Extra Problems – Part I
Finance
Summer 2019

1. You gather the following financial data for the year that ended yesterday.

Sales (all on credit)	$49,000
Cost of Goods Sold	$31,000
Net Income	$ 3,000
Dividend Payout Ratio	35%
Total Assets	$90,000
Total Equity	$55,000
Accounts Receivable	$ 6,000
Accounts Payable	$ 8,000

a. Calculate the average collection period (ACP).

$$ACP = \frac{365}{ARTO} \qquad ARTO = \frac{Sales}{AR} = \frac{49{,}000}{6{,}000} = 8.167$$

$$44.7 \text{ days} = \frac{365}{8.167}$$

b. We know that the policies of the U.S. Federal Reserve (Fed) should soon lead to an increase in interest rates. Why is a firm's average collection period (ACP) especially important when we are expecting higher interest rates? **Use no more than 50 words.**

ACP is used in financial modeling to help forecast the timing of cash collections. Reductions in ACP indicate quicker collection of cash, which results in a reduction in the amount of external financing needed (EFN). Since EFN is frequently raised through borrowing, higher interest rates make external financing more costly.

2. $ROE = \frac{\text{Net income}}{\text{sales}} \times \frac{\text{sales}}{\text{assets}} \times \frac{\text{assets}}{\text{equity}}$

(profit margin) (asset turnover) (equity multiplier)

$.067 = .05 \times \frac{333}{850} \times \frac{850}{250}$

Use profit margin and payout ratio to determine sales

Payout ratio $= \frac{\text{Dividends}}{\text{Net Income}}$

$.60 = \frac{10}{\text{Net Income}}$

Net Income $= 16.67$

Profit Margin $= \frac{\text{Net income}}{\text{sales}}$

$.05 = \frac{16.67}{\text{sales}}$

sales $= 333$

Equity = Total Assets - Total Liabilities

250 = 850 - 600

3. You are hired by a client to assist in financial planning. You gather the following information from the financial statements for the year that ended yesterday.

Sales	$80,000
Cost of Goods Sold	$41,000
Net Profit Margin	.05
Accounts Receivable Turnover	10
Total Assets	$56,000
Total Liabilities	$27,000
Dividends	$1,000

After building in some other assumptions, your preliminary analysis indicates that the external financing needed (EFN) for the coming year will be $2,650.

One of your assumptions was that future payments to suppliers will continue as done in the past. In the past, the firm's average days payable (ADP) was 40 days. You now learn that the firm is contemplating a new policy whereby it would maintain an average days payable (ADP) of 25 days.

No calculations are necessary. Do not attempt to re-calculate the EFN.

a. If there are no other changes, would this change in expected ADP cause EFN to increase, decrease, stay the same, or is there is not enough information to determine whether EFN may change.

EFN would increase

b. In 30 words or less, explain your answer from part a.

Lower ADP indicates a decrease in pro forma accounts payable. Lower spontaneous financing from accounts payable increases need for external financing. *(21 words)*

An alternative answer:

Lower ADP indicates that cash is paid to suppliers sooner. Since cash is disbursed more quickly, the deficit between cash receipts and disbursements will widen. This will increase the EFN. *(30 words)*

4. You are provided with the following information.

Profit margin	.08
Sales	$10,000
Dividends	$300
Accounts Receivable	$675
Accounts Payable	$525

Use profit margin to determine net income

$$\text{Profit Margin} = \frac{\text{Net Income}}{\text{Sales}}$$

$$.08 = \frac{\text{Net Income}}{10,000}$$

$$\text{Net Income} = 800$$

a. Calculate the firm's payout ratio.

$$\text{Payout ratio} = \frac{\text{Dividends}}{\text{Net Income}}$$

$$.375 = \frac{300}{800}$$

b. Why is a firm's payout ratio especially important when conducting financial modeling? Use no more than 20 words.

Financial models identify the external financing needed (EFN). Dividend is a cash outflow. Amount of dividend affects amount of EFN. (20 words)

5. REM CO.

INCOME STATEMENT	ACTUAL	PROFORMA
SALES	2500	2900
COSTS	2000	2320
TAXES	200	232
NET INCOME	300	348
PAYOUT	0.6	0.6
DIVIDEND	180	208.8
RETENTION	0.4	0.4
ADD TO RETAINED EARNINGS	120	139.2

BALANCE SHEET	ACTUAL	PROFORMA
CURRENT ASSETS	2000	2320
FIXED ASSETS	4000	4640
TOTAL ASSETS	6000	6960
CURRENT LIAB	800	928
LONG-TERM DEBT	1200	1200
EQUITY	4000	4139.2
TOTAL LIAB & EQUITY	6000	6267.2
EFN		692.8
		6960

6. An equity research analyst provided a comparison of the recent financial performance of Home Depot and Lowes (the two leading home improvement retailers in the U.S. market). The analyst confirmed that the two firms had virtually identical net profit margins. Net profit margin was approximately 4% for each firm. However, the analyst noted that the return on equity (ROE) for Home Depot was 15% and the ROE for Lowes was 10%.

You also gather the following information for both firms.

	Lowes	Home Depot
Cash	4,000	4,700
Current Assets	13,000	15,000
Total Assets	34,600	81,000
Current Liabilities	5,900	6,800
Total Liabilities	16,500	53,000
Total Equity	18,100	28,000

Provide calculations to show the primary performance advantage that allowed Home Depot to generate the higher ROE. Briefly explain your result.

Use ROE Decomposition (DuPont Analysis) to identify source of performance advantage (contributing to higher ROE of Home Depot)

$$ROE = \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}}$$

Net Profit Margin × Total Asset Turnover × Equity Multiplier

Home Depot ROE: $.15 = .04 \times \frac{\text{Sales}}{\text{Assets}} \times \frac{81,000}{28,000}$ Solve for $\frac{\text{Sales}}{\text{Assets}}$

$.15 = .04 \times 1.30 \times 2.89$

Lower ROE: $.10 = .04 \times \frac{\text{Sales}}{\text{Assets}} \times \frac{34,600}{18,100}$ Solve for $\frac{\text{Sales}}{\text{Assets}}$

$.10 = .04 \times 1.31 \times 1.91$

Net profit margin and total asset turnover are similar. Biggest difference is in equity multiplier. Difference in ROE is driven by Home Depot's greater use of leverage.

7. You are hired by a client to assist in long-term financial modeling. You gather the following information from the financial statements for the year that ended yesterday.

Sales	$26,000
Net Income	$2,000
Dividends	$ 800

Your preliminary analysis reveals that:

- sales will increase by 15%
- assets, costs and current liabilities will be proportional to sales
- long-term debt is unrelated to sales
- payout ratio will be the same in the future

You determine that the external funding needed (EFN) for the coming year will be $2,500.

The client is contemplating changing the retention ratio to 70% in the coming year.

Do not re-calculate the EFN. Just carefully explain whether/why the EFN would change (increase, decrease, stay the same) or explain why there is not enough information to determine whether the EFN would change.

The prior payout ratio was 40% (Dividends/Net Income = $800/2000). The retention ratio was 60% (1 – Payout Ratio). Therefore, the external funding needed (EFN) of $2500 was originally based on a retention ratio of 60%.

If the retention ratio is changed to 70%, the firm will be retaining more of its earnings in the coming year. Accordingly, the firm will require less external funding. This will cause a decrease in the EFN.

8. Below are your client's financial statements for the year that ended yesterday.

Income Statement

Sales	70,000
Costs	40,000
Taxes	9,000
Net Income	21,000

Balance Sheet

Current Assets	33,000	Current Liabilities	28,000
Fixed Assets	17,000	Long-Term Debt	12,000
		Equity	10,000
Total Assets	50,000	Total Liabilities & Equity	50,000

Costs, assets, and current liabilities are proportional to sales. Long-term debt is unrelated to sales. The firm recently paid dividends of $14,700 and wishes to maintain the same payout ratio in the future. Sales are projected to be $72,800 in the coming year.

a. Calculate the external funding needed (EFN).

Growth rate $= \frac{72,800}{70,000} - 1 = 4\%$

Payout ratio $= \frac{14,700}{21,000} = .70$

Retention ratio $= 1 - .70 = .30$

Pro forma dividends $= 21,840 \times .70 = 15,288$

Pro forma retention $= 21,840 \times .30 = 6,552$ (add to equity)

Pro forma Income Statement

Sales	70,000	× 1.04	= 72,800
Costs	40,000	× 1.04	= 41,600
Taxes	9,000	× 1.04	= 9,360
Net Income			21,840

Pro forma Balance Sheet

Current Assets	33,000	× 1.04	= 34,320	Current Liabilities	28,000 × 1.04 = 29,120
Fixed Assets	17,000	× 1.04	= 17,680	Long-Term Debt	12,000
				Equity	10,000 + 6,552 = 16,552
Total Assets	50,000	× 1.04	= 52,000	Total Liab. and Equity	57,672
				EFN	-5,672
					52,000

b. Explain what the specific value of the EFN you calculated above represents and what types of actions a manager must be prepared to take given this particular EFN value.

EFN represents the amount of external funding needed to be able to support a specific level of expected activity (asset growth and sales growth). A rapidly growing firm will typically need to raise larger amounts of external cash.

In the above situation, the firm is forecasted to grow at a relatively slow rate (4%). Given the modest rate of growth, internally generated cash will be more than sufficient to meet the firm's needs. Accordingly, during the year, the firm will have more cash than necessary (as evidenced by the negative EFN). Since the firm is expected to have excess cash, it may consider using the cash to distribute a larger dividend, repurchase stock, or pay down debt.

9. One of your financial objectives is to accumulate $20,000 by June 2024 (5 years from now). You have $10,000 as of today that is available to invest.

Scenario 1: Invest a lump-sum (one time) amount as of today.

a. You can invest $10,000 today in an investment that is expected to provide a 12% annual rate of return. Will you achieve your objective of having $20,000 five years from today (June 2024)?

Find future value of $10,000

$FV_T = C_0 \times (1+r)^T$

$FV_5 = 10{,}000 \times (1.12)^5 = 10{,}000 \times 1.7623 = 17{,}623$

At a 12% rate of return, the $10,000 today will be worth $17,623 at the end of year 5. We would not achieve our objective.

b. If you can invest $10,000 today, what annual rate of return must you obtain on your investment to achieve your objective of having $20,000 five years from today (June 2024)?

Use future value (FV) formula; solve for r

$FV_T = C_0 \times (1+r)^T$

$20{,}000 = 10{,}000 \times (1+r)^5$

$2 = (1+r)^5$

$2^{\frac{1}{5}} = (1+r)^{5\frac{1}{5}}$

$1.1487 = 1 + r$

$.1487 = r$

We must generate a 14.87% rate of return to reach our objective at the end of year 5.

c. If you can invest $10,000 today and expect to earn an annual rate of return of 12%, how long will it take to achieve your objective of having $20,000 in the future?

Use Future Value (FV) formula; solve for T

$FV_T = C_0 \times (1 + r)^T$

$20{,}000 = 10{,}000 \times (1.12)^T$

$2 = (1.12)^T$ ← At this point, we could use Table A.3 to identify that the time period is between 6 and 7 years. See example in homework problem #5 (p. 122) and p. 96 of the textbook. We could also solve for T.

$\ln 2 = T \ln(1.12)$ ← Take natural log of each side of the equation

$.6931 = T(.1133)$

$6.117 = T$

If the annual rate of return is 12%, the $10,000 today will grow to become $20,000 after 6.117 years (approx 6 years, 43 days).

d. If your objective is to have $20,000 in five years (June 2024), how much must you invest today if your annual rate of return is 12%?

Use Future Value (FV) formula; solve for C_0

$FV_T = C_0 \times (1 + r)^T$

$20{,}000 = C_0 \times (1.12)^5$

$20{,}000 = C_0 \times 1.7623$

$11{,}348.5 = C_0$

We must invest $11,348.5 today to have $20,000 in five years (if we can earn an annual rate of return of 12% over the five years).

We could also use PV formula; solve for PV

$PV = C_T \times \frac{1}{(1+r)^T}$

$= 20{,}000 \times \frac{1}{(1.12)^5}$

$11{,}348.5 = 20{,}000 \times .5674$

10. Given the results of your analysis from Scenario 1 (Problem 9), you decide to re-evaluate. You re-visit your budget and identify an alternative investment strategy (with respect to the amount and timing of your investments).

Scenario 2: Invest an equal amount at the end of every year for a fixed number of years.

a. You can invest $3,000 per year at the end of each of the next five years. If an investment provides an expected annual rate of return of 12%, will you be able to achieve your objective of having $20,000 on June 2024?

Use Future Value of Annuity ($FVAN_T$) formula; ordinary annuity since payments at end of year

$$FVAN_T = C \times \left[\frac{(1+r)^T - 1}{r}\right]$$

$$= 3{,}000 \times \left[\frac{(1.12)^5 - 1}{.12}\right]$$

$$19{,}058.5 = 3{,}000 \times 6.3528$$

If we can earn an annual rate of return of 12%, our five investments of $3,000 per year will be worth $19,058.5 at the end of year 5. We will not achieve our objective.

b. You can invest an equal amount per year at the end of each of the next five years. If an investment provides an expected annual rate of return of 12%, how much must you invest per year to achieve your objective of having $20,000 on June. 2024?

Use Future Value of Annuity ($FVAN_T$) formula; solve for C

$$FVAN_T = C \times \left[\frac{(1+r)^T - 1}{r}\right]$$

$$20{,}000 = C \times \left[\frac{(1.12)^5 - 1}{.12}\right]$$

$$20{,}000 = C \times 6.3528$$

$$3{,}148.2 = C$$

To achieve our objective of having $20,000 five years from today, we must invest $3,148.2 per year for each of the next five years (assuming an annual rate of return of 12%).

11. Cash Budget for November

Cash Collections		
Cash Sales in November	50,000	10% of November Sales
Collect AR from October Sales	369,000	90% of October Sales
Total Cash Collections	419,000	
Cash Disbursements		
Salaries & Operating Expense	47,000	
Fixed Asset Purchases	75,000	
Taxes Paid	34,000	
Raw Materials Paid	89,600	28% of September Sales
Labor Expense Paid	205,000	50% of October Sales
Total Cash Disbursements	450,600	
Net Cashflow	(31,600)	
Begin Cash	20,500	
Total Cash	(11,100)	
Desired Cash	25,000	5% of November Sales
Surplus/(Deficit) Cash	(36,100)	

Notes:
Depreciation is a non-cash expense and should not be included as a cash outflow

If APTO = 6, then ADP (average days payable) = 365/6 or approx 60 days
Average approx 60 days before paying for materials (i.e., pay for Sept purchases in November)