted over different intervals, the only way to compare them is to compute the interest over a common interval. Here, the natural common interval to choose is six years.

If you deposit $1 into a bank account that pays 4% per year for six years, you will have $(1.04)^6 = 1.265$ after six years.

a. If the account pays 2.0% per six months, then you will have $(1.02)^{12} = 1.268$ after six years, so you prefer 2.0% every six months.

b. If the account pays 6.0% per 18 months, then you will have $(1.06)^4 = 1.262$ after six years, so you prefer 4% per year over this option.

c. If the account pays 0.25% per month then you will have $(1.0025)^{72} = 1.197$ after six years, so you prefer 4% per year when compared to this option.

The comparisons are very difficult to make unless you put them on an equal footing (common interval). Once you do so, the better choice becomes clear. In this example, the overall best choice was option a., 2.0% every six months for 6 years.

5-7. Your bank account pays interest with an EAR of 4%. What is the APR quote for this account based on semiannual compounding? What is the APR with monthly compounding?

Use the formula for converting from an EAR to an APR quote (Eq. 5.3).

$$\left(1+\frac{\text{APR}}{k}\right)^k = 1.04$$

Solving for the APR

$$\text{APR} = \left[(1.04)^{1/k} - 1\right]k$$

With annual payments $k = 1$, so APR = 6%.

With semiannual payments $k = 2$, so APR = 3.96%.

With monthly payments $k = 12$, so APR = 3.93%.

The same effective annual rate can be quoted many different ways using different compounding periods.

5-30. If the rate of inflation is 2%, what nominal interest rate is necessary for you to earn a 4% real interest rate on your investment?

$$1+r_r = \frac{1+r}{1+i} \text{ implies } 1+r = (1+r_r)(1+i)$$
$$= (1.04)(1.02) = 1.0608$$

Therefore, a nominal rate of 6.08% is required.

5-34. What is the shape of the yield curve given in the following term structure of risk-free interest rates? What expectations are investors likely to have about future interest rates?

Term	1 year	2 years	3 years	5 years	7 years	10 years	20 years
Rate (EAR, %)	1.99	2.41	2.74	3.32	3.76	4.13	4.93

The yield curve is increasing (some may comment that it is "normal", whereas others may consider this shape "steep"). This is often a sign that investors expect interest rates to rise in the future.

EXTRA QUESTION: What is the present value of an investment that pays $100 with certainty at the end of each of years 1, 3, and 5? If you wanted to value this investment correctly using the annuity formula, which discount rate should you use?

PV = 100 / 1.0199 + 100 / 1.0274^3 + 100 / 1.0332^5 =$275.19.

To determine the single discount rate that would compute the value correctly, we solve the following for r:

PV = 275.19 = 100/(1 + r) + 100 / $(1 + r)^3$ + 100/$(1 + r)^5$.

This is just an IRR calculation. Using trial and error or the excel spreadsheet, r = 2.958%. Note that this rate is between the 1, 3, and 5-yr rates given.