

SOLUTIONS TO END-OF-CHAPTER PROBLEMS

Chapter 17

17-1 Nominal cost of trade credit = $\frac{3}{97} \times \frac{360}{30 - 15}$
 = $0.0309 \times 24 = 0.7423 = 74.23\%$.

Effective cost of trade credit = $(1.0309)^{24} - 1.0 = 1.0772 = 107.72\%$.

17-2 Effective cost of trade credit = $(1 + 1/99)^8 - 1.0$
 = $0.0837 = 8.37\%$.

17-3 Net purchase price of inventory = \$500,000/day.

Credit terms = 2/15, net 40.

$\$500,000 \times 15 = \$7,500,000$.

17-4 \$25,000 interest-only loan, 11 percent nominal rate. Interest calculated as simple interest based on 365-day year. Interest for 1st month = ?

Interest rate per day = $0.11/365 = 0.000301$.

Interest charge for period = $(31)(0.11/365)(\$25,000)$
 = \$233.56.

17-5 \$15,000 installment loan, 11 percent nominal rate. Effective annual rate, assuming a 365-day year = ?

Add-on interest = $0.11(\$15,000) = \$1,650$.

Monthly Payment = $\frac{\$15,000 + \$1,650}{12} = \$1,387.50$.

0		1	2	...	11	12
	i = ?					
15,000		-1,387.50	-1,387.50		-1,387.50	-1,387.50

With a financial calculator, enter N = 12, PV = 15000, PMT = -1387.50, FV = 0, and then press I to obtain 1.6432 percent. However, this is a monthly rate.

$$\begin{aligned} \text{Effective annual rate}_{\text{Add-on}} &= (1 + k_d)^n - 1.0 \\ &= (1.016432)^{12} - 1.0 \\ &= 1.2160 - 1.0 = 0.2160 = 21.60\%. \end{aligned}$$

17-6 a. $\frac{1}{99} \times \frac{360}{5} = 72.73\%$.

b. $\frac{2}{98} \times \frac{360}{50} = 14.69\%$.

c. $\frac{3}{97} \times \frac{360}{35} = 31.81\%$.

d. $\frac{2}{98} \times \frac{360}{35} = 20.99\%$.

e. $\frac{2}{98} \times \frac{360}{25} = 29.39\%$.

17-7 a. $\frac{3}{97} \times \frac{360}{45 - 20} = 44.54\%$.

Because the firm still takes the discount on Day 20, 20 is used as the discount period in calculating the cost of nonfree trade credit.

b. Paying after the discount period, but still taking the discount gives the firm more credit than it would receive if it paid within 15 days.

17-8 a. Effective rate = 12%.

b.

0	1
----- i = ? -----	
50,000	-50,000
	- 4,500
<u>-10,000</u> (compensating balance)	<u>10,000</u>
<u>40,000</u>	<u>-44,500</u>

With a financial calculator, enter N = 1, PV = 40000, PMT = 0, and FV = -44500 to solve for I = 11.25%.

Note that, if Hawley actually needs \$50,000 of funds, he will have to borrow $\frac{\$50,000}{1 - 0.2} = \$62,500$. The effective interest rate will still be 11.25 percent.

c.	0	i = ?	1
	50,000		-50,000
	-4,375 (discount interest)		<u>7,500</u>
	-7,500 (compensating balance)		<u>-42,500</u>
	<u>38,125</u>		

With a financial calculator, enter N = 1, PV = 38125, PMT = 0, and FV = -42500 to solve for I = 11.4754% ≈ 11.48%.

Note that, if Hawley actually needs \$50,000 of funds, he will have to borrow $\frac{\$50,000}{1 - 0.0875 - 0.15} = \$65,573.77$. The effective interest rate will still be 11.48 percent.

$$d. \text{ Approximate annual rate} = \frac{(0.08)(\$50,000)}{(\$50,000/2)} = \frac{\$4,000}{\$25,000} = 16\%.$$

Precise effective rate:

$$\$50,000 = \sum_{t=1}^{12} \frac{\$4,166.67}{(1 + k_d)^t} + \frac{\$4,000}{(1 + k_d)^{12}}$$

k_d , the monthly interest rate, is 1.1326 percent, found with a financial calculator. Input N = 12; PV = 50000; PMT = -4166.67; FV = -4000; and I = ?. The precise effective annual rate is $(1.011326)^{12} - 1.0 = 14.47\%$.

Alternative b has the lowest effective interest rate.

$$17-9 \text{ Sales per day} = \frac{\$4,500,000}{360} = \$12,500.$$

$$\text{Discount sales} = 0.5(\$12,500) = \$6,250.$$

$$\text{A/R attributable to discount customers} = \$6,250(10) = \$62,500.$$

A/R attributable to nondiscount customers:

Total A/R	\$437,500
Discount customers' A/R	<u>62,500</u>
Nondiscount customers' A/R	<u>\$375,000</u>

$$\text{Days sales outstanding nondiscount customers} = \frac{\text{A/R}}{\text{Sales per day}} = \frac{\$375,000}{\$6,250} = 60 \text{ days.}$$

Alternatively,

$$\text{DSO} = \$437,500 / \$12,500 = 35 \text{ days.}$$

$$35 = 0.5(10) + 0.5(\text{DSO}_{\text{Nondiscount}})$$

$$\text{DSO}_{\text{Nondiscount}} = 30 / 0.5 = 60 \text{ days.}$$

Thus, although nondiscount customers are supposed to pay within 40 days, they are actually paying, on average, in 60 days.

Cost of trade credit to nondiscount customers equals the rate of return to the firm:

$$\text{Nominal rate} = \frac{2}{98} \times \frac{360}{60 - 10} = 0.0204(7.2) = 14.69\%.$$

$$\text{Effective cost} = (1 + 2/98)^{360/50} - 1 = 15.66\%.$$

17-10 Accounts payable:

$$\text{Nominal cost} = \left(\frac{3}{97}\right) \left(\frac{360}{80}\right) = (0.03093)(4.5) = 13.918\%.$$

$$\text{EAR cost} = (1.03093)^{4.5} - 1.0 = 14.69\%.$$

Bank loan:

0	$i = ?$	1
-----	-----	-----
500,000		-500,000
<u>-60,000</u>	(discount interest)	
<u>440,000</u>		

With a financial calculator, enter $N = 1$, $PV = 440000$, $PMT = 0$, and $FV = -500000$ to solve for $I = 13.636\% \approx 13.64\%$.

Note that, if Masson actually needs \$500,000 of funds, he will have to borrow $\frac{\$500,000}{1 - 0.12} = \$568,181.82$. The effective interest rate will still be 13.64 percent.

The bank loan is the lowest cost source of capital available to D.J. Masson at 13.64 percent.

17-11 a. Simple interest: 12%.

b. 3-months: $(1 + 0.115/4)^4 - 1 = 12.0055\%$, or use the interest conversion feature of your calculator as follows:

$$\text{NOM}\% = 11.5; \text{P/YR} = 4; \text{EFF}\% = ? \quad \text{EFF}\% = 12.0055\%.$$

c. Add-on: Interest = Funds needed(k_d).
 Loan = Funds needed($1 + k_d$).
 PMT = Loan/12.

$$\text{Assume you borrowed } \$100. \text{ Then, Loan} = \$100(1.06) = \$106.$$

$$\text{PMT} = \$106/12 = \$8.8333.$$

$$\$100 = \sum_{t=1}^{12} \frac{\$8.8333}{(1 + k_d)^t}$$

Enter N = 12, PV = 100, PMT = -8.8333, FV = 0, and press I to get I = 0.908032% = k_d . This is a monthly periodic rate, so the effective annual rate = $(1.00908032)^{12} - 1 = 0.1146 = 11.46\%$.

- d. Trade credit: 1/99 = 1.01% on discount if pay in 15 days, otherwise pay 45 days later. So, get 60 - 15 = 45 days of credit at a cost of 1/99 = 1.01%. There are 360/45 = 8 periods, so the effective cost rate is:

$$(1 + 1/99)^8 - 1 = (1.0101)^8 - 1 = 8.3723\%$$

Thus, the least expensive type of credit for Yonge is trade credit with an effective cost of 8.3723 percent.

17-12 a.
$$\frac{\text{Average accounts payable}}{\text{payable}} = \frac{\$3,600,000}{360 \text{ days}} \times 10 \text{ days} = \$10,000 \times 10 = \$100,000.$$

- b. There is no cost of trade credit at this point. The firm is using "free" trade credit.

c.
$$\frac{\text{Average payables (net of discount)}}{\text{(net of discount)}} = \frac{\$3,600,000}{360} \times 30 = \$10,000 \times 30 = \$300,000.$$

Nominal cost = $(2/98)(360/20) = 36.73\%$,

or $\$73,469 / (\$300,000 - \$100,000) = 36.73\%$.

Effective cost = $(1 + 2/98)^{360/20} - 1 = 0.4386 = 43.86\%$.

d. Nominal rate = $\frac{2}{98} \times \frac{360}{40 - 10} = 24.49\%$.

Effective cost = $(1 + 2/98)^{360/30} - 1 = 0.2743 = 27.43\%$.

- 17-13 a. Bank Loan 13 percent, discount interest

0	$i = ?$	1
300,000		-300,000
-39,000 (discount interest)		
<u>261,000</u>		

With a financial calculator, enter N = 1, PV = 261000, PMT = 0, and FV = -300000 to solve for I = 14.9425% \approx 14.94%.

Note that, if Thompson actually needs \$300,000 of funds, it will have to borrow $\frac{\$300,000}{1 - 0.13} = \$344,827.59$. The effective interest rate will

still be 14.9425% \approx 14.94%.

Trade Credit

Terms: 2/10, net 30. But the firm plans delaying payments 35 additional days, which is the equivalent of 2/10, net 65.

$$\begin{aligned}\text{Nominal cost} &= \frac{\text{Discount percent}}{100 - \text{Discount percent}} \times \frac{360}{\text{Days credit is outstanding} - \text{Discount period}} \\ &= \frac{2}{100 - 2} \times \frac{360}{65 - 10} = \frac{2}{98} \times \frac{360}{55} = 0.0204(6.55) = 13.36\%.\end{aligned}$$

$$\text{Effective cost} = (1 + 2/98)^{360/55} - 1 = 14.14\%.$$

Comparing effective interest costs, the Thompson Corporation might be tempted to obtain financing from a bank. (For reason see solution to Part b.)

- b. The interest rate comparison had favored trade credit, but Thompson Corporation should take into account how its trade creditors would look upon a 35-day delay in making payments. Thompson would become a "slow pay" account, and in times when suppliers were operating at full capacity, Thompson would be given poor service and would also be forced to pay on time.

17-14 a. Size of bank loan = (Purchases/Day)(Days late)

$$\begin{aligned}&= \left(\frac{\text{Purchases}}{\text{Days payables outstanding}} \right) (\text{Days payables outstanding} - 30) \\ &= (\$600,000/60)(60 - 30) = \$10,000(30) = \$300,000.\end{aligned}$$

Alternatively, one could simply recognize that accounts payable must be cut to half of its existing level, because 30 days is half of 60 days.

- b. Given the limited information, the decision must be based on the rule-of-thumb comparisons, such as the following:

1. Debt ratio = $(\$1,500,000 + \$700,000)/\$3,000,000 = 73\%$.

Raattama's debt ratio is 73 percent, as compared to a typical debt ratio of 50 percent. The firm appears to be undercapitalized.

2. Current ratio = $\$1,800,000/\$1,500,000 = 1.20$.

The current ratio appears to be low, but current assets could cover current liabilities if all accounts receivable can be collected and if the inventory can be liquidated at its book value.

3. Quick ratio = $\$400,000/\$1,500,000 = 0.27$.

The quick ratio indicates that current assets, excluding inventory, are only sufficient to cover 27 percent of current liabilities, which is very bad.

The company appears to be carrying excess inventory and financing extensively with debt. Bank borrowings are already high, and the liquidity situation is poor. On the basis of these observations, the loan should be denied, and the treasurer should be advised to seek permanent capital, especially equity capital.

17-15 a. The quarterly interest rate is equal to $11.25\%/4 = 2.8125\%$.

$$\begin{aligned} \text{Effective annual rate} &= (1 + 0.028125)^4 - 1 \\ &= 1.117336 - 1 = 0.117336 = 11.73\%. \end{aligned}$$

b.	0		1
		i = ?	

	1,500,000		-1,500,000
	-33,750	(discount interest)	300,000
	-300,000	(compensating balance)	<u>-1,200,000</u>
	<u>1,166,250</u>		

With a financial calculator, enter $N = 1$, $PV = 1166250$, $PMT = 0$, and $FV = -1200000$ to solve for $I = 2.89389\% \approx 2.89\%$. However, this is a periodic rate.

$$\text{Effective annual rate} = (1 + 0.0289389)^4 - 1 = 12.088\% \approx 12.09\%.$$

Note that, if Gifts Galore actually needs \$1,500,000 of funds, it will have to borrow $\frac{\$1,500,000}{1 - 0.0225 - 0.2} = \frac{\$1,500,000}{0.7775} = \$1,929,260.45$. The effective interest rate will still be $12.088\% \approx 12.09\%$.

c. Installment loan:

$$\text{Nominal quarterly rate} = \frac{\text{Interest}}{\text{Amount received}/2} = \frac{\$33,750}{\$1,500,000/2} = 4.5\%.$$

$$\text{Nominal annual rate} = 4.5\% \times 4 = 18\%.$$

17-16 a. Malone's current accounts payable balance represents 60 days purchases.

$$\text{Daily purchases can be calculated as } \frac{\$500}{60} = \$8.33.$$

If Malone takes discounts then the accounts payable balance would include only 10 days purchases, so the A/P balance would be $\$8.33 \times 10 = \83.33 .

If Malone doesn't take discounts but pays in 30 days, its A/P balance would be $\$8.33 \times 30 = \250 .

b. Takes Discounts:

If Malone takes discounts its A/P balance would be \$83.33. The cash it would need to be loaned is \$500 - \$83.33 = \$416.67.

Since the loan is a discount loan with compensating balances, Malone would require more than a \$416.67 loan.

$$\text{Face amount of loan} = \frac{\$416.67}{1 - 0.15 - 0.20} = \frac{\$416.67}{0.65} = \$641.03.$$

Doesn't Take Discounts:

If Malone doesn't take discounts, its A/P balance would be \$250. The cash needed from the bank is \$500 - \$250 = \$250.

$$\text{Face amount of loan} = \frac{\$250}{1 - 0.15 - 0.20} = \frac{\$250}{0.65} = \$384.62.$$

c. Nonfree Trade Credit:

Nominal annual cost:

$$\frac{\text{Discount \%}}{100 - \text{Discount \%}} \times \frac{360}{\text{Days credit is outstanding} - \text{Discount period}} = \frac{1}{99} \times \frac{360}{20} = 18.18\%.$$

$$\text{Effective cost: } \left(1 + \frac{1}{99}\right)^{18} - 1 = (1.0101)^{18} - 1 = 1.1983 - 1 = 19.83\%.$$

Bank Loan: 15% Discount Loan with 20% compensating balance.

Assume the firm doesn't take discounts so it needs \$250 and borrows \$384.62. (The cost will be the same regardless of how much the firm borrows.)

0	1

384.62	-384.62
-57.69 Discount interest	+76.92
-76.92 Compensating balance	<u>-307.70</u>
<u>250.00</u>	

With a financial calculator, input the following data, N = 1, PV = 250, PMT = 0, FV = -307.70, and then solve for I = 23.08%.

Just to show you that it doesn't matter how much the firm borrows, assume the firm takes discounts and it reduces A/P to \$83.33 so it needs \$416.67 cash and borrows \$641.03.

0	1

641.03	-641.03
-96.15 Discount interest	+128.21
<u>-128.21</u> Compensating balance	<u>-512.82</u>
<u>416.67</u>	

With a financial calculator, input the following data, $N = 1$, $PV = 416.67$, $PMT = 0$, $FV = -512.82$, and then solve for $I = 23.08\%$.

Because the cost of nonfree trade credit is less than the cost of the bank loan, Malone should forge discounts and reduce its payables only to \$250,000.

d. Pro Forma Balance Sheet (Thousands of Dollars):

Cash ^a	\$ 126.9	Accounts payable	\$ 250.0
Accounts receivable	450.0	Notes payable ^b	434.6
Inventory	750.0	Accruals	50.0
Prepaid interest	<u>57.7</u>		
Total current assets	\$1,384.6	Total current liabilities	\$ 734.6
Fixed assets	750.0	Long-term debt	150.0
		Common equity	
	<u>1,250.0</u>		
Total assets	<u>\$2,134.6</u>	Total claims	<u>\$2,134.6</u>

^a $\$384,615(0.2) = \$76,923 =$ Compensating balance.

Cash = $\$50 + \$76.923 = \$126.9$.

^b Notes payable = $\$50 + \$384.6 = \$434.6$.

17-17 a. 1. *Line of credit:*

Commitment fee	=	$(0.005)(\$2,000,000)(11/12)$	=	\$ 9,167
Interest	=	$(0.11)(1/12)(\$2,000,000)$	=	<u>18,333</u>
Total				<u>\$27,500</u>

2. *Trade discount:*

$$\text{a. Nominal rate} = \left(\frac{2}{98}\right)\left(\frac{360}{30}\right) = 24.49 \approx 24.5\%.$$

$$\text{Total cost} = 0.245(\$2,000,000)/12 = \$40,833.$$

$$\text{b. Effective cost} = (1 + 2/98)^{360/30} - 1 = 0.2743 = 27.43\%.$$

$$\text{Total cost} = 0.2743(\$2,000,000)/12 = \$45,717.$$

3. <i>30-day commercial paper:</i>		
Interest =	$(0.095)(\$2,000,000)(1/12)$	= \$15,833
Transaction fee =	$(0.005)(\$2,000,000)$	= <u>10,000</u>
		<u>\$25,833</u>
4. <i>60-day commercial paper:</i>		
Interest =	$(0.09)(\$2,000,000)(2/12)$	= \$30,000
Transaction fee =	$(0.005)(\$2,000,000)$	= <u>10,000</u>
		\$40,000
Marketable securities interest received		
=	$(0.094)(\$2,000,000)(1/12)$	= -15,667
Transactions cost, marketable securities		
=	$(0.004)(\$2,000,000)$	= <u>+8,000</u>
		<u>\$32,333</u>

The 30-day commercial paper has the lowest cost.

- b. The lowest cost of financing is not necessarily the best. The use of 30-day commercial paper is the cheapest; however, sometimes the commercial paper market is tight and funds are not available. This market also is impersonal. A banking arrangement may provide financial counseling and a long-run relationship in which the bank performs almost as a "partner and counselor" to the firm. Note also that while the use of 60-day commercial paper is more expensive than the use of 30-day paper, it provides more flexibility in the event the money is needed for more than 30 days. However, the line of credit provides even more flexibility than the 60-day commercial paper and at a lower cost.

SPREADSHEET PROBLEM

17-18 The detailed solution for the spreadsheet problem is available both on the instructor's resource CD-ROM and on the instructor's side of the Harcourt College Publishers' web site, <http://www.harcourtcollege.com/finance/brigham>.

CYBERPROBLEM

17-19 The detailed solution for the cyberproblem is available on the instructor's side of the Harcourt College Publishers' web site, <http://www.harcourtcollege.com/finance/brigham>.

INTEGRATED CASE

Bats and Balls Inc.

Working Capital Financing Policy

17-20 BATS AND BALLS (B&B) INC., A BASEBALL EQUIPMENT MANUFACTURER, IS A SMALL COMPANY WITH SEASONAL SALES. EACH YEAR BEFORE THE BASEBALL SEASON, B&B PURCHASES INVENTORY THAT IS FINANCED THROUGH A COMBINATION OF TRADE CREDIT AND SHORT-TERM BANK LOANS. AT THE END OF THE SEASON, B&B USES SALES REVENUES TO REPAY ITS SHORT-TERM OBLIGATIONS. THE COMPANY IS ALWAYS LOOKING FOR WAYS TO BECOME MORE PROFITABLE, AND SENIOR MANAGEMENT HAS ASKED ONE OF ITS EMPLOYEES, ANN TAYLOR, TO REVIEW THE COMPANY'S CURRENT ASSET FINANCING POLICIES. PUTTING TOGETHER HER REPORT, ANN IS TRYING TO ANSWER EACH OF THE FOLLOWING QUESTIONS:

A. B&B TRIES TO MATCH THE MATURITY OF ITS ASSETS AND LIABILITIES. DESCRIBE HOW B&B COULD ADOPT EITHER A MORE AGGRESSIVE OR MORE CONSERVATIVE FINANCING POLICY.

ANSWER: [SHOW S17-1 THROUGH S17-4 HERE.] THERE ARE THREE ALTERNATIVE CURRENT ASSET FINANCING POLICIES: AGGRESSIVE, MODERATE, AND RELAXED. A MODERATE FINANCING POLICY MATCHES ASSET AND LIABILITY MATURITIES. (OF COURSE EXACT MATURITY MATCHING IS NOT POSSIBLE BECAUSE OF (1) THE UNCERTAINTY OF ASSET LIVES AND (2) SOME COMMON EQUITY MUST BE USED AND COMMON EQUITY HAS NO MATURITY.) WITH THIS STRATEGY, THE FIRM MINIMIZES ITS RISK THAT IT WILL BE UNABLE TO PAY OFF MATURING OBLIGATIONS. AN AGGRESSIVE FINANCING POLICY OCCURS WHEN THE FIRM FINANCES ALL OF ITS FIXED ASSETS WITH LONG-TERM CAPITAL, BUT PART OF ITS PERMANENT CURRENT ASSETS WITH SHORT-TERM, NONSPONTANEOUS CREDIT. THERE ARE DEGREES OF AGGRESSIVENESS, IN FACT, A FIRM COULD CHOOSE TO FINANCE ALL OF ITS PERMANENT CURRENT ASSETS AND PART OF ITS FIXED ASSETS WITH SHORT-TERM CREDIT; THIS WOULD BE A HIGHLY AGGRESSIVE POSITION, AND ONE THAT WOULD SUBJECT THE FIRM TO THE DANGERS OF RISING INTEREST RATES AS WELL AS TO LOAN RENEWAL PROBLEMS. A CONSERVATIVE FINANCING POLICY OCCURS WHEN THE FIRM FINANCES ALL OF ITS PERMANENT ASSET REQUIREMENTS AND SOME OF ITS SEASONAL DEMANDS WITH PERMANENT CAPITAL. THIS POSITION IS A VERY SAFE

ONE. THEREFORE, AN AGGRESSIVE FINANCING POLICY USES THE GREATEST AMOUNT OF SHORT-TERM DEBT, WHILE THE CONSERVATIVE POLICY USES THE LEAST. THE MATURITY MATCHING POLICY FALLS BETWEEN THESE TWO POLICIES.

B. WHAT ARE THE ADVANTAGES AND DISADVANTAGES OF USING SHORT-TERM CREDIT AS A SOURCE OF FINANCING?

ANSWER: [SHOW S17-5 AND S17-6 HERE.] ALTHOUGH USING SHORT-TERM CREDIT IS GENERALLY RISKIER THAN USING LONG-TERM CREDIT, SHORT-TERM CREDIT DOES HAVE SOME SIGNIFICANT ADVANTAGES. A SHORT-TERM LOAN CAN BE OBTAINED MUCH FASTER THAN LONG-TERM CREDIT. LENDERS INSIST ON A MORE THOROUGH FINANCIAL EXAMINATION BEFORE EXTENDING LONG-TERM CREDIT. IF A FIRM'S NEEDS FOR FUNDS ARE SEASONAL OR CYCLICAL, IT MAY NOT WANT TO COMMIT TO LONG-TERM DEBT BECAUSE: (1) FLOTATION COSTS ARE GENERALLY HIGH FOR LONG-TERM DEBT BUT TRIVIAL FOR SHORT-TERM DEBT. (2) PREPAYMENT PENALTIES WITH LONG-TERM DEBT CAN BE EXPENSIVE. SHORT-TERM DEBT PROVIDES FLEXIBILITY. (3) LONG-TERM LOAN AGREEMENTS CONTAIN PROVISIONS THAT CONSTRAIN A FIRM'S FUTURE ACTIONS. SHORT-TERM CREDIT AGREEMENTS ARE LESS ONEROUS. (4) THE YIELD CURVE IS NORMALLY UPWARD SLOPING, INDICATING THAT INTEREST RATES ARE GENERALLY LOWER ON SHORT-TERM THAN ON LONG-TERM DEBT.

EVEN THOUGH SHORT-TERM DEBT IS OFTEN LESS EXPENSIVE THAN LONG-TERM DEBT, SHORT-TERM DEBT SUBJECTS THE FIRM TO MORE RISK THAN LONG-TERM FINANCING. THE REASONS FOR THIS ARE: (1) IF A FIRM USES LONG-TERM DEBT, ITS INTEREST COSTS WILL BE RELATIVELY STABLE OVER TIME; HOWEVER, IF THE FIRM USES SHORT-TERM DEBT, ITS INTEREST EXPENSE WILL FLUCTUATE WIDELY. (2) IF A FIRM BORROWS HEAVILY ON A SHORT-TERM BASIS, IT MAY FIND ITSELF UNABLE TO REPAY THIS DEBT, AND IT MAY BE IN SUCH A WEAK FINANCIAL POSITION THAT THE LENDER WILL NOT EXTEND THE LOAN, WHICH COULD FORCE THE FIRM INTO BANKRUPTCY.

C. IS IT LIKELY THAT B&B COULD MAKE SIGNIFICANTLY GREATER USE OF ACCRUALS?

ANSWER: [SHOW S17-7 HERE.] NO, B&B COULD NOT MAKE GREATER USE OF ITS ACCRUALS. ACCRUALS ARISE BECAUSE (1) WORKERS ARE PAID AFTER THEY HAVE ACTUALLY PROVIDED THEIR SERVICES, AND (2) TAXES ARE PAID AFTER THE PROFITS HAVE BEEN EARNED. THUS, ACCRUALS REPRESENT CASH OWED EITHER TO WORKERS OR

TO THE IRS. THE COST OF ACCRUALS IS GENERALLY CONSIDERED TO BE ZERO, SINCE NO EXPLICIT INTEREST MUST BE PAID ON THESE ITEMS.

THE AMOUNT OF ACCRUALS IS GENERALLY LIMITED BY THE AMOUNT OF WAGES PAID AND THE FIRM'S PROFITABILITY, AS WELL AS BY INDUSTRY CONVENTIONS REGARDING WHEN WAGE PAYMENTS ARE MADE AND IRS REGULATIONS REGARDING TAX PAYMENTS. (INCREASINGLY, CONGRESS IS PUTTING BUSINESSES ON A PAY-AS-YOU-GO, OR EVEN PAY-AHEAD-OF-TIME BASIS THROUGH THE USE OF ESTIMATED TAXES.) A FIRM CANNOT ORDINARILY CONTROL ITS ACCRUALS. FIRMS USE ALL THE ACCRUALS THEY CAN, BUT THEY HAVE LITTLE CONTROL OVER THE LEVELS OF THESE ACCOUNTS.

- D. ASSUME THAT B&B BUYS ON TERMS OF 1/10, NET 30, BUT THAT IT CAN GET AWAY WITH PAYING ON THE 40TH DAY IF IT CHOOSES NOT TO TAKE DISCOUNTS. ALSO, ASSUME THAT IT PURCHASES \$3 MILLION OF COMPONENTS PER YEAR, NET OF DISCOUNTS. HOW MUCH FREE TRADE CREDIT CAN THE COMPANY GET, HOW MUCH COSTLY TRADE CREDIT CAN IT GET, AND WHAT IS THE PERCENTAGE COST OF THE COSTLY CREDIT? SHOULD B&B TAKE DISCOUNTS?

ANSWER: [SHOW S17-8 THROUGH S17-14 HERE.] IF B&B'S NET PURCHASES ARE \$3,000,000 ANNUALLY, THEN, WITH A 1 PERCENT DISCOUNT, ITS GROSS PURCHASES ARE $\$3,000,000/0.99 = \$3,030,303$. IF WE ASSUME A 360-DAY YEAR, THEN NET DAILY PURCHASES FROM THIS SUPPLIER ARE $\$3,000,000/360 = \$8,333$.

IF THE DISCOUNT IS TAKEN, THEN B&B MUST PAY THIS SUPPLIER AT THE END OF DAY 10 FOR PURCHASES MADE ON DAY 1, ON DAY 11 FOR PURCHASES MADE ON DAY 2, AND SO ON. THUS, IN A STEADY STATE, B&B WILL ON AVERAGE HAVE 10 DAYS' WORTH OF PURCHASES IN PAYABLES, SO,

$$\text{PAYABLES} = 10(\$8,333) = \$83,333.$$

IF THE DISCOUNT IS NOT TAKEN, THEN B&B WILL WAIT 40 DAYS BEFORE PAYING, SO

$$\text{PAYABLES} = 40(\$8,333) = \$333,333.$$

THEREFORE:

TRADE CREDIT IF DISCOUNTS ARE NOT TAKEN: $\$333,333 = \text{TOTAL TRADE CREDIT}$
TRADE CREDIT IF DISCOUNTS ARE TAKEN: $\underline{- 83,333} = \text{FREE TRADE CREDIT}$

DIFFERENCE: $\underline{\$250,000}$ = COSTLY TRADE CREDIT
 TO OBTAIN \$250,000 OF COSTLY TRADE CREDIT, B&B MUST GIVE UP
 $0.01(\$3,030,303) = \$30,303$ IN LOST DISCOUNTS ANNUALLY. SINCE THE
 FORGONE DISCOUNTS PAY FOR \$250,000 OF CREDIT, THE NOMINAL ANNUAL
 INTEREST RATE IS 12.12 PERCENT:

$$\frac{\$30,303}{\$250,000} = 0.1212 = 12.12\%$$

HERE IS A FORMULA THAT CAN BE USED TO FIND THE NOMINAL ANNUAL INTEREST
 RATE OF COSTLY TRADE CREDIT:

$$\text{NOMINAL COST OF TRADE CREDIT} = \frac{\text{DISCOUNT \%}}{1 - \text{DISCOUNT \%}} \times \frac{360}{\text{DAYS TAKEN} - \text{DISCOUNT PERIOD}}$$

IN THIS SITUATION,

$$\frac{1}{99} \times \frac{360}{40 - 10} = 0.0101 \times 12 = 0.1212 = 12.12\%$$

NOTE (1) THAT THE FORMULA GIVES THE SAME NOMINAL ANNUAL INTEREST RATE
 AS WAS CALCULATED EARLIER, (2) THAT THE FIRST TERM IS THE PERIODIC COST
 OF THE CREDIT (B&B SPENDS \$1 TO GET THE USE OF \$99), AND (3) THAT THE
 SECOND TERM IS THE NUMBER OF "SAVINGS PERIODS" PER YEAR (B&B DELAYS
 PAYMENT FOR $40 - 10 = 30$ DAYS), AND THERE ARE $360/30 = 12$ 30-DAY
 PERIODS IN A YEAR. THEREFORE, WE COULD CALCULATE THE EXACT EFFECTIVE
 ANNUAL INTEREST RATE AS: $\text{EFFECTIVE RATE} = (1.0101)^{12} - 1 = 12.82\%$.

IF B&B CAN OBTAIN FINANCING FROM ITS BANK (OR FROM OTHER SOURCES) AT
 AN INTEREST RATE OF LESS THAN 12.82 PERCENT, IT SHOULD BORROW THE FUNDS
 AND TAKE DISCOUNTS.

E. WOULD IT BE FEASIBLE FOR B&B TO FINANCE WITH COMMERCIAL PAPER?

ANSWER: [SHOW S17-15 HERE.] IT WOULD NOT BE FEASIBLE FOR B&B TO FINANCE WITH
 COMMERCIAL PAPER. COMMERCIAL PAPER IS UNSECURED, SHORT-TERM DEBT
 ISSUED BY LARGE, FINANCIALLY STRONG FIRMS AND SOLD PRIMARILY TO OTHER
 BUSINESS FIRMS, TO INSURANCE COMPANIES, TO PENSION FUNDS, TO MONEY
 MARKET MUTUAL FUNDS, AND TO BANKS. MATURITIES ARE GENERALLY 270 DAYS
 (9 MONTHS) OR LESS, BECAUSE SEC REGISTRATION IS REQUIRED ON MATURITIES
 BEYOND 270 DAYS. THERE IS A VERY ACTIVE, LIQUID MARKET FOR COMMERCIAL

PAPER, AND, SINCE THERE IS VIRTUALLY NO DEFAULT RISK, COMMERCIAL PAPER RATES ARE GENERALLY LESS THAN THE PRIME RATE, AND NOT MUCH MORE THAN THE T-BILL RATE. NOTE, THOUGH, THAT ISSUERS OF COMMERCIAL PAPER ARE REQUIRED TO HAVE BACK-UP LINES OF BANK CREDIT THAT CAN BE USED TO PAY OFF THE PAPER IF NEED BE WHEN IT MATURES. THESE BACK-UP CREDIT LINES HAVE A COST, AND THIS COST MUST BE ADDED TO THE INTEREST RATE ON THE PAPER TO DETERMINE ITS EFFECTIVE COST. SINCE ONLY LARGE, WELL-KNOWN, FINANCIALLY STRONG COMPANIES CAN ISSUE COMMERCIAL PAPER, IT WOULD BE IMPOSSIBLE FOR B&B TO TAP THIS MARKET.

F. SUPPOSE B&B DECIDED TO RAISE AN ADDITIONAL \$100,000 AS A 1-YEAR LOAN FROM ITS BANK, FOR WHICH IT WAS QUOTED A RATE OF 8 PERCENT. WHAT IS THE EFFECTIVE ANNUAL COST RATE ASSUMING (1) SIMPLE INTEREST, (2) DISCOUNT INTEREST, (3) DISCOUNT INTEREST WITH A 10 PERCENT COMPENSATING BALANCE, AND (4) ADD-ON INTEREST ON A 12-MONTH INSTALLMENT LOAN? FOR THE FIRST THREE OF THESE ASSUMPTIONS, WOULD IT MATTER IF THE LOAN WERE FOR 90 DAYS, BUT RENEWABLE, RATHER THAN FOR A YEAR?

ANSWER: [SHOW S17-16 THROUGH S17-28 HERE.]

1. WITH A SIMPLE INTEREST LOAN, B&B GETS THE FULL USE OF THE \$100,000 FOR A YEAR, AND THEN PAYS $0.08(\$100,000) = \$8,000$ IN INTEREST AT THE END OF THE TERM, ALONG WITH THE \$100,000 PRINCIPAL REPAYMENT. FOR A 1-YEAR SIMPLE INTEREST LOAN, THE NOMINAL RATE, 8 PERCENT, IS ALSO THE EFFECTIVE ANNUAL RATE.

2. ON A DISCOUNT INTEREST LOAN, THE BANK DEDUCTS THE INTEREST FROM THE FACE AMOUNT OF THE LOAN IN ADVANCE; THAT IS, THE BANK "DISCOUNTS" THE LOAN. IF THE LOAN HAD A \$100,000 FACE AMOUNT, THEN THE $0.08(\$100,000) = \$8,000$ WOULD BE DEDUCTED UP FRONT, SO THE BORROWER WOULD HAVE THE USE OF ONLY $\$100,000 - \$8,000 = \$92,000$. AT THE END OF THE YEAR, THE BORROWER MUST REPAY THE \$100,000 FACE AMOUNT. THUS, THE EFFECTIVE ANNUAL RATE IS 8.7 PERCENT:

$$\text{EFFECTIVE RATE} = \frac{\$8,000}{\$92,000} = 0.087 = 8.7\%.$$

NOTE THAT A TIME LINE CAN ALSO BE USED TO CALCULATE THE EFFECTIVE ANNUAL RATE OF 1-YEAR DISCOUNT LOAN:

0	i = ?	1

100,000		-100,000
<u>-8,000</u>	(DISCOUNT INTEREST)	
<u>92,000</u>		

WITH A FINANCIAL CALCULATOR, ENTER N = 1, PV = 92000, PMT = 0, AND FV = -100000 TO SOLVE FOR I = 8.6957% . 8.7%.

3. IF THE LOAN IS A DISCOUNT LOAN, AND A COMPENSATING BALANCE IS ALSO REQUIRED, THEN THE EFFECTIVE RATE IS CALCULATED AS FOLLOWS:

$$\text{AMOUNT BORROWED} = \frac{\$100,000}{1 - 0.08 - 0.1} = \$121,951.22.$$

0	i = ?	1

121,951.22		-121,951.22
- 9,756.10	(DISCOUNT INTEREST)	<u>12,195.12</u>
<u>-12,195.12</u>	(COMPENSATING BALANCE)	<u>-109,756.10</u>
<u>100,000.00</u>		

WITH A FINANCIAL CALCULATOR, ENTER N = 1, PV = 100000, PMT = 0, AND FV = -109756.10 TO SOLVE FOR I = 9.7561% . 9.76%.

4. IN AN INSTALLMENT (ADD-ON) LOAN, THE INTEREST IS CALCULATED AND ADDED ON TO THE REQUIRED CASH AMOUNT, AND THEN THIS SUM IS THE FACE AMOUNT OF LOAN, AND IT IS AMORTIZED BY EQUAL PAYMENTS OVER THE STATED LIFE. THUS, THE INTEREST WOULD BE $\$100,000 \times 0.08 = \$8,000$, THE FACE AMOUNT WOULD BE $\$108,000$, AND EACH MONTHLY PAYMENT WOULD BE $\$9,000$: $\$108,000/12 = \$9,000$.

HOWEVER, THE FIRM WOULD RECEIVE ONLY $\$100,000$, AND IT MUST BEGIN TO REPAY THE PRINCIPAL AFTER ONLY ONE MONTH. THUS, IT WOULD GET THE USE OF $\$100,000$ IN THE FIRST MONTH, THE USE OF $\$100,000 - \$9,000 = \$91,000$ IN THE SECOND MONTH, AND SO ON, FOR AN AVERAGE OF $\$100,000/2 = \$50,000$ OVER THE YEAR. SINCE THE INTEREST EXPENSE IS $\$8,000$, THE APPROXIMATE COST IS 16 PERCENT, OR TWICE THE STATED RATE:

$$\text{APPROXIMATE COST} = \frac{\text{INTEREST}}{\text{AMOUNT RECEIVED}/2} = \frac{\$8,000}{\$50,000} = 0.16 = 16\%.$$

TO FIND THE EXACT EFFECTIVE ANNUAL RATE, RECOGNIZE THAT B&B HAS RECEIVED \$100,000 AND MUST MAKE 12 MONTHLY PAYMENTS OF \$9,000:

$$PV = \sum_{t=1}^{12} \frac{PMT}{(1+i)^t}$$

$$100,000 = \sum_{t=1}^{12} \frac{\$9,000}{(1+i)^t}.$$

ENTER IN $N = 12$, $PV = 100000$, $PMT = -9000$, AND $FV = 0$, IN A FINANCIAL CALCULATOR, WE FIND THE MONTHLY RATE TO BE 1.2043 PERCENT, WHICH CONVERTS TO AN EFFECTIVE ANNUAL RATE OF 15.45 PERCENT:

$$(1.012043)^{12} - 1.0 = 0.1545 = 15.45\%,$$

WHICH IS CLOSE TO THE 16 PERCENT APPROXIMATE ANNUAL INTEREST RATE. IF THE LOAN WERE FOR 90 DAYS:

1. SIMPLE INTEREST. B&B WOULD HAVE HAD TO PAY $(0.08/4)(\$100,000) = 0.02(\$100,000) = \$2,000$ IN INTEREST AFTER 3 MONTHS, PLUS REPAY THE PRINCIPAL. IN THIS CASE THE NOMINAL 2 PERCENT RATE MUST BE CONVERTED TO AN ANNUAL RATE, AND THE EFFECTIVE ANNUAL RATE IS 8.24 PERCENT:

$$EAR_{\text{SIMPLE}} = (1.02)^4 - 1 = 1.0824 - 1 = 0.0824 = 8.24\%.$$

IN GENERAL, THE SHORTER THE MATURITY (WITHIN A YEAR), THE HIGHER THE EFFECTIVE COST OF A SIMPLE LOAN.

2. DISCOUNT INTEREST. IF B&B BORROWS \$100,000 FACE VALUE AT A NOMINAL RATE OF 8 PERCENT, DISCOUNT INTEREST, FOR 3 MONTHS, THEN $m = 12/3 = 4$, AND THE INTEREST PAYMENT IS $(0.08/4)(\$100,000) = \$2,000$, SO

$$EAR_{\text{DISCOUNT}} = \left(1.0 + \frac{\$2,000}{\$100,000 - \$2,000} \right)^4 - 1$$

$$= (1.0204)^4 - 1 = 0.0842 = 8.42\%.$$

DISCOUNT INTEREST IMPOSES LESS OF A PENALTY ON SHORTER-TERM THAN ON LONGER-TERM LOANS.

3. DISCOUNT INTEREST WITH COMPENSATING BALANCE. EVERYTHING IS THE SAME AS IN #2 ABOVE, EXCEPT THAT WE MUST ADD THE COMPENSATING BALANCE TERM TO THE DENOMINATOR.

$$\begin{aligned} \text{EAR} &= \left(1.0 + \frac{\$2,000}{\$100,000 - \$2,000 - \$10,000} \right)^4 - 1 \\ &= (1.0227)^4 - 1 = 0.0941 = 9.41\%. \end{aligned}$$

G. HOW LARGE WOULD THE LOAN ACTUALLY BE IN EACH OF THE CASES IN PART F?

ANSWER: SIMPLE INTEREST. THE FACE VALUE OF THE LOAN WOULD BE \$100,000.

DISCOUNT INTEREST. THE FACE VALUE OF THE LOAN IS CALCULATED AS:

$$\text{FACE VALUE} = \frac{\text{FUNDS REQUIRED}}{1 - \text{NOMINAL RATE}} = \frac{\$100,000}{1 - 0.08} = \$108,695.65.$$

DISCOUNT INTEREST WITH COMPENSATING BALANCE. THE FACE VALUE OF THE LOAN IS CALCULATED AS:

$$\text{FACE VALUE} = \frac{\text{FUNDS REQUIRED}}{1 - \text{NOMINAL RATE} - \text{CB}} = \frac{\$100,000}{1 - 0.08 - 0.10} = \$121,951.22.$$

INSTALLMENT LOAN. THE FACE VALUE OF THE LOAN IS \$100,000. NOTE THAT B&B WOULD ONLY HAVE FULL USE OF THE \$100,000 FOR THE FIRST MONTH AND, OVER THE COURSE OF THE YEAR, IT WOULD ONLY HAVE APPROXIMATE USE OF $\$100,000/2 = \$50,000$.

QUARTERLY BASIS: SIMPLE INTEREST. THE FACE VALUE OF THE LOAN IS \$100,000.

DISCOUNT INTEREST. THE FACE VALUE IS CALCULATED AS:

$$\text{FACE VALUE} = \frac{\text{FUNDS REQUIRED}}{1 - \text{NOMINAL RATE}} = \frac{\$100,000}{1 - 0.02} = \$102,040.82.$$

DISCOUNT INTEREST WITH COMPENSATING BALANCE. THE FACE VALUE OF THE LOAN IS CALCULATED AS:

$$\text{FACE VALUE} = \frac{\text{FUNDS REQUIRED}}{1 - \text{NOMINAL RATE} - \text{CB}} = \frac{\$100,000}{1 - 0.02 - 0.10} = \$113,636.36.$$

H. WHAT ARE THE PROS AND CONS OF BORROWING ON A SECURED VERSUS AN UNSECURED BASIS? IF INVENTORIES OR RECEIVABLES ARE TO BE USED AS COLLATERAL, HOW WOULD THE LOAN BE HANDLED?

ANSWER: [SHOW S17-29 THROUGH S17-32 HERE.] GIVEN A CHOICE, IT IS ORDINARILY BETTER TO BORROW ON AN UNSECURED BASIS, SINCE THE BOOKKEEPING COSTS OF SECURED LOANS ARE OFTEN HIGH. HOWEVER, WEAK FIRMS MAY FIND THAT THEY CAN BORROW ONLY IF THEY PUT UP SOME TYPE OF SECURITY TO PROTECT THE LENDER, OR THAT BY USING SECURITY THEY CAN BORROW AT A MUCH LOWER RATE.

MOST SECURED SHORT-TERM BUSINESS BORROWING INVOLVES THE USE OF ACCOUNTS RECEIVABLE AND INVENTORY AS COLLATERAL. IF RECEIVABLES ARE USED TO SECURE A LOAN THEY MAY BE PLEDGED OR FACTORED.

WHEN RECEIVABLES ARE PLEDGED, THE BORROWER PLEDGES THEM AS COLLATERAL ON THE LOAN. USUALLY, THE LENDER MAKES AN INITIAL CREDIT APPRAISAL OF THE INVOICES PLEDGED, AND WILL NOT ACCEPT INVOICES FROM BUYERS THAT HAVE POOR CREDIT RATINGS. THE LENDER THEN PERIODICALLY REVIEWS THE INVOICES TO ENSURE THAT THEY REMAIN CREDIT WORTHY. FURTHER, THE LENDER MAY LEND LESS THAN THE INVOICE AMOUNT, SAY 75 PERCENT. FINALLY, THE LENDER STILL RETAINS RECOURSE AGAINST THE BORROWER (THE SELLER), SO THE LOAN MUST BE PAID ACCORDING TO THE TERMS OF THE LOAN AGREEMENT EVEN IF ONE OR MORE OF THE INVOICES BECOME BAD DEBTS.

IN A FACTORING ARRANGEMENT, THE LENDER, CALLED A FACTOR, ACTUALLY BUYS THE RECEIVABLES. HERE, EACH BUYER'S ORDER IS SENT TO THE FACTOR FOR APPROVAL. WHEN AN ORDER IS APPROVED, SHIPMENT IS MADE, AND THE BUYER IS INSTRUCTED TO MAKE PAYMENT DIRECTLY TO THE FACTOR. IF THE FACTOR DOES NOT APPROVE THE CREDIT, THE SELLER GENERALLY REFUSES THE ORDER, FOR THE FACTOR WILL NOT PROVIDE FINANCING. THE FACTOR NORMALLY PROVIDES THREE SERVICES: (1) CREDIT CHECKING, (2) LENDING, AND (3) RISK BEARING. ALTHOUGH THE FACTOR WILL CHARGE FOR THESE SERVICES, IT MAY BE LESS COSTLY FOR SMALLER FIRMS TO EMPLOY A FACTOR THAN TO SET UP A CREDIT DEPARTMENT. A FACTORING ARRANGEMENT (AND TO A CERTAIN EXTENT THE PLEDGING OF RECEIVABLES) REDUCES THE CASH CONVERSION CYCLE, BUT AT A COST.

IF INVENTORY IS USED TO SECURE A LOAN, THERE MAY BE A BLANKET LIEN, A TRUST RECEIPT, OR A WAREHOUSE RECEIPT SYSTEM. BLANKET LIENS ARE ONE WAY OF PLEDGING INVENTORY AS COLLATERAL. WITH A BLANKET LIEN, THE LENDER HAS A LIEN AGAINST ALL THE BORROWER'S INVENTORY, BUT THE

BORROWER IS FREE TO SELL THE INVENTORY, AND, HENCE, THEY CAN BE REDUCED BELOW THE LEVEL THAT EXISTED WHEN THE SECURED LOAN WAS GRANTED.

IN A TRUST RECEIPT ARRANGEMENT, EACH INDIVIDUAL ITEM OF INVENTORY IS IDENTIFIED AND HELD IN TRUST FOR THE LENDER. WHEN AN ITEM IS SOLD, THE LOAN ON THAT PARTICULAR ITEM MUST BE PAID OFF, USUALLY BY THE END OF THAT DAY. SINCE EACH ITEM IS IDENTIFIED, THE TRUST RECEIPT SYSTEM IS ONLY WORKABLE FOR BIG TICKET ITEMS. AUTOMOBILE DEALERS OFTEN USE TRUST RECEIPTS. THE LENDER PERIODICALLY INVENTORIES THE ITEMS HELD IN TRUST TO ENSURE THAT THE BORROWER IS ABIDING BY THE LOAN AGREEMENT.

IN A WAREHOUSE RECEIPT SYSTEM, THE INVENTORY ITEMS ARE PLACED UNDER CONTROL OF A THIRD PARTY. THE BORROWER CANNOT REMOVE GOODS FROM THE WAREHOUSE UNTIL THE LENDER HAS BEEN REPAID, SO THE WAREHOUSE OPERATOR PROVIDES PROTECTION FOR THE LENDER. THIS TYPE OF FINANCING IS OFTEN USED FOR SMALL, NONPERISHABLE ITEMS SUCH AS CANNED GOODS. IT IS ALSO OFTEN USED ON ITEMS THAT MUST AGE, SUCH AS TOBACCO AND ALCOHOL.