École de gestion TELFER School of Management

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Fall 2010 **ADM 2350 SECTIONS A, & B** **Prof. W. Rentz**

FINANCIAL MANAGEMENT

Assignment #4 Solutions

GENERAL INSTRUCTIONS: Your assignment must be **sent electronically** in either **doc** (**NOT** docx) or **pdf** format **to the TUTOR for your section**. Your **tutor must RECEIVE** your assignment by **no later than noon on Monday, December 6, 2010**. Late assignments will **NOT** be accepted. To ensure that your tutor receives the assignment on time, **it is STRONGLY recommended that you electronically submit your assignment before midnight on the evening of Sunday, December 5, 2010 at the latest.** Unless there are system problems with doc-depot, the professor's solution set will be posted on doc-depot by no later than 6 PM of the due date. This assignment counts 5% of your course grade. You are encouraged to work on this assignment in teams of up to 5 students **from the same section of this course**. *However,* you may turn in an individual assignment if you prefer. Each assignment must be typed and contain the student name(s) and student number(s) on each page. A scanned statement of integrity must be electronically attached to each assignment (See pages 10-11 of the course syllabus). Each individual whose name appears on the assignment must sign the statement of integrity.

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1. (30 marks) The Kahl Gold Corporation (KGC) had sales of $7,300,000 last year and earned a 4 percent return, after taxes, on sales. Although its terms of purchase are twenty days, its accounts payable represent 40 days of purchases. Suppliers are threatening to cut off the firm's purchases. Accordingly, the firm's president is seeking to increase KGC's bank borrowings in order for KGC to become current on its trade obligations (i.e. to have 20 days of payables outstanding). KGC's balance sheet (in thousands of dollars) is

Cash	$50	Accounts payable	$400
Accounts receivable	250	Note payable	500
Inventories	1,100	Accruals	250
Current assets	$1,400	Current liabilities	$1,150
Land & buildings	500	Mortgage	500
Equipment	500	Common shares	250
		Retained earnings	500
Total assets	$2,400	Total claims	$2,400

a. How much financing is needed to eliminate the past-due accounts payable?

A/P = $400,000. The average daily payables are $400,000/40 = $10,000. Since we want to reduce payables by 20 days, the amount of financing needed is 20 x $10,000 = $200,000.

1 mark for correct current A/P of $400,000
1 mark for correct current 40 days of payables
1 mark for correct current average daily payables of $10,000
1 mark for 20 days as amount of reduction in days payable
1 mark for correct $200,000 amount of financing needed

b. As a bank loan officer, would you make the loan? Explain why or why not. (Hint: It might be useful to calculate the Debt Ratio, the Current Ratio, and the ROA to aid in making your loan decision.)

Perhaps, but with caution. First, the firm is undercapitalized. Its debt ratio is quite high at ($1,150 + $500)/$2,400 = 68.75%, and its current ratio is quite low at $1,400/$1,150 = 1.22. Worse still, a disproportionate amount of the current assets are inventories, the least liquid of current assets. Thus, the firm's quick ratio is an abysmal ($1,400 - $1,100)/$1,150 = 0.26. What the firm really needs is more equity financing. However, its return on assets, which is the product of the return on sales or profit margin times the total asset turnover, is 4% x ($7,300,000/$2,400,000) = 12.17%. Thus, with a return on assets of 12.17%, the firm is certainly capable of servicing the loan because the interest payments are tax deductible. So, the loan could be granted, but the firm really should increase its permanent capital.

1 mark for correctly calculating the debt ratio
1 mark for correctly calculating the current ratio
1 mark for correctly calculating the return on assets
2 marks for a reasonable recommendation about the loan

c. Suppose KGC has the following choices for raising the needed capital:

- Borrow from the bank on a line of credit. The loan has a 9.0 percent nominal annual rate with monthly compounding.

$$k_{annual} = \left(1 + \frac{QR}{m}\right)^{m} - 1 = 1.0075^{12} - 1 = 0.0938 \; or \; 9.38\%$$

1 mark for recognizing that effective annual rates must be compared
1 mark for correct effective annual rate expression
1 mark for correct monthly rate of 9.0%/12 = 0.75%
1 mark for m = 12
1 mark for correct effective annual rate of 9.38%

- Negotiate with suppliers and arrange to buy on terms of 0.48/10, net 30.

$$k_{periodic} = \frac{Percentage\ discount}{100\% - Percentage\ discount} \qquad m = \frac{365}{Credit\ \ period - Discount\ \ period}$$

$$k_{annual} = \left[1 + k_{periodic}\right]^{m} - 1 = \left[1 + \frac{0.48\%}{(100\% - 0.48\%)}\right]^{\left[\frac{365}{(30-10)}\right]} - 1 = 0.0918\ or\ 9.18\%$$

Note that if the firm takes this option and does NOT take its cash discounts, it still needs to finance 10 x $10,000 = $100,000 of payables. If it does take the discounts, then it needs 30 x $10,000 = $300,000 of payables.

1 mark for correct expression for the periodic interest rate
1 mark for correct expression for number of costly credit periods per year
1 mark for correct expression for effective annual rate
1 mark for correctly substituting into the effective annual rate expression
1 mark for correct value of effective annual rate = 9.18%

- Sell subordinated convertible debentures at a par value of $1,000 with a 9 percent annual coupon rate. The firm's share price is currently $25. The conversion price is $40. The expected growth rate of the share price is 8 percent per year. The convertibles will initially sell at par and will be callable after ten years with a 9% call premium.

To find the cost k_c of convertible debt, one must first find the conversion value of the bonds in ten years. Note that the $1,000 par value of the bonds divided by the $40 conversion price in the calculation below represents the conversion ratio, i.e. the number of shares into which each bond can be converted.

Conversion value in 10 years = ($1,000/$40) x $25 x 1.08^{10} = $1,349.33

$$\$1{,}000 = \$90 \times PVIFA_{k_c,10} + \$1{,}349.33 \times PVIF_{k_c,10}$$

Set P/Y = C/Y = 1, N = 10, PV = - $1,000, PMT = $90, and FV = $1,349.33. Then CPT I/Y = 11.08.

If one does not have a financial calculator, use the YTM approximation formula previously used in this course with $1,000 as the current price and $1,349.33 as the maturity value.

$$k_c = \left[\frac{\$90 + \left(\frac{\$1{,}349.33 - \$1{,}000}{10}\right)}{\left(\frac{(2 \times \$1{,}000) + \$1{,}349.33}{3}\right)}\right] = \left[\frac{\$90 + \$34.93}{\$1{,}116.44}\right] = 0.1119\ or\ 11.19\%$$

1 mark for correct expression for conversion value
1 mark for correct calculation of conversion value
1 mark for correct YTM expression or approximate YTM expression
1 mark for correctly substituting into YTM expression
1 mark for correct YTM value

d. Which method of borrowing would you recommend? Justify your answer.

Since the line of credit and the trade credit costs are essentially the same, it makes more sense to use the line of credit since the trade credit still leaves the firm short of its required financing. The convertible bonds are the most costly method of financing. One should realize, however, that long-term financing typically is somewhat more expense than short-term financing. What this firm needs is permanent capital, especially equity capital. Thus, it makes most sense to issue convertible bonds, as the convertibles will eventually provide equity financing.

1 mark for noting that using trade credit would still leave a shortfall
1 mark for noting that the firm needs long-term financing
1 mark for noting that convertibles are long-term financing
1 mark for noting that convertibles will eventually be equity financing
1 mark for noting that additional equity is what the firm needs most

2. (30 marks) The Rentz Corporation (RC) has annual credit sales of $14.60 million. Current expenses for the collection department are $400,000, bad debt losses are 1.5 percent, and the average collection period is 30 days. RC is considering easing its collection efforts so that collection expenses will be reduced to $300,000 per year. The change is expected to increase bad debt losses to 3.0 percent and to increase the average collection period to 50 days. In addition, sales are expected to increase to $15.33 million per year. Should RC relax its collection efforts if the pre-tax opportunity cost of funds is 20 percent, the variable cost ratio is 80 percent, and taxes are 40 percent?

	Current Policy	New Policy
Gross Sales	$14,600,000	$15,330,000
Less: Discounts	0	0
Net sales	$14,600,000	$15,330,000
Less: Production costs	- 11,680,000	- 12,264,000
Π before taxes & credit costs	$ 2,920,000	$ 3,066,000
Less: Cost to carry receivables	- 240,000	- 420,000
Less: Collection expenses	- 400,000	- 300,000
Less: Bad debt losses	- 219,000	- 459,900
Profit before taxes	$ 2,061,000	$ 1,886,100
Less: Taxes (40%)	- 824,400	- 754,440
Net Income	$ 1,236,600	$ 1,131,660

Net income falls under the new policy. Hence, do NOT make the change.

2 marks for calculating the production costs for EACH policy (4 marks TOTAL)
1 mark additional credit if both production cost calculations are correct
2 marks for calculating the profits before taxes & credit for EACH policy (4 marks TOTAL)
1 mark additional credit if both profit calculations are correct
2 marks for calculating the cost of carrying receivables for EACH policy (4 marks TOTAL)
1 mark additional credit if both carrying cost calculations are correct
2 marks for calculating the bad debt losses for EACH policy (4 marks TOTAL)
1 mark additional credit if both bad debt loss calculations are correct
2 marks for calculating the profit before taxes for EACH policy (4 marks TOTAL)
1 mark additional credit for both profit calculations correct
2 marks for realizing that profit before taxes or net income falls under the new policy
3 marks for a reasonable conclusion

Old Carry Cost = ($14,600,000/365 days) x 30 days x 0.20 = $40,000 x 30 x 0.20 = $240,000

New Carry Cost = ($15,330,000/365 days) x 50 days x 0.20 = $42,000 x 50 x 0.20 = $420,000

Instead of using the income statement approach, some students may use the NPV approach of the text. We will show that this leads to the same result.

A-T CFs = [ΔSales - ΔProduction Costs - ΔCollection Expenses - ΔBad Debt Losses](1 – T) = [$730,000 - $584,000 – (- $100,000) - $240,900] x (1 - 0.40) = $5,100 x 0.60 = $3,060

NPV = (A-T CFs)/(A-T Interest Rate) - ΔReceivables = $3,060/0.12 – $900,000 = - $874,500

Old Receivables = ($14,600,000/365 days) x 30 days = $1,200,000

New Receivables = ($15,330,000/365 days) x 50 days = $2,100,000

ΔReceivables = $900,000

Note that the NPV result is exactly what one would obtain by capitalizing the ΔNet Income by the after-tax interest rate: ($1,131,660 - $1,236,600)/0.12 = - $104,940/0.12 = - $874,500

3. (40 marks) Timothy Huang was recently hired as the financial manager of White Office Furnishings, a small manufacturer of metal office furniture. His first assignment is to develop a rational working capital policy. Huang has identified three potential policies: (1) an aggressive policy calling for a minimum amount of working capital and for substantial use of short-term debt, (2) a conservative policy calling for a high working capital level and primary reliance on long-term, as opposed to short-term, debt, and (3) a moderate policy falling between the two extremes. Huang estimates that the balance sheet under each policy will look like Table 1 ($000 omitted).

   Short-term debt costs 5.0 percent, while long-term debt costs 7.0 percent. Variable costs are expected to be 60 percent of sales for the aggressive policy, 55 percent of sales for the moderate policy, and 50 percent of sales for the conservative policy. However, fixed costs increase if more current assets are held, because of increased storage and insurance costs. Annual fixed costs will be $125,000 under an aggressive policy, $150,000 with a moderate policy, and $175,000 under a conservative policy. The firm's marginal corporate income tax rate is 40 percent.

Table 1

Balance Sheet

	Aggressive	Moderate	Conservative
Current Assets	$400	$450	$500
Net Fixed Assets	$300	$350	$400
Total Assets	$700	$800	$900

Short-term Debt (5%)	$400	$200	$ 0
Long-term Debt (7%)	$ 0	$200	$400
Common equity	$300	$400	$500
Total claims	$700	$800	$900

Because its working capital policy will affect the firm's ability to respond to customers' needs, sales are expected to vary under different economic scenarios as shown in Table 2 ($000 omitted).

Table 2

Sales with each Working Capital Policy

	Aggressive	Moderate	Conservative
Strong Economy	$700	$850	$975
Average Economy	$600	$725	$825
Weak Economy	$500	$600	$675

As Huang's assistant, you have been asked to draft a report that answers the following questions:

a. What are the two basic decisions in formulating a working capital policy? Describe how a firm that is willing to take relatively high risks in the hope of earning high returns makes these two decisions. Then describe the policy decisions of a highly risk-averse (conservative) firm and a moderate firm.

The two basic working capital policy issues are (1) what is the *appropriate level* of current assets and (2) how should the firm *finance* its current assets.

Under conditions of certainty, all firms would hold only minimal levels of current assets. However, under uncertainty, firms hold some minimum amount of cash and inventories based on expected sales, plus additional safety stock to accommodate higher than expected sales. At the same time, their accounts receivable levels are determined by credit terms, and the tougher the credit terms, the lower the receivables for any given sales level.

Thus, with a *tight* working capital policy, a firm would hold *minimal safety stocks* and would have a *restrictive* credit policy. Such a policy minimizes costs, but it also lowers sales because the firm cannot respond rapidly to increases in demand and because the restrictive credit policy would turn off some customers.

A moderate policy falls between the others in terms of expected risk and return.

A *liberal working capital policy* calls for large safety stocks and for a relaxed credit policy. Generally, expected return is lower under such a policy than under a tight policy. but the risks are also lower. Note that the liberal working capital policy (*i.e.* relatively large net working capital) is typically followed by firms with conservative attitudes towards risk (*i.e.* relatively small risks of lost sales,

although truly conservative firms may be loathe to give credit terms to anyone but the best credit risks).

Working capital *financing policies* involve the mix of long-term versus short-term debt. Firms have a target capital structure that defines their debt/equity mix, but must also choose the debt maturity mix. Since the yield curve normally slopes upward, short-term debt typically costs less than long-term debt. However, short-term debt is also riskier when used on a permanent basis because (1) short-term debt costs will rise if interest rates increase and (2) short-term creditors may be unwilling to renew the debt if the firm's condition deteriorates badly.

If a firm uses short-term debt only to finance its temporary seasonal or cyclical working capital needs, and uses long-term debt (plus equity) to finance its permanent asset base, then it follows a *maturity matching financing policy*. This policy falls between the two (aggressive and conservative) extremes.

In an *aggressive financing policy*, the firm finances part of its permanent assets with short-term debt. This policy provides the highest expected return because short-term debt costs are typically less than long-term costs, but it is very risky.

Under a *conservative financing policy*, the firm would have a level of permanent financing (long-term debt plus equity) that exceeds its permanent assets. It would carry marketable securities during slack times. Then, when working capital needs increase with seasonal or cyclical sales increases, the marketable securities would be sold to finance increases in inventory and receivables. The conservative financing policy is the least risky, but it also typically results in the lowest expected return.

b. Construct income statements for each working capital policy assuming an average economy. Also, calculate the return on equity (ROE). Use the following format:

Income Statements With Each Policy

Average Economy	Aggressive	Moderate	Conservative
Sales	$600,000	$725,000	$825,000
Less cost of goods sold	485,000	548,750	587,500
EBIT	$115,000	$176,250	$237,500
Less interest	20,000	24,000	28,000
Taxable income	$ 95,000	$152,250	$209,500
Less taxes (@ 40%)	38,000	60,900	83,800
Net income	$ 57,000	$ 91,350	$125,700
ROE	19.00%	22.84%	25.14%

c. Rework the income statements for weak and strong economies.

Weak Economy	Aggressive	Moderate	Conservative
Sales	$500,000	$600,000	$675,000
Less cost of goods sold	425,000	480,000	512,500
EBIT	$ 75,000	$120,000	$162,500
Less interest	20,000	24,000	28,000
Taxable income	$ 55,000	$ 96,000	$134,500
Less taxes (@ 40%)	22,000	38,400	53,800
Net income	$ 33,000	$ 57,600	$ 80,700
ROE	11.00%	14.40%	16.14%

Strong Economy	Aggressive	Moderate	Conservative
Sales	$700,000	$850,000	$975,000
Less cost of goods sold	545,000	617,500	662,500
EBIT	$ 155,000	$232,500	$312,500
Less interest	20,000	24,000	28,000
Taxable income	$135,000	$208,500	$284,500
Less taxes (@ 40%)	54,000	83,400	113,800
Net income	$ 81,000	$125,100	$170,700
ROE	27.00%	31.28%	34.14%

d. Assume that there is a 40 percent chance of an average economy and a 30 percent probability of a strong economy and of a weak economy. What is the expected ROE under each policy? Are the policies equally risky?

Economic state	Probability	Aggressive	Moderate	Conservative
Weak	0.30	11.00%	14.40%	16.14%
Average	0.40	19.00	22.84	25.14
Strong	0.30	27.00	31.28	34.14
Expected ROE		19.00%	22.84%	25.14%
Standard deviation σ_{ROE}		6.20%	6.54%	6.97%
Coefficient of Variation		0.33	0.29	0.28

Quite surprisingly, we see that the conservative policy produces the highest expected ROE. Measured by the standard deviation of return, it has the highest risk. However, this is a completely misleading statistic because the conservative policy has the highest rate of return in ALL economic states. A more relevant measure of risk is the coefficient of variation. By this risk measure, the conservative policy has the lowest risk. The moderate policy falls in the middle. Of course, the firm's primary focus should be on market risk, not on total risk as measured here. However, returns under all policies are positively correlated with the economy, so the higher the total risk, the higher the market risk.

Note that in this particular example, the return in the average economy for a policy was also its expected return. This occurred because the sales in the average economy for a policy was also its expected sales.

e. Now suppose that, after the firm has established its working capital policy, the Bank of Canada reacts to increasing inflationary expectations and begins to tighten monetary policy. As a result, interest rates increase. If the firm is following the conservative policy, it has locked in its 7 percent long-term debt cost. If it is following the aggressive policy, an increase of four percentage points for short-term debt pushes its short-term debt cost up to 9 percent. The moderate firm, of course, has only partially locked up its borrowing costs. What impact does this rise in the short-term rate have on the firm's profitability under each of the working capital policies, in an average economy, as measured by ROE?

If the firm's short-term cost of debt increased to 9%, then interest costs would be greatest under the aggressive policy:

Short-term interest rate	Aggressive	Moderate	Conservative
5%	$20,000	$24,000	$28,000
9%	36,000	32,000	28,000
Increase	$16,000	$ 8,000	$ 0

Note that interest expense doesn't increase if the firm uses a conservative policy, because the 7% long-term rate is locked in. The increased interest expense causes a decrease in ROE under the aggressive and moderate policies:

Income Statements With Each Policy

Average Economy	Aggressive	Moderate	Conservative
Sales	$600,000	$725,000	$825,000
Less cost of goods sold	485,000	548,750	587,500
EBIT	$115,000	$176,250	$237,500
Less interest	36,000	32,000	28,000
Taxable income	$ 79,000	$144,250	$209,500
Less taxes (@ 40%)	31,600	57,700	83,800
Net income	$ 47,400	$ 86,550	$125,700
ROE	15.80%	21.64%	25.14%

Short-term interest rate	Aggressive	Moderate	Conservative
5%	19.00%	22.84%	25.14%
9%	15.80%	21.64%	25.14%

Thus, the greater the use of short-term debt, the greater the reduction in ROE in the event of an increase in interest rates.

f. One supplier, which supplies $73,000 worth of materials a year, offers terms of 2/10, net 30.

1. What are the daily purchases net of discounts from this supplier?

If the firm's *gross* purchases are $73,000 annually, then, with a 2% discount, its *net* purchases are 0.98($73,000) = $71,540. If we assume a 365 day year, then *net daily purchases* are $71,540/365 = $196.

2. What is the average level of accounts payable to this supplier if the discount is taken? What is the average level of accounts payable **net** of discounts even though the discount is not taken? What are the amounts of free credit and costly credit under both discount policies?

If the discount is taken, then the firm must pay this supplier on Day 11 for purchases made on Day 1, on Day 12 for purchases made on Day 2, and so on. Thus, in a steady state, the firm will on average have 10 days' worth of purchases in payables, so Payables = 10($196) = $1,960.

If the discount is not taken, the firm will wait 30 days before paying, so Payables = 30($196.00) = $5,880. Therefore:

Trade credit if discounts not taken: $5,880 = Total trade credit
***Less:* Trade credit if discounts are taken: -1,960 = Free trade credit**
Difference: $3,920 = Costly trade credit

Here we see that the firm gets $1,960 of free credit—it can wait 10 days and still take the discount. If the firm foregoes the discount then it can get $5,880 in credit. The difference, $5,880 - $1,960 = $3,920, is the amount of costly trade credit.

3. What is the approximate cost of the costly trade credit? What is the effective annual cost?

To obtain $3,920 of costly trade credit, the firm must give up 0.02 ($73,000) = $1,460 in lost discounts annually. Since the foregone discounts pay for $3,920 of credit, the approx. cost is APR or QR = $1,460/$3,920 = 0.3724 = 37.24%.

A formula that can be used to find the approximate cost of costly trade credit is:

APR or QR = [Disc. %/(100% - Disc.%)] x [365/(Credit period - Discount period)].

[2%/(100% - 98%)] x [365/(30 - 10)] = 0.020408 x 18.25 = 0.3724 = 37.24%.

Note that (1) the formula gives the same cost as was calculated earlier, (2) the first term is the periodic cost of the credit (the firm spends $2 to get the use of $98), and (3) the second term is the number of "compounding periods" per year (the firm delays payment for 30 - 10 = 20 days, and there are 365/20 = 18.25 twenty-day periods in a year.)

$k_{annual} = [1+(2/98)]^{365/20} - 1 = 0.4459 = 44.59\%$

Marking Scheme:

a. 1 mark EACH, 2 basic decisions, (TOTAL 2 marks)
2 marks EACH, policy discussions (TOTAL 6 marks)
b. 1 mark EACH, inc. state., 3 policies, ave. eco. (TOTAL 3 marks)
1 mark TOTAL, calc. of 3 ROEs, GIVEN student net incomes
c. Marks for each state of the economy will be as in Part b. Since there are 2 states of the economy in Part c., total marks for this part are 2 x 4 = 8.
d. 2 marks EACH, expected ROEs (TOTAL 6 marks)
2 marks for discussion of risk of the policies
e. 1 mark EACH, rate change impact on ROEs (TOTAL 3 marks)
f. 1 mark EACH for free, costly, and total trade credit levels (TOTAL 3 marks)
3 marks for correct calculation of the APR or QR
3 marks for correct calculation of the effective annual rate