IDA MUSDAFIA IBRAHIM.,SE.,M.M

Manajemen Keuangan II (3 SKS)

No	Mahasiswa	Foto	01	02	03	04	05	06	07	08	09	10	11	12	13	14
								2020-04-16	2020-04-23	2020-05-14	2020-06-04			2020-06-25	2020-07-02	2020-07-09
1	2018031009 CLIVF JONATHAN		(-)	(-)	(-)	(-)	(-)	Hadir	Hadir	Hadir	Hadir	(-)	(-)	Hadir	Hadir	Hadir
2	2018031019 CHARISSA HELSJE SWEETLYALA		(-)	(-)	(-)	(-)	(-)	Hadir	Hadir	Hadir	Hadir	(-)	(-)	Hadir	Hadir	Hadir
3	2018031023 GREGORIUS BIMA		(-)	(-)	(-)	(-)	Hadir	Hadir	Hadir	Hadir	Hadir	(-)	(-)	Hadir	Hadir	Hadir
4	2018031031 BAGUS ARYO MUWAFFAQ DZULFIQAR		(-)	(-)	(-)	(-)	(-)	Hadir	Hadir	Hadir	Hadir	(-)	(-)	Hadir	Hadir	Hadir
5	2018031040 MUHAMMAD RIZKI FARIDIANSYAH AZIZ		(-)	(-)	(-)	(-)	(-)	Hadir	Hadir	Hadir	Hadir	(-)	(-)	Hadir	Hadir	Hadir
6	2018031041 VERA YUNIAR		(-)	(-)	(-)	(-)	(-)	Hadir	Hadir	Hadir	Hadir	(-)	(-)	Hadir	Hadir	Hadir
7	2018031042 MEGA YANA		(-)	(-)	(-)	(-)	(-)	Hadir	Hadir	Hadir	Hadir	(-)	(-)	Hadir	Hadir	Hadir
8	2018031052 WORONURUL HALIZA		(-)	(-)	(-)	(-)	(-)	Hadir	Hadir	(-)	Hadir	(-)	(-)	Hadir	Hadir	Hadir
9	2018031055 YASMIN BINTI BADAR MAHRI		(-)	(-)	(-)	(-)	(-)	Hadir	Hadir	Hadir	Hadir	(-)	(-)	Hadir	Hadir	Hadir
10	2018031056 ANTONIUS KURNIAWAN ANDIKA JINGI		(-)	(-)	(-)	(-)	(-)	Hadir	Hadir	Hadir	Hadir	(-)	(-)	Hadir	Hadir	Hadir
11	2018031067 FELIA CICILIA PANGAU		(-)	(-)	(-)	(-)	(-)	Hadir	Hadir	Hadir	Hadir	(-)	(-)	Hadir	Hadir	Hadir
12	2018031071 ERIEF ADITIA PERMANA		(-)	(-)	(-)	(-)	(-)	Hadir	Hadir	Hadir	Hadir	(-)	(-)	Hadir	Hadir	Hadir
13	2018031072 MARVIANA ROSA SATE UJAN		(-)	(-)	(-)	(-)	(-)	Hadir	Hadir	Hadir	Hadir	(-)	(-)	Hadir	Hadir	Hadir
14	2018031073 FADILAH AKBAR		(-)	(-)	(-)	(-)	(-)	Hadir	Hadir	Hadir	Hadir	(-)	(-)	(-)	Hadir	Hadir
15	2018031089 MUHAMMAD FIKRI		(-)	(-)	(-)	(-)	(-)	Hadir	Hadir	Hadir	Hadir	(-)	(-)	Hadir	(-)	Hadir
16	2018031096 MARIA LIDWINA SUKARTA		(-)	(-)	(-)	(-)	(-)	Hadir	Hadir	Hadir	Hadir	(-)	(-)	Hadir	Hadir	Hadir

No	Mahasiswa	Foto	01	02	03	04	05	06	07	08	09	10	11	12	13	14
								2020-04-16	2020-04-23	2020-05-14	2020-06-04			2020-06-25	2020-07-02	2020-07-09
17	2018031098 DENTA WULANDARI GONSIERAD		(-)	(-)	(-)	(-)	(-)	Hadir	Hadir	Hadir	Hadir	(-)	(-)	Hadir	Hadir	Hadir
18	2019131014 DIMAS LUTHFIANTO		(-)	(-)	(-)	(-)	(-)	Hadir	Hadir	Hadir	Hadir	(-)	(-)	Hadir	Hadir	Hadir

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Dosen : IDA MUSDAFIA IBRAHIM.,SE.,M.M

Manajemen Keuangan II (3 SKS)

KAMIS 07:50 - 10:20

NO.	NIM	NAMA	FOTO	NILAI UAS	NILAI UTS	NILAI TUGAS	TOTAL
1	2018031009	CLIVF JONATHAN		88 (40%)	80 (30%)	75 (30%)	81.7
2	2018031019	CHARISSA HELSJE SWEETLYALA		88 (40%)	80 (30%)	75 (30%)	81.7
3	2018031023	GREGORIUS BIMA		100 (40%)	75 (30%)	75 (30%)	85
4	2018031031	BAGUS ARYO MUHAFIQ DZULFIQAR		100 (40%)	80 (30%)	80 (30%)	88
5	2018031040	MUHAMMAD RIZKI FARIDIANSYAH AZIZ		98 (40%)	80 (30%)	75 (30%)	85.7
6	2018031041	VERA YUNIAR		98 (40%)	95 (30%)	95 (30%)	96.2
7	2018031042	MEGA YANA		98 (40%)	85 (30%)	90 (30%)	91.7
8	2018031052	WORONURUL HALIZA		94 (40%)	80 (30%)	85 (30%)	87.1
9	2018031055	YASMIN BINTI BADAR MAHRI		90 (40%)	80 (30%)	85 (30%)	85.5
10	2018031056	ANTONIUS KURNIAWAN ANDIKA JINGI		90 (40%)	80 (30%)	75 (30%)	82.5
11	2018031067	FELIA CIGILIA PANGAU		98 (40%)	75 (30%)	80 (30%)	85.7
12	2018031071	ERIEF ADITIA PERMANA		98 (40%)	70 (30%)	80 (30%)	84.2
13	2018031072	MARVIANA ROSA SATE UJAN		100 (40%)	75 (30%)	90 (30%)	89.5
14	2018031073	FADILAH AKBAR		100 (40%)	75 (30%)	75 (30%)	85

NO.	NIM	NAMA	FOTO	NILAI UAS	NILAI UTS	NILAI TUGAS	TOTAL
15	2018031089	MUHAMMAD FIKRI		100 (40%)	75 (30%)	75 (30%)	85
16	2018031096	MARIA LIDWINA SUKARTA		98 (40%)	80 (30%)	80 (30%)	87.2
17	2018031098	DENTA WULANDARI GONSIERAD		100 (40%)	80 (30%)	80 (30%)	88
18	2019131014	DIMAS LUTHFIANTO		96 (40%)	75 (30%)	90 (30%)	87.9

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Answers to Warm-Up Exercises

E8-1. Total annual return

Answer: ($0 + $12,000 − $10,000) ÷ $10,000 = $2,000 ÷ $10,000 = 20%

Logistics, Inc. doubled the annual rate of return predicted by the analyst. The negative net income is irrelevant to the problem.

E8-2. Expected return

Answer:

Analyst	Probability	Return	Weighted Value
1	0.35	5%	1.75%
2	0.05	–5%	–0.25%
3	0.20	10%	2.0%
4	0.40	3%	1.2%
Total	1.00	Expected return	4.70%

E8-3. Comparing the risk of two investments

Answer: $CV_1 = 0.10 \div 0.15 = 0.6667 \quad CV_2 = 0.05 \div 0.12 = 0.4167$

Based solely on standard deviations, Investment 2 has lower risk than Investment 1. Based on coefficients of variation, Investment 2 is still less risky than Investment 1. Since the two investments have different expected returns, using the coefficient of variation to assess risk is better than simply comparing standard deviations because the coefficient of variation considers the relative size of the expected returns of each investment.

E8-4. Computing the expected return of a portfolio

Answer: $r_p = (0.45 \times 0.038) + (0.4 \times 0.123) + (0.15 \times 0.174)$

$= (0.0171) + (0.0492) + (0.0261 = 0.0924 = 9.24\%$

The portfolio is expected to have a return of approximately 9.2%.

E8-5. Calculating a portfolio beta

Answer:

Beta = $(0.20 \times 1.15) + (0.10 \times 0.85) + (0.15 \times 1.60) + (0.20 \times 1.35) + (0.35 \times 1.85)$

$= 0.2300 + 0.0850 + 0.2400 + 0.2700 + 0.6475 = 1.4725$

E8-6. Calculating the required rate of return

Answer:

a. Required return = 0.05 + 1.8 (0.10 − 0.05) = 0.05 + 0.09 = 0.14

b. Required return = 0.05 + 1.8 (0.13 − 0.05) = 0.05 + 0.144 = 0.194

c. Although the risk-free rate does not change, as the market return increases, the required return on the asset rises by 180% of the change in the market's return.

■ Solutions to Problems

P8-1. Rate of return: $r_t = \dfrac{(P_t - P_{t-1} + C_t)}{P_{t-1}}$

LG 1; Basic

a. **Investment X:** Return $= \dfrac{(\$21{,}000 - \$20{,}000 + \$1{,}500)}{\$20{,}000} = 12.50\%$

Investment Y: Return $= \dfrac{(\$55{,}000 - \$55{,}000 + \$6{,}800)}{\$55{,}000} = 12.36\%$

b. Investment X should be selected because it has a higher rate of return for the same level of risk.

P8-2. Return calculations: $r_t = \dfrac{(P_t - P_{t-1} + C_t)}{P}$

LG 1; Basic

Investment	Calculation	r_t(%)
A	($1,100 – $800 – $100) ÷ $800	25.00
B	($118,000 – $120,000 + $15,000) ÷ $120,000	10.83
C	($48,000 – $45,000 + $7,000) ÷ $45,000	22.22
D	($500 – $600 + $80) ÷ $600	–3.33
E	($12,400 – $12,500 + $1,500) ÷ $12,500	11.20

P8-3. Risk preferences

LG 1; Intermediate

a. The risk-neutral manager would accept Investments X and Y because these have higher returns than the 12% required return and the risk doesn't matter.

b. The risk-averse manager would accept Investment X because it provides the highest return and has the lowest amount of risk. Investment X offers an increase in return for taking on more risk than what the firm currently earns.

c. The risk-seeking manager would accept Investments Y and Z because he or she is willing to take greater risk without an increase in return.

d. Traditionally, financial managers are risk averse and would choose Investment X, since it provides the required increase in return for an increase in risk.

P8-4. Risk analysis

LG 2; Intermediate

a.

Expansion	Range
A	24% – 16% = 8%
B	30% – 10% = 20%

b. Project A is less risky, since the range of outcomes for A is smaller than the range for Project B.

c. Since the most likely return for both projects is 20% and the initial investments are equal, the answer depends on your risk preference.

d. The answer is no longer clear, since it now involves a risk-return tradeoff. Project B has a slightly higher return but more risk, while A has both lower return and lower risk.

P8-5. Risk and probability

LG 2; Intermediate

a.

Camera	Range
R	30% – 20% = 10%
S	35% – 15% = 20%

b.

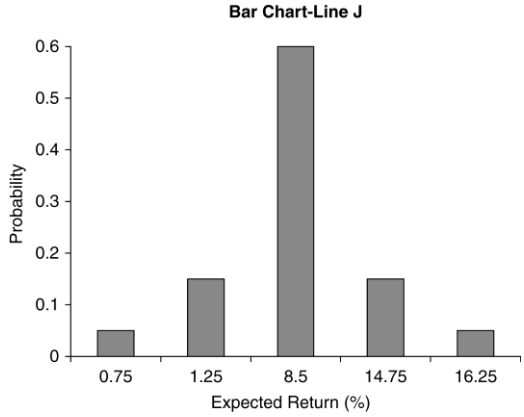
	Possible Outcomes	Probability P_{ri}	Expected Return r_i	Weighted Value (%)($r_i \times P_{ri}$)
Camera R	Pessimistic	0.25	20	5.00%
	Most likely	0.50	25	12.50%
	Optimistic	0.25	30	7.50%
		1.00	Expected return	25.00%
Camera S	Pessimistic	0.20	15	3.00%
	Most likely	0.55	25	13.75%
	Optimistic	0.25	35	8.75%
		1.00	Expected return	25.50%

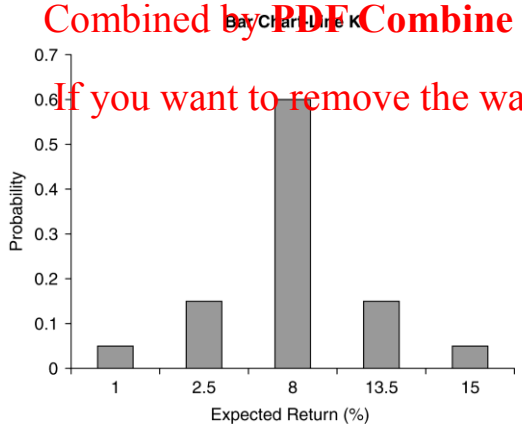
c. Camera S is considered more risky than Camera R because it has a much broader range of outcomes. The risk-return tradeoff is present because Camera S is more risky and also provides a higher return than Camera R.

P8-6. Bar charts and risk

LG 2; Intermediate

a.





b.

	Market Acceptance	Probability P_{ri}	Expected Return r_i	Weighted Value $(r_i \times P_{ri})$
Line J	Very Poor	0.05	0.0075	0.000375
	Poor	0.15	0.0125	0.001875
	Average	0.60	0.0850	0.051000
	Good	0.15	0.1475	0.022125
	Excellent	0.05	0.1625	0.008125
		1.00	Expected return	0.083500
Line K	Very Poor	0.05	0.010	0.000500
	Poor	0.15	0.025	0.003750
	Average	0.60	0.080	0.048000
	Good	0.15	0.135	0.020250
	Excellent	0.05	0.150	0.007500
		1.00	Expected return	0.080000

c. Line K appears less risky due to a slightly tighter distribution than line J, indicating a lower range of outcomes.

P8-7. Coefficient of variation: $CV = \frac{\sigma_r}{\bar{r}}$

LG 2: Basic

a. **A** $CV_A = \frac{7\%}{20\%} = 0.3500$

B $CV_B = \frac{9.5\%}{22\%} = 0.4318$

C $CV_C = \frac{6\%}{19\%} = 0.3158$

D $CV_D = \frac{5.5\%}{16\%} = 0.3438$

b. Asset C has the lowest coefficient of variation and is the least risky relative to the other choices.

P8-8. Standard deviation versus coefficient of variation as measures of risk

LG 2; Basic

a. Project A is least risky based on range with a value of 0.04.

b. The standard deviation measure fails to take into account both the volatility and the return of the investment. Investors would prefer higher return but less volatility, and the coefficient of variation provices a measure that takes into account both aspects of investors' preferences. Project D has the lowest CV, so it is the least risky investment relative to the return provided.

c. **A** $CV_A = \frac{0.029}{0.12} = 0.2417$

B $CV_B = \frac{0.032}{0.125} = 0.2560$

C $CV_C = \frac{0.035}{0.13} = 0.2692$

D $CV_D = \frac{0.030}{0.128} = 0.2344$

In this case Project D is the best alternative since it provides the least amount of risk for each percent of return earned. Coefficient of variation is probably the best measure in this instance since it provides a standardized method of measuring the risk-return tradeoff for investments with differing returns.

P8-9. Personal finance: Rate of return, standard deviation, coefficient of variation

LG 2; Challenge

a.

	Stock Price			Variance
Year	Beginning	End	Returns	(Return–Average Return)^2
2009	14.36	21.55	50.07%	0.0495
2010	21.55	64.78	200.60%	1.6459
2011	64.78	72.38	11.73%	0.3670
2012	72.38	91.80	26.83%	0.2068

b. Average return 72.31%

c.

Sum of variances	2.2692	
	3	Sample divisor (n – 1)
	0.7564	Variance
	86.97%	Standard deviation

d. 1.20 Coefficient of variation

e. The stock price of Hi-Tech, Inc. has definitely gone through some major price changes over this time period. It would have to be classified as a volatile security having an upward price trend over the past 4 years. Note how comparing securities on a *CV* basis allows the investor to put the stock in proper perspective. The stock is riskier than what Mike normally buys but if he believes that Hi-Tech, Inc. will continue to rise then he should include it. The coefficient of variation, however, is greater than the 0.90 target.

P8-10. Assessing return and risk

LG 2; Challenge

a. Project 257

(1) Range: 1.00 – (–0.10) = 1.10

(2) Expected return: $\bar{r} = \sum_{i=1}^{n} r_i \times P_{ri}$

Rate of Return r_i	**Probability** P_{ri}	**Weighted Value** $r_i \times P_{ri}$	**Expected Return** $\bar{r} = \sum_{i=1}^{n} r_i \times P_{ri}$
–0.10	0.01	–0.001	
0.10	0.04	0.004	
0.20	0.05	0.010	
0.30	0.10	0.030	
0.40	0.15	0.060	
0.45	0.30	0.135	
0.50	0.15	0.075	
0.60	0.10	0.060	
0.70	0.05	0.035	
0.80	0.04	0.032	
1.00	0.01	0.010	
	1.00		0.450

(3) Standard deviation: $\sigma = \sqrt{\sum_{i=1}^{n} (r_i - \bar{r})^2 \times P_{ri}}$

r_i	$\bar{r}$	$r_i - \bar{r}$	$(r_i - \bar{r})^2$	P_{ri}	$(r_i - \bar{r})^2 \times P_{ri}$
–0.10	0.450	–0.550	0.3025	0.01	0.003025
0.10	0.450	–0.350	0.1225	0.04	0.004900
0.20	0.450	–0.250	0.0625	0.05	0.003125
0.30	0.450	–0.150	0.0225	0.10	0.002250
0.40	0.450	–0.050	0.0025	0.15	0.000375
0.45	0.450	0.000	0.0000	0.30	0.000000
0.50	0.450	0.050	0.0025	0.15	0.000375
0.60	0.450	0.150	0.0225	0.10	0.002250
0.70	0.450	0.250	0.0625	0.05	0.003125
0.80	0.450	0.350	0.1225	0.04	0.004900
1.00	0.450	0.550	0.3025	0.01	0.003025
					0.027350

$\sigma_{\text{Project 257}} = \sqrt{0.027350} = 0.165378$

(4) $CV = \dfrac{0.165378}{0.450} = 0.3675$

Project 432

(1) Range: 0.50 – 0.10 = 0.40

(2) Expected return: $\bar{r} = \sum_{i=1}^{n} r_i \times P_{ri}$

Rate of Return r_i	Probability P_{ri}	Weighted Value $r_i \times P_{ri}$	Expected Return $\bar{r} = \sum_{i=1}^{n} r_i \times P_{ri}$
0.10	0.05	0.0050	
0.15	0.10	0.0150	
0.20	0.10	0.0200	
0.25	0.15	0.0375	
0.30	0.20	0.0600	
0.35	0.15	0.0525	
0.40	0.10	0.0400	
0.45	0.10	0.0450	
0.50	0.05	0.0250	
	1.00		0.300

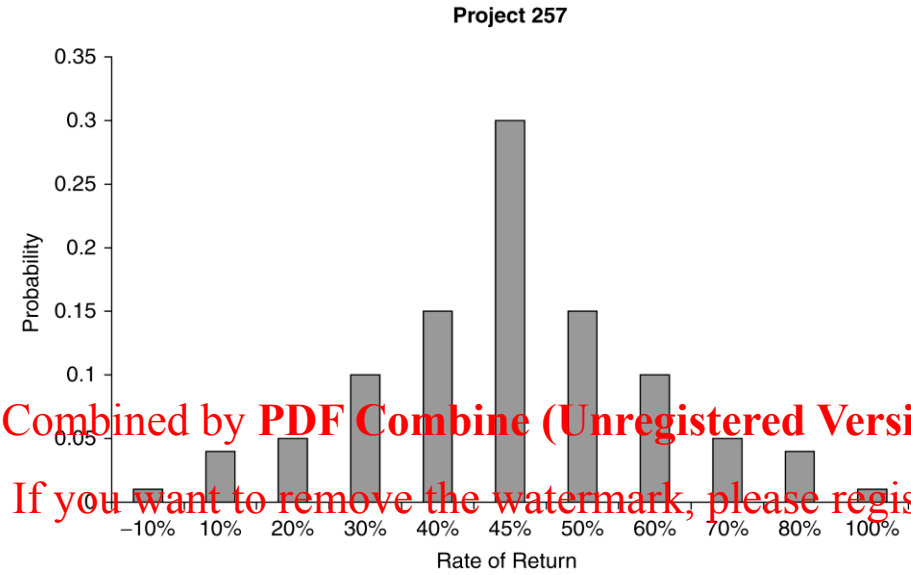
(3) Standard deviation: $\sigma = \sqrt{\sum_{i=1}^{n} (r_i - \bar{r})^2 \times P_{ri}}$

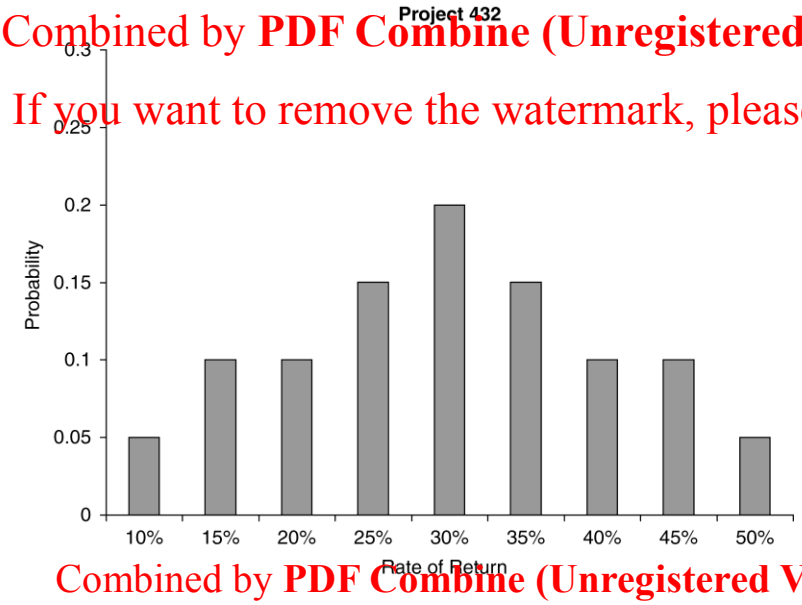
r_i	$\bar{r}$	$r_i - \bar{r}$	$(r_i - \bar{r})^2$	P_{ri}	$(r_i - \bar{r})^2 \times P_{ri}$
0.10	0.300	–0.20	0.0400	0.05	0.002000
0.15	0.300	–0.15	0.0225	0.10	0.002250
0.20	0.300	–0.10	0.0100	0.10	0.001000
0.25	0.300	–0.05	0.0025	0.15	0.000375
0.30	0.300	0.00	0.0000	0.20	0.000000
0.35	0.300	0.05	0.0025	0.15	0.000375
0.40	0.300	0.10	0.0100	0.10	0.001000
0.45	0.300	0.15	0.0225	0.10	0.002250
0.50	0.300	0.20	0.0400	0.05	0.002000
					0.011250

$\sigma_{\text{Project 432}} = \sqrt{0.011250} = 0.106066$

(4) $CV = \dfrac{0.106066}{0.300} = 0.3536$

b. Bar Charts





c. Summary statistics

	Project 257	Project 432
Range	1.100	0.400
Expected return ($\bar{r}$)	0.450	0.300
Standard deviation (σ_r)	0.165	0.106
Coefficient of variation (CV)	0.3675	0.3536

Since Projects 257 and 432 have differing expected values, the coefficient of variation should be the criterion by which the risk of the asset is judged. Since Project 432 has a smaller CV, it is the opportunity with lower risk.

P8-11. Integrative—expected return, standard deviation, and coefficient of variation

LG 2; Challenge

a. Expected return: $\bar{r} = \sum_{i=1}^{n} r_i \times P_{ri}$

	Rate of Return r_i	Probability P_{ri}	Weighted Value $r_i \times P_{ri}$	Expected Return $\bar{r} = \sum_{i=1}^{n} r_i \times P_{ri}$
Asset F	0.40	0.10	0.04	
	0.10	0.20	0.02	
	0.00	0.40	0.00	
	–0.05	0.20	–0.01	
	–0.10	0.10	–0.01	
				0.04

Continued

Asset G	0.35	0.40	0.14	
	0.10	0.30	0.03	
	–0.20	0.30	–0.06	
				0.11
Asset H	0.40	0.10	0.04	
	0.20	0.20	0.04	
	0.10	0.40	0.04	
	0.00	0.20	0.00	
	–0.20	0.10	–0.02	
				0.10

Asset G provides the largest expected return.

b. Standard deviation: $\sigma = \sqrt{\sum_{i=1}^{n} (r_i - \bar{r})^2 x P_{ri}}$

	$r_i - \bar{r}$	$(r_i - \bar{r})^2$	P_{ri}	σ^2	σ_r
Asset F	0.40 – 0.04 = 0.36	0.1296	0.10	0.01296	
	0.10 – 0.04 = 0.06	0.0036	0.20	0.00072	
	0.00 – 0.04 = –0.04	0.0016	0.40	0.00064	
	–0.05 – 0.04 = –0.09	0.0081	0.20	0.00162	
	–0.10 – 0.04 = –0.14	0.0196	0.10	0.00196	
				0.01790	0.1338
Asset G	0.35 – 0.11 = 0.24	0.0576	0.40	0.02304	
	0.10 – 0.11 = –0.01	0.0001	0.30	0.00003	
	–0.20 – 0.11 = –0.31	0.0961	0.30	0.02883	
				0.05190	0.2278
Asset H	0.40 – 0.10 = 0.30	0.0900	0.10	0.009	
	0.20 – 0.10 = 0.10	0.0100	0.20	0.002	
	0.10 – 0.10 = 0.00	0.0000	0.40	0.000	
	0.00 – 0.10 = –0.10	0.0100	0.20	0.002	
	–0.20 – 0.10 = –0.30	0.0900	0.10	0.009	
				0.022	0.1483

Based on standard deviation, Asset G appears to have the greatest risk, but it must be measured against its expected return with the statistical measure coefficient of variation, since the three assets have differing expected values. An incorrect conclusion about the risk of the assets could be drawn using only the standard deviation.

c. $\text{Coefficient of variation} = \dfrac{\text{standard deviation } (\sigma)}{\text{expected value}}$

Asset F: $CV = \dfrac{0.1338}{0.04} = 3.345$

Asset G: $CV = \dfrac{0.2278}{0.11} = 2.071$

Asset H: $CV = \dfrac{0.1483}{0.10} = 1.483$

As measured by the coefficient of variation, Asset F has the largest relative risk.

P8-12. Normal probability distribution

LG 2; Challenge

a. Coefficient of variation: $CV = \sigma_r \div \bar{r}$

Solving for standard deviation: $0.75 = \sigma_r \div 0.189$

$\sigma_r = 0.75 \times 0.189 = 0.14175$

b. (1) 68% of the outcomes will lie between ±1 standard deviation from the expected value:

$+1\sigma = 0.189 + 0.14175 = 0.33075$

$-1\sigma = 0.189 - 0.14175 = 0.04725$

(2) 95% of the outcomes will lie between ± 2 standard deviations from the expected value:

$+2\sigma = 0.189 + (2 \times 0.14175) = 0.4725$

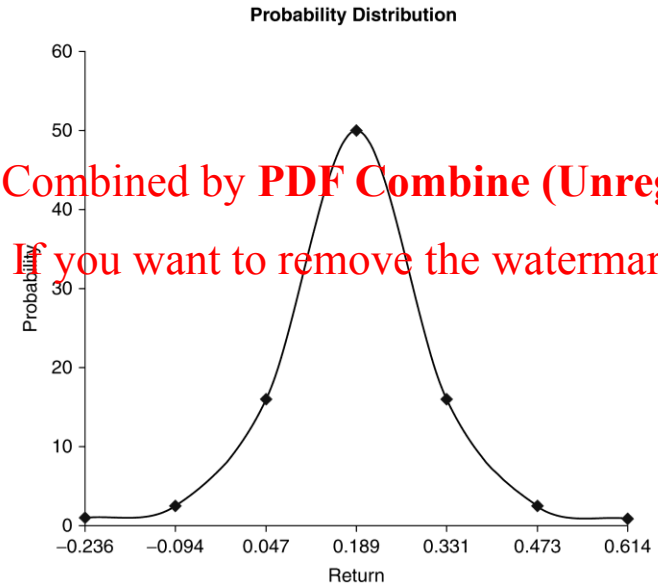
$-2\sigma = 0.189 - (2 \times 0.14175) = -0.0945$

(3) 99% of the outcomes will lie between ±3 standard deviations from the expected value:

$+3\sigma = 0.189 + (3 \times 0.14175) = 0.61425$

$-3\sigma = 0.189 - (3 \times 0.14175) = -0.23625$

c.



P8-13. Personal finance: Portfolio return and standard deviation
LG 3; Challenge

a. Expected portfolio return for each year: $r_p = (w_L \times r_L) + (w_M \times r_M)$

Year	Asset L ($w_L \times r_L$)	+	Asset M ($w_M \times r_M$)		Expected Portfolio Return r_p
2013	(14% × 0.40 = 5.6%)	+	(20% × 0.60 = 12.0%)	=	17.6%
2014	(14% × 0.40 = 5.6%)	+	(18% × 0.60 = 10.8%)	=	16.4%
2015	(16% × 0.40 = 6.4%)	+	(16% × 0.60 = 9.6%)	=	16.0%
2016	(17% × 0.40 = 6.8%)	+	(14% × 0.60 = 8.4%)	=	15.2%
2017	(17% × 0.40 = 6.8%)	+	(12% × 0.60 = 7.2%)	=	14.0%
2018	(19% × 0.40 = 7.6%)	+	(10% × 0.60 = 6.0%)	=	13.6%

b. Portfolio return: $r_p = \dfrac{\sum_{i=1}^{n} w_i \times r_i}{n}$

$$r_p = \frac{17.6 + 16.4 + 16.0 + 15.2 + 14.0 + 13.6}{6} = 15.467 = 15.5\%$$

c. Standard deviation: $\sigma_{rp} = \sqrt{\sum_{i=1}^{n} \frac{(r_i - \bar{r})^2}{(n-1)}}$

$$\sigma_{rp} = \sqrt{\frac{\left[\begin{array}{l}(17.6\% - 15.5\%)^2 + (16.4\% - 15.5\%)^2 + (16.0\% - 15.5\%)^2 \\ + (15.2\% - 15.5\%)^2 + (14.0\% - 15.5\%)^2 + (13.6\% - 15.5\%)^2\end{array}\right]}{6-1}}$$

$$\sigma_{rp} = \sqrt{\frac{\left[\begin{array}{l}(2.1\%)^2 + (0.9\%)^2 + (0.5\%)^2 \\ + (-0.3\%)^2 + (-1.5\%)^2 + (-1.9\%)^2\end{array}\right]}{5}}$$

$$\sigma_{rp} = \sqrt{\frac{(.000441 + 0.000081 + 0.000025 + 0.000009 + 0.000225 + 0.000361)}{5}}$$

$$\sigma_{rp} = \sqrt{\frac{0.001142}{5}} = \sqrt{0.000228\%} = 0.0151 = 1.51\%$$

d. The assets are negatively correlated.

e. Combining these two negatively correlated assets reduces overall portfolio risk.

P8-14. Portfolio analysis
LG 3; Challenge

a. Expected portfolio return:
Alternative 1: 100% Asset F

$$r_p = \frac{16\% + 17\% + 18\% + 19\%}{4} = 17.5\%$$

Alternative 2: 50% Asset F + 50% Asset G

Year	Asset F ($w_F \times r_F$)	+	Asset G ($w_G \times r_G$)		Portfolio Return r_p
2013	(16% × 0.50 = 8.0%)	+	(17% × 0.50 = 8.5%)	=	16.5%
2014	(17% × 0.50 = 8.5%)	+	(16% × 0.50 = 8.0%)	=	16.5%
2015	(18% × 0.50 = 9.0%)	+	(15% × 0.50 = 7.5%)	=	16.5%
2016	(19% × 0.50 = 9.5%)	+	(14% × 0.50 = 7.0%)	=	16.5%

$$r_p = \frac{16.5\% + 16.5\% + 16.5\% + 16.5\%}{4} = 16.5\%$$

Alternative 3: 50% Asset F + 50% Asset H

Year	Asset F ($w_F \times r_F$)	+	Asset H ($w_H \times r_H$)	Portfolio Return r_p
2013	(16% × 0.50 = 8.0%)	+	(14% × 0.50 = 7.0%)	15.0%
2014	(17% × 0.50 = 8.5%)	+	(15% × 0.50 = 7.5%)	16.0%
2015	(18% × 0.50 = 9.0%)	+	(16% × 0.50 = 8.0%)	17.0%
2016	(19% × 0.50 = 9.5%)	+	(17% × 0.50 = 8.5%)	18.0%

$$r_p = \frac{15.0\% + 16.0\% + 17.0\% + 18.0\%}{4} = 16.5\%$$

b. Standard deviation: $\sigma_{rp} = \sqrt{\sum_{i=1}^{n} \frac{(r_i - \bar{r})^2}{(n-1)}}$

(1)

$$\sigma_F = \sqrt{\frac{[(16.0\% - 17.5\%)^2 + (17.0\% - 17.5\%)^2 + (18.0\% - 17.5\%)^2 + (19.0\% - 17.5\%)^2]}{4-1}}$$

$$\sigma_F = \sqrt{\frac{[(-1.5\%)^2 + (-0.5\%)^2 + (0.5\%)^2 + (1.5\%)^2]}{3}}$$

$$\sigma_F = \sqrt{\frac{(0.000225 + 0.000025 + 0.000025 + 0.000225)}{3}}$$

$$\sigma_F = \sqrt{\frac{0.0005}{3}} = \sqrt{.000167} = 0.01291 = 1.291\%$$

(2)

$$\sigma_{FG} = \sqrt{\frac{[(16.5\% - 16.5\%)^2 + (16.5\% - 16.5\%)^2 + (16.5\% - 16.5\%)^2 + (16.5\% - 16.5\%)^2]}{4-1}}$$

$$\sigma_{FG} = \sqrt{\frac{[(0)^2 + (0)^2 + (0)^2 + (0)^2]}{3}}$$

$$\sigma_{FG} = 0$$

(3)

$$\sigma_{FH} = \sqrt{\frac{[(15.0\% - 16.5\%)^2 + (16.0\% - 16.5\%)^2 + (17.0\% - 16.5\%)^2 + (18.0\% - 16.5\%)^2]}{4-1}}$$

$$\sigma_{FH} = \sqrt{\frac{[(-1.5\%)^2 + (-0.5\%)^2 + (0.5\%)^2 + (1.5\%)^2]}{3}}$$

$$\sigma_{FH} = \sqrt{\frac{[(0.000225 + 0.000025 + 0.000025 + 0.000225)]}{3}}$$

$$\sigma_{FH} = \sqrt{\frac{0.0005}{3}} = \sqrt{0.000167} = 0.012910 = 1.291\%$$

c. Coefficient of variation: $CV = \sigma_r \div \bar{r}$

$$CV_F = \frac{1.291\%}{17.5\%} = 0.0738$$

$$CV_{FG} = \frac{0}{16.5\%} = 0$$

$$CV_{FH} = \frac{1.291\%}{16.5\%} = 0.0782$$

d. Summary:

	r_p: Expected Value of Portfolio	**σ_{rp}**	**CV_p**
Alternative 1 (*F*)	17.5%	1.291%	0.0738
Alternative 2 (*FG*)	16.5%	0	0.0
Alternative 3 (*FH*)	16.5%	1.291%	0.0782

Since the assets have different expected returns, the coefficient of variation should be used to determine the best portfolio. Alternative 3, with positively correlated assets, has the highest coefficient of variation and therefore is the riskiest. Alternative 2 is the best choice; it is perfectly negatively correlated and therefore has the lowest coefficient of variation.

P8-15. Correlation, risk, and return

LG 4; Intermediate

a. (1) Range of expected return: between 8% and 13%
(2) Range of the risk: between 5% and 10%

b. (1) Range of expected return: between 8% and 13%
(2) Range of the risk: $0 < \text{risk} < 10\%$

c. (1) Range of expected return: between 8% and 13%
(2) Range of the risk: $0 < \text{risk} < 10\%$

P8-16. Personal finance: International investment returns

LG 1, 4; Intermediate

a. $$\text{Return}_{\text{pesos}} = \frac{24,750 - 20,500}{20,500} = \frac{4,250}{20,500} = 0.20732 = 20.73\%$$

b. $$\text{Purchase price} = \frac{\text{Price in pesos}}{\text{Pesos per dollar}} = \frac{20.50}{9.21} = \$2.22584 \times 1{,}000 \text{ shares} = \$2,225.84$$

$$\text{Sales price} = \frac{\text{Price in pesos}}{\text{Pesos per dollar}} = \frac{24.75}{9.85} = \$2.51269 \times 1{,}000 \text{ shares} = \$2,512.69$$

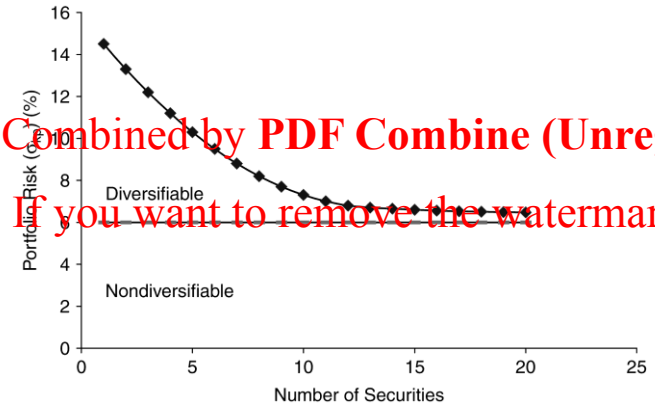
c. $$\text{Return}_{\text{pesos}} = \frac{2,512.69 - 2,225.84}{2,225.84} = \frac{286.85}{2,225.84} = 0.12887 = 12.89\%$$

d. The two returns differ due to the change in the exchange rate between the peso and the dollar. The peso had depreciation (and thus the dollar appreciated) between the purchase date and
the sale date, causing a decrease in total return. The answer in part c is the more important of the two returns for Joe. An investor in foreign securities will carry exchange-rate risk.

P8-17. Total, nondiversifiable, and diversifiable risk

LG 5; Intermediate

a. and b.

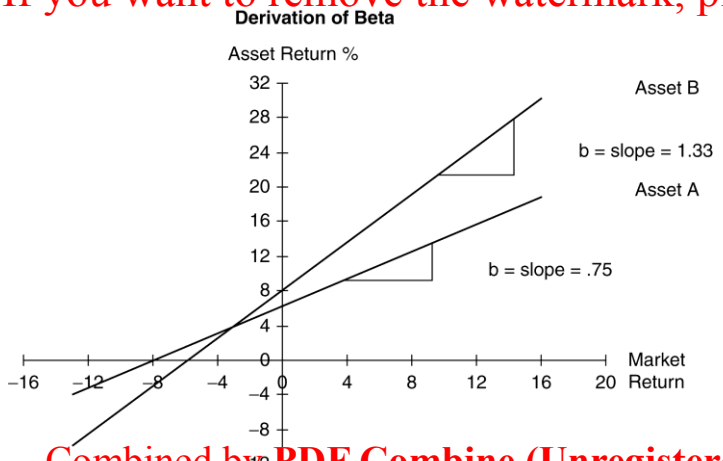


c. Only nondiversifiable risk is relevant because, as shown by the graph, diversifiable risk can be virtually eliminated through holding a portfolio of at least 20 securities that are not positively correlated. David Talbot's portfolio, assuming diversifiable risk could no longer be reduced by additions to the portfolio, has 6.47% relevant risk.

P8-18. Graphic derivation of beta

LG 5; Intermediate

a.



b. To estimate beta, the "rise over run" method can be used. $\text{Beta} = \frac{\text{Rise}}{\text{Run}} = \frac{\Delta Y}{\Delta X}$

Taking the points shown on the graph:

$$\text{Beta A} = \frac{\Delta Y}{\Delta X} = \frac{12-9}{8-4} = \frac{3}{4} = 0.75$$

$$\text{Beta B} = \frac{\Delta Y}{\Delta X} = \frac{26-22}{13-10} = \frac{4}{3} = 1.33$$

A financial calculator with statistical functions can be used to perform linear regression analysis. The beta (slope) of line A is 0.79; of line B, 1.379.

c. With a higher beta of 1.33, Asset B is more risky. Its return will move 1.33 times for each one point the market moves. Asset A's return will move at a lower rate, as indicated by its beta coefficient of 0.75.

P8-19. Graphical derivation and interpretation of beta

LG 5; Intermediate

a. With a return range from −60% to + 60%, Biotech Cures, exhibited in Panel B, is the more risky stock. Returns are widely dispersed in this return range regardless of market conditions. By comparison, the returns of Panel A's Cyclical Industries Incorporated only range from about −40% to + 40%. There is less dispersion of returns within this return range.

b. The returns on Cyclical Industries Incorporated's stock are more closely correlated with the market's performance. Hence, most of Cyclical Industries' returns fit around the upward sloping least-squares regression line. By comparison, Biotech Cures has earned returns approaching 60% during a period when the overall market experienced a loss. Even if the market is up, Biotech Cures has lost almost half of its value in some years.

c. On a standalone basis, Biotech Cures Corporation is riskier. However, if an investor was seeking to diversify the risk of their current portfolio, the unique, nonsystematic performance of Biotech Cures Corporation makes it a good addition. Other considerations would be the mean return for both (here Cyclical Industries has a higher return when the overall market return is zero), expectations regarding the overall market performance, and level to which one can use historic returns to accurately forecast stock price behavior.

P8-20. Interpreting beta

LG 5; Basic

Effect of change in market return on asset with beta of 1.20

a. $1.20 \times (15\%) = 18.0\%$ increase

b. $1.20 \times (-8\%) = 9.6\%$ decrease

c. $1.20 \times (0\%) =$ no change

d. The asset is more risky than the market portfolio, which has a beta of 1. The higher beta makes the return move more than the market.

P8-21. Betas

LG 5; Basic

a. and b.

Asset	Beta	Increase in Market Return	Expected Impact on Asset Return	Decrease in Market Return	Impact on Asset Return
A	0.50	0.10	0.05	–0.10	–0.05
B	1.60	0.10	0.16	–0.10	–0.16
C	–0.20	0.10	–0.02	–0.10	0.02
D	0.90	0.10	0.09	–0.10	–0.09

c. Asset B should be chosen because it will have the highest increase in return.

d. Asset C would be the appropriate choice because it is a defensive asset, moving in opposition to the market. In an economic downturn, Asset C's return is increasing.

P8-22. Personal finance: Betas and risk rankings

LG 5; Intermediate

a.

	Stock	Beta
Most risky	B	1.40
	A	0.80
Least risky	C	–0.30

b. and c.

Asset	Beta	Increase in Market Return	Expected Impact on Asset Return	Decrease in Market Return	Impact on Asset Return
A	0.80	0.12	0.096	–0.05	–0.04
B	1.40	0.12	0.168	–0.05	–0.07
C	–0.30	0.12	–0.036	–0.05	0.015

d. In a declining market, an investor would choose the defensive stock, Stock C. While the market declines, the return on C increases.

e. In a rising market, an investor would choose Stock B, the aggressive stock. As the market rises one point, Stock B rises 1.40 points.

P8-23. Personal finance: Portfolio betas: $b_p = \sum_{j=1}^{n} w_j \times b_j$

LG 5; Intermediate

a.

		Portfolio A		Portfolio B	
Asset	**Beta**	w_A	$w_A \times b_A$	w_B	$w_B \times b_B$
1	1.30	0.10	0.130	0.30	0.39
2	0.70	0.30	0.210	0.10	0.07
3	1.25	0.10	0.125	0.20	0.25
4	1.10	0.10	0.110	0.20	0.22
5	0.90	0.40	0.360	0.20	0.18
		b_A =	0.935	b_B =	1.11

b. Portfolio A is slightly less risky than the market (average risk), while Portfolio B is more risky than the market. Portfolio B's return will move more than Portfolio A's for a given increase or decrease in market return. Portfolio B is the more risky.

P8-24. Capital asset pricing model (CAPM): $r_j = R_F + [b_j \times (r_m - R_F)]$

LG 6; Basic

Case	r_j	=	$R_F + [b_j \times (r_m - R_F)]$
A	8.9%	=	5% + [1.30 × (8% − 5%)]
B	12.5%	=	8% + [0.90 × (13% − 8%)]
C	8.4%	=	9% + [−0.20 × (12% − 9%)]
D	15.0%	=	10% + [1.00 × (15% − 10%)]
E	8.4%	=	6% + [0.60 × (10% − 6%)]

P8-25. Personal finance: Beta coefficients and the capital asset pricing model

LG 5, 6; Intermediate

To solve this problem you must take the CAPM and solve for beta. The resulting model is:

$$\text{Beta} = \frac{r - R_F}{r_m - R_F}$$

a. $\text{Beta} = \frac{10\% - 5\%}{16\% - 5\%} = \frac{5\%}{11\%} = 0.4545$

b. $\text{Beta} = \frac{15\% - 5\%}{16\% - 5\%} = \frac{10\%}{11\%} = 0.9091$

c. $\text{Beta} = \frac{18\% - 5\%}{16\% - 5\%} = \frac{13\%}{11\%} = 1.1818$

d. $\text{Beta} = \frac{20\% - 5\%}{16\% - 5\%} = \frac{15\%}{11\%} = 1.3636$

e. If Katherine is willing to take a maximum of average risk then she will be able to have an expected return of only 16%. ($r = 5\% + 1.0(16\% - 5\%) = 16\%$.)

P8-26. Manipulating CAPM: $r_j = R_F + [b_j \times (r_m - R_F)]$

LG 6; Intermediate

a. $r_j = 8\% + [0.90 \times (12\% - 8\%)]$

$r_j = 11.6\%$

b. $15\% = R_F + [1.25 \times (14\% - R_F)]$

$R_F = 10\%$

c. $16\% = 9\% + [1.10 \times (r_m - 9\%)]$

$r_m = 15.36\%$

d. $15\% = 10\% + [b_j \times (12.5\% - 10\%)$

$b_j = 2$

P8-27. Personal finance: Portfolio return and beta

LG 1, 3, 5, 6: Challenge

a. $b_p = (0.20)(0.80) + (0.35)(0.95) + (0.30)(1.50) + (0.15)(1.25)$

$= 0.16 + 0.3325 + 0.45 + 0.1875 = 1.13$

b. $r_A = \dfrac{(\$20,000 - \$20,000) + \$1,600}{\$20,000} = \dfrac{\$1,600}{\$20,000} = 8\%$

$r_B = \dfrac{(\$36,000 - \$35,000) + \$1,400}{\$35,000} = \dfrac{\$2,400}{\$35,000} = 6.86\%$

$r_C = \dfrac{(\$34,500 - \$30,000) + 0}{\$30,000} = \dfrac{\$4,500}{\$30,000} = 15\%$

$r_D = \dfrac{(\$16,500 - \$15,000) + \$375}{\$15,000} = \dfrac{\$1,875}{\$15,000} = 12.5\%$

c. $r_P = \dfrac{(\$107,000 - \$100,000) + \$3,375}{\$100,000} = \dfrac{\$10,375}{\$100,000} = 10.375\%$

d. $r_A = 4\% + [0.80 \times (10\% - 4\%)] = 8.8\%$

$r_B = 4\% + [0.95 \times (10\% - 4\%)] = 9.7\%$

$r_C = 4\% + [1.50 \times (10\% - 4\%)] = 13.0\%$

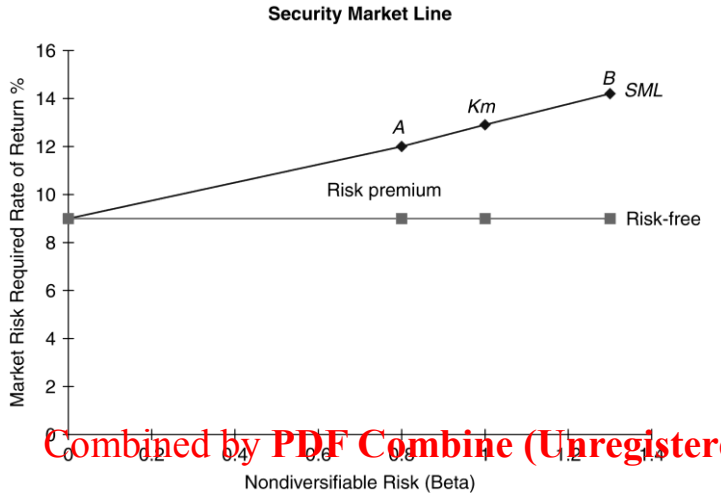
$r_D = 4\% + [1.25 \times (10\% - 4\%)] = 11.5\%$

e. Of the four investments, only C (15% vs. 13%) and D (12.5% vs. 11.5%) had actual returns that exceeded the CAPM expected return (15% vs. 13%). The underperformance could be due to any unsystematic factor that would have caused the firm not do as well as expected. Another possibility is that the firm's characteristics may have changed such that the beta at the time of the purchase overstated the true value of beta that existed during that year. A third explanation is that beta, as a single measure, may not capture all of the systematic factors that cause the expected return. In other words, there is error in the beta estimate.

P8-28. Security market line, SML

LG 6; Intermediate

a, b, and d.



c. $r_j = R_F + [b_j \times (r_m - R_F)]$

Asset A

$r_j = 0.09 + [0.80 \times (0.13 - 0.09)]$

$r_j = 0.122$

Asset B

$r_j = 0.09 + [1.30 \times (0.13 - 0.09)]$

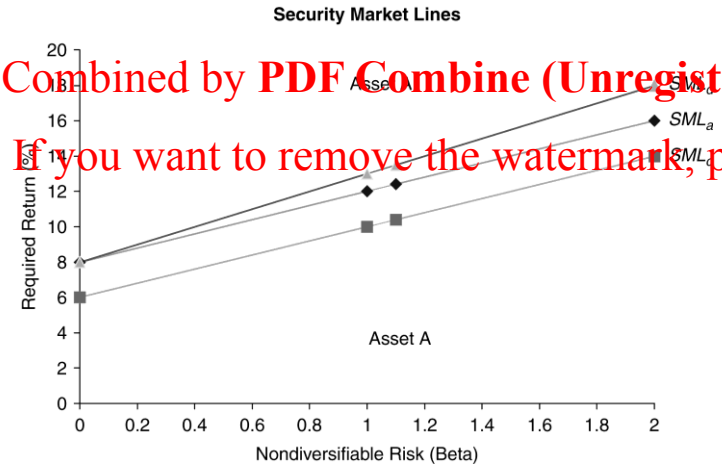
$r_j = 0.142$

d. Asset A has a smaller required return than Asset B because it is less risky, based on the beta of 0.80 for Asset A versus 1.30 for Asset B. The market risk premium for Asset A is 3.2% (12.2% – 9%), which is lower than Asset B's market risk premium (14.2% – 9% = 5.2%).

P8-29. Shifts in the security market line

LG 6; Challenge

a, b, c, d.



b. $r_j = R_F + [b_j \times (r_m - R_F)]$

$r_A = 8\% + [1.1 \times (12\% - 8\%)]$

$r_A = 8\% + 4.4\%$

$r_A = 12.4\%$

c. $r_A = 6\% + [1.1 \times (10\% - 6\%)]$

$r_A = 6\% + 4.4\%$

$r_A = 10.4\%$

d. $r_A = 8\% + [1.1 \times (13\% - 8\%)]$

$r_A = 8\% + 5.5\%$

$r_A = 13.5\%$

e. (1) A decrease in inflationary expectations reduces the required return as shown in the parallel downward shift of the SML.

(2) Increased risk aversion results in a steeper slope, since a higher return would be required for each level of risk as measured by beta.

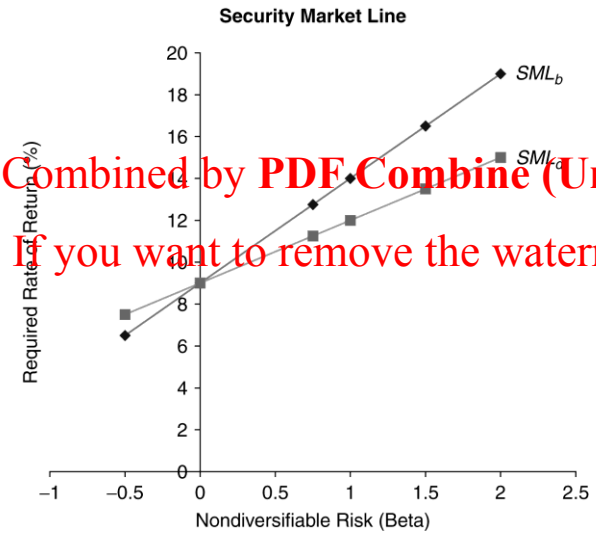
P8-30. Integrative—risk, return, and CAPM

LG 6; Challenge

a.

Project	r_j	=	$R_F + [b_j \times (r_m - R_F)]$	=
A	r_j	=	$9\% + [1.5 \times (14\% - 9\%)]$	= 16.5%
B	r_j	=	$9\% + [0.75 \times (14\% - 9\%)]$	= 12.75%
C	r_j	=	$9\% + [2.0 \times (14\% - 9\%)]$	= 19.0%
D	r_j	=	$9\% + [0 \times (14\% - 9\%)]$	= 9.0%
E	r_j	=	$9\% + [(-0.5) \times (14\% - 9\%)]$	= 6.5%

b. and d.



c. Project A is 150% as responsive as the market.

Project B is 75% as responsive as the market.
Project C is twice as responsive as the market.
Project D is unaffected by market movement.
Project E is only half as responsive as the market, but moves in the opposite direction as the market.

d. See graph for new SML.

$r_A = 9\% + [1.5 \times (12\% - 9\%)] = 13.50\%$

$r_B = 9\% + [0.75 \times (12\% - 9\%)] = 11.25\%$

$r_C = 9\% + [2.0 \times (12\% - 9\%)] = 15.00\%$

$r_D = 9\% + [0 \times (12\% - 9\%)] = 9.00\%$

$r_E = 9\% + [-0.5 \times (12\% - 9\%)] = 7.50\%$

e. The steeper slope of SML_b indicates a higher risk premium than SML_d for these market conditions. When investor risk aversion declines, investors require lower returns for any given risk level (beta).

P8-31. Ethics problem

LG 1; Intermediate

Investors expect managers to take risks with their money, so it is clearly not unethical for managers to make risky investments with other people's money. However, managers have a duty to communicate truthfully with investors about the risk that they are taking. Portfolio managers should not take risks that they do not expect to generate returns sufficient to compensate investors for the return variability.

Chapter 11
The Cost of Capital

■ Solutions to Problems

P11-1. LG 1: Concept of Cost of Capital

Basic

(a) The firm is basing its decision on the cost of finance a particular project rather than the firm's combined cost of capital. This decision-making method may lead to erroneous accept/reject decisions.

(b) $k_a = w_d k_d + w_e k_e$

$k_a = 0.40\ (7\%) + 0.60(16\%)$

$k_a = 2.8\% + 9.6\%$

$k_a = 12.4\%$

(c) Reject project 263. Accept project 264.

(d) Opposite conclusions were drawn using the two decision criteria. The overall cost of capital as a criterion provides better decisions because it takes into consideration the long-run interrelationship of financing decisions.

P11-2. LG 2: Cost of Debt Using Both Methods

Intermediate

(a) Net Proceeds: $N_d = \$1{,}010 - \$30$

$N_d = \$980$

(c) Cost to Maturity:

$$B_o = \left[\sum_{t=1}^{n} \frac{I}{(1+k)^t}\right] + \left[\frac{M}{(1+k)^n}\right]$$

$$\$980 = \left[\sum_{t=1}^{15} \frac{-\$120}{(1+k)^t}\right] + \left[\frac{-\$1{,}000}{(1+k)^{15}}\right]$$

Step 1: Try 12%

$V = 120 \times (6.811) + 1{,}000 \times (0.183)$

$V = 817.32 + 183$

$V = \$1{,}000.32$

(Due to rounding of the PVIF, the value of the bond is 32 cents greater than expected. At the coupon rate, the value of a $1,000 face value bond is $1,000.)

Try 13%:

$V = 120 \times (6.462) + 1{,}000 \times (0.160)$

$V = 775.44 + 160$

$V = \$935.44$

The cost to maturity is between 12% and 13%.

Step 2: $1,000.32 – $935.44 = $64.88

Step 3: $1,000.32 – $980.00 = $20.32

Step 4: $20.32 ÷ $64.88 = 0.31

Step 5: 12 + 0.31 = 12.31% = before-tax cost of debt

12.31 (1 – 0.40) = 7.39% = after-tax cost of debt

Calculator solution: 12.30%

(d) Approximate before-tax cost of debt

$$k_d = \frac{I + \frac{\$1{,}000 - N_d}{n}}{\frac{N_d + \$1{,}000}{2}}$$

$$k_d = \frac{\$120 + \frac{(\$1{,}000 - \$980)}{15}}{\frac{(\$980 + \$1{,}000)}{2}}$$

$k_d = \$121.33 \div \$990.00$

$k_d = 12.26\%$

Approximate after-tax cost of debt = 12.26% × (1 – 0.4) = 7.36%

(e) The interpolated cost of debt is closer to the actual cost (12.2983%) than using the approximating equation. However, the short cut approximation is fairly accurate and expedient.

P11-3. LG 2: Cost of Debt–Using the Approximation Formula:

Basic

$$k_d = \frac{I + \frac{\$1{,}000 - N_d}{n}}{\frac{N_d + \$1{,}000}{2}} \qquad k_i = k_d \times (1 - T)$$

Bond A

$$k_d = \frac{\$90 + \frac{\$1,000 - \$955}{20}}{\frac{\$955 + \$1,000}{2}} = \frac{\$92.25}{\$977.50} = 9.44\%$$

$k_i = 9.44\% \times (1 - 0.40) = 5.66\%$

Bond B

$$k_d = \frac{\$100 + \frac{\$1,000 - \$970}{16}}{\frac{\$970 + \$1,000}{2}} = \frac{\$101.88}{\$985} = 10.34\%$$

$k_i = 10.34\% \times (1 - 0.40) = 6.20\%$

Bond C

$$k_d = \frac{\$120 + \frac{\$1,000 - \$955}{15}}{\frac{\$955 + \$1,000}{2}} = \frac{\$123}{\$977.50} = 12.58\%$$

$k_i = 12.58\% \times (1 - 0.40) = 7.55\%$

Bond D

$$k_d = \frac{\$90 + \frac{\$1,000 - \$985}{25}}{\frac{\$985 + \$1,000}{2}} = \frac{\$90.60}{\$992.50} = 9.13\%$$

$k_i = 9.13\% \times (1 - 0.40) = 5.48\%$

Bond E

$$k_d = \frac{\$110 + \frac{\$1,000 - \$920}{22}}{\frac{\$920 + \$1,000}{2}} = \frac{\$113.64}{\$960} = 11.84\%$$

$k_i = 11.84\% \times (1 - 0.40) = 7.10\%$

P11-4. LG 2: The Cost of Debt Using the Approximation Formula

Intermediate

$$k_d = \frac{I + \frac{\$1,000 - N_d}{n}}{\frac{N_d + \$1,000}{2}} \qquad k_i = k_d \times (1 - T)$$

Alternative A

$$k_d = \frac{\$90 + \frac{\$1,000 - \$1,220}{16}}{\frac{\$1,220 + \$1,000}{2}} = \frac{\$76.25}{\$1,110} = 6.87\%$$

$k_i = 6.87\% \times (1 - 0.40) = 4.12\%$

Alternative B

$$k_d = \frac{\$70 + \frac{\$1,000 - \$1,020}{5}}{\frac{\$1,020 + \$1,000}{2}} = \frac{\$66.00}{\$1,010} = 6.54\%$$

$k_i = 6.54\% \times (1 - 0.40) = 3.92\%$

Alternative C

$$k_d = \frac{\$60 + \frac{\$1,000 - \$970}{7}}{\frac{\$970 + \$1,000}{2}} = \frac{\$64.29}{\$985} = 6.53\%$$

$k_i = 6.53\% \times (1 - 0.40) = 3.92\%$

Alternative D

$$k_d = \frac{\$50 + \frac{\$1,000 - \$895}{10}}{\frac{\$895 + \$1,000}{2}} = \frac{\$60.50}{\$947.50} = 6.39\%$$

$k_i = 6.39\% \times (1 - 0.40) = 3.83\%$

P11-5. LG 2: Cost of Preferred Stock: $k_p = D_p \div N_p$

Basic

(a) $k_p = \frac{\$12.00}{\$95.00} = 12.63\%$

(b) $k_p = \frac{\$10.00}{\$90.00} = 11.11\%$

P11-6. LG 2: Cost of Preferred Stock: $k_p = D_p \div N_p$

Basic

Preferred Stock	Calculation
A	$k_p = \$11.00 \div \$92.00 = 11.96\%$
B	$k_p = 3.20 \div 34.50 = 9.28\%$
C	$k_p = 5.00 \div 33.00 = 15.15\%$
D	$k_p = 3.00 \div 24.50 = 12.24\%$
E	$k_p = 1.80 \div 17.50 = 10.29\%$

P11-7. LG 3: Cost of Common Stock Equity–CAPM

Intermediate

$k_s = R_F + [b \times (k_m - R_F)]$

$k_s = 6\% + 1.2 \times (11\% - 6\%)$

$k_s = 6\% + 6\%$

$k_s = 12\%$

(a) Risk premium = 6%

(b) Rate of return = 12%

(c) After-tax cost of common equity using the CAPM = 12%

P11-8. LG 3: Cost of Common Stock Equity: $k_n = \dfrac{D_1 + g}{N_n}$

Intermediate

(a) $g = \dfrac{D_{2006}}{D_{2002}} = FVIF_{k\%,4}$

$g = \dfrac{\$3.10}{\$2.12} = 1.462$

From FVIF table, the factor closest to 1.462 occurs at 10% (i.e., 1.464 for 4 years). Calculator solution: 9.97%

(b) $N_n = \$52$ (given in the problem)

(c) $k_r = \dfrac{D_{2007}}{P_0} + g$

$k_r = \dfrac{\$3.40}{\$57.50} + 0.10 = 15.91\%$

(d) $k_r = \dfrac{D_{2007}}{N_n} + g$

$k_r = \dfrac{\$3.40}{\$55.00} + 0.10 = 16.54\%$

P11-9. LG 3: Retained Earnings versus New Common Stock

Intermediate

$k_r = \frac{D_1}{P_0} + g$ $k_n = \frac{D_1}{N_n} + g$

Firm	Calculation
A	$k_r = (\$2.25 \div \$50.00) + 8\% = 12.50\%$ $k_n = (\$2.25 \div \$47.00) + 8\% = 12.79\%$
B	$k_r = (\$1.00 \div \$20.00) + 4\% = 9.00\%$ $k_n = (\$1.00 \div \$18.00) + 4\% = 9.56\%$
C	$k_r = (\$2.00 \div \$42.50) + 6\% = 10.71\%$ $k_n = (\$2.00 \div \$39.50) + 6\% = 11.06\%$
D	$k_r = (\$2.10 \div \$19.00) + 2\% = 13.05\%$ $k_n = (\$2.10 \div \$16.00) + 2\% = 15.13\%$

P11-10. LG 2, 4: The Effect of Tax Rate on WACC

Intermediate

(a) WACC = (0.30)(11%)(1 – 0.40) + (0.10)(9%) + (0.60)(14%)
WACC = 1.98% + 0.9% + 8.4%
WACC = 11.28%

(b) WACC = (0.30)(11%)(1 – 0.35) + (0.10)(9%) + (0.60)(14%)
WACC = 2.15% + 0.9% + 8.4%
WACC = 11.45%

(c) WACC = (0.30)(11%)(1 – 0.25) + (0.10)(9%) + (0.60)(14%)
WACC = 2.48% + 0.9% + 8.4%
WACC = 11.78%

(d) As the tax rate decreases, the WACC increases due to the reduced tax shield from the tax-deductible interest on debt.

P11-11. LG 4: WACC–Book Weights

Basic

(a)

Type of Capital	Book Value	Weight	Cost	Weighted Cost
L-T Debt	$700,000	0.500	5.3%	2.650%
Preferred stock	50,000	0.036	12.0%	0.432%
Common stock	650,000	0.464	16.0%	7.424%
	$1,400,000	1.000		10.506%

(b) The WACC is the rate of return that the firm must receive on long-term projects to maintain the value of the firm. The cost of capital can be compared to the return for a project to determine whether the project is acceptable.

P11-12. LG 4: WACC—Book Weights and Market Weights

Intermediate

(a) Book value weights:

Type of Capital	Book Value	Weight	Cost	Weighted Cost
L-T Debt	$4,000,000	0.784	6.00%	4.704%
Preferred stock	40,000	0.008	13.00%	0.104%
Common stock	1,060,000	0.208	17.00%	3.536%
	$5,100,000			8.344%

(b) Market value weights:

Type of Capital	Market Value	Weight	Cost	Weighted Cost
L-T Debt	$3,840,000	0.557	6.00%	3.342%
Preferred stock	60,000	0.009	13.00%	0.117%
Common stock	3,000,000	0.435	17.00%	7.395%
	$6,900,000			10.854%

(c) The difference lies in the two different value bases. The market value approach yields the better value since the costs of the components of the capital structure are calculated using the prevailing market prices. Since the common stock is selling at a higher value than its book value, the cost of capital is much higher when using the market value weights. Notice that the book value weights give the firm a much greater leverage position than when the market value weights are used.

P11-13. LG 4: WACC and Target Weights

Intermediate

(a) Historical market weights:

Type of Capital	Weight	Cost	Weighted Cost
L-T Debt	0.25	7.20%	1.80%
Preferred stock	0.10	13.50%	1.35%
Common stock	0.65	16.00%	10.40%
			13.55%

(b) Target market weights:

Type of Capital	Weight	Cost	Weighted Cost
L-T Debt	0.30	7.20%	2.160%
Preferred Stock	0.15	13.50%	2.025%
Common Stock	0.55	16.00%	8.800%
			12.985%

(c) Using the historical weights the firm has a higher cost of capital due to the weighting of the more expensive common stock component (0.65) versus the target weight of (0.55). This over-weighting in common stock leads to a smaller proportion of financing coming from the significantly less expense L-T debt and the lower costing preferred stock.

P11-14. LG 4, 5: Cost of Capital and Break Point Challenge

(a) Cost of Retained Earnings

$$k_r = \frac{\$1.26(1+0.06)}{\$40.00} + 0.06 = \frac{\$1.34}{\$40.00} = 3.35\% + 6\% = 9.35\%$$

(b) Cost of New Common Stock

$$k_s = \frac{\$1.26(1+0.06)}{\$40.00 - \$7.00} + 0.06 = \frac{\$1.34}{\$33.00} = 4.06\% + 6\% = 10.06\%$$

(c) Cost of Preferred Stock

$$k_p = \frac{\$2.00}{\$25.00 - \$3.00} = \frac{\$2.00}{\$22.00} = 9.09\%$$

(d) $$k_d = \frac{\$100 + \frac{\$1,000 - \$1,175}{5}}{\frac{\$1,175 + \$1,000}{2}} = \frac{\$65.00}{\$1,087.50} = 5.98\%$$

$k_i = 5.98\% \times (1 - 0.40) = 3.59\%$

(e) $$BP_{\text{common equity}} = \frac{\$4,200,000 - (\$1.26 \times 1,000,000)}{0.50} = \frac{\$2,940,000}{0.50} = \$5,880,000$$

(f) WACC = (0.40)(3.59%) + (0.10)(9.09%) + (0.50)(9.35%)
WACC = 1.436 + 0.909 + 4.675
WACC = 7.02%
This WACC applies to projects with a cumulative cost between 0 and $5,880,000.

(g) WACC = (0.40)(3.59%) + (0.10)(9.09%) + (0.50)(9.44%)
WACC = 1.436 + 0.909 + 4.72
WACC = 7.07%
This WACC applies to projects with a cumulative cost over $5,880,000.

P11-15. LG 2, 3, 4, 5: Calculation of Specific Costs, WACC, and WMCC

Challenge

(a) Cost of Debt: (approximate)

$$k_d = \frac{I + \frac{(\$1,000 - N_d)}{n}}{\frac{(N_d + \$1,000)}{2}}$$

$$k_d = \frac{\$100 + \frac{(\$1,000 - \$950)}{10}}{\frac{(\$950 + \$1,000)}{2}} = \frac{\$100 + \$5}{\$975} = 10.77\%$$

$k_i = 10.77 \times (1 - 0.40)$

$k_i = 6.46\%$

Cost of Preferred Stock: $k_p = \frac{D_p}{N_p}$

$$k_p = \frac{\$8}{\$63} = 12.70\%$$

Cost of Common Stock Equity: $k_s = \frac{D_1}{P_0} + g$

$$g = \frac{D_{2007}}{D_{2002}} = FVIF_{k\%,4}$$

$$g = \frac{\$4.00}{\$2.85} = 1.403$$

From FVIF table, the factor closest to 1.403 occurs at 7% (i.e., 1.404 for 5 years). Calculator solution: 7.01%

$$k_r = \frac{\$4.00}{\$50.00} + 0.07 = 15.00\%$$

Cost of New Common Stock Equity:

$$k_n = \frac{\$4.00}{\$42.00} + 0.07 = 16.52\%$$

(b) Breaking point = $\frac{AF_j}{W_j}$

$$BP_{\text{common equity}} = \frac{[\$7,000,000 \times (1 - 0.6^*)]}{0.50} = \$5,600,000$$

Between $0 and $5,600,000, the cost of common stock equity is 15% because all common stock equity comes from retained earnings. Above $5,600,000, the cost of common stock equity is 16.52%. It is higher due to the flotation costs associated with a new issue of common stock.

* The firm expects to pay 60% of all earnings available to common shareholders as dividends.

(c) WACC—$0 to $5,600,000:

L-T Debt	0.40 × 6.46%	=	2.58%
Preferred stock	0.10 × 12.70%	=	1.27%
Common stock	0.50 × 15.00%	=	7.50%
	WACC	=	11.35%

(d) WACC—above $5,600,000:

L-T Debt	0.40 × 6.46%	=	2.58%
Preferred stock	0.10 × 12.70%	=	1.27%
Common stock	0.50 × 16.52%	=	8.26%
	WACC	=	12.11%

P11-16. LG 2, 3, 4, 5: Calculation of Specific Costs, WACC, and WMCC Challenge

(a) Debt: (approximate)

$$k_d = \frac{I + \frac{(\$1,000 - N_d)}{n}}{\frac{(N_d + \$1,000)}{2}}$$

$$k_d = \frac{\$80 + \frac{(\$1,000 - \$940)}{20}}{\frac{(\$940 + \$1,000)}{2}} = \frac{\$80 + \$3}{\$970} = 8.56\%$$

$k_i = kd \times (1 - t)$

$k_i = 8.56\% \times (1 - 0.40)$

$k_i = 5.1\%$

Preferred Stock:

$$k_p = \frac{D_p}{N_p}$$

$$k_p = \frac{\$7.60}{\$90} = 8.44\%$$

Common Stock:

$$k_n = \frac{D_1}{N_n} + g$$

$$k_p = \frac{\$7.00}{\$78} = 0.06 = 0.1497 = 14.97\%$$

Retained Earnings:

$$k_r = \frac{D_1}{P_0} + g$$

$$k_p = \frac{\$7.00}{\$90} = 0.06 = 0.1378 = 13.78\%$$

(b) Breaking point = $\frac{AF_j}{W_i}$

(1) $BP_{\text{common equity}} = \frac{[\$100{,}000]}{0.50} = \$200{,}000$

Type of Capital	Target Capital Structure %	Cost of Capital Source	Weighted Cost
(2) WACC equal to or below $200,000 BP:			
Long-term debt	0.30	5.1%	1.53%
Preferred stock	0.20	8.4%	1.68%
Common stock equity	0.50	13.8%	6.90%
			WACC = 10.11%
(3) WACC above $200,000 BP:			
Long-term debt	0.30	5.1%	1.53%
Preferred stock	0.20	8.4%	1.68%
Common stock equity	0.50	15.0%	7.50%
			WACC = 10.71%

P11-17. LG 4, 5, 6: Integrative–WACC, WMCC, and IOS Challenge

(a) **Breaking Points and Ranges:**

Source of Capital	Cost %	Range of New Financing	Breaking Point	Range of Total New Financing
Long-term debt	6	$0–$320,000	$320,000 ÷ 0.40 = $800,000	$0–$800,000
	8	$320,001 and above		Greater than $800,000
Preferred stock	17	$0 and above		Greater than $0
Common stock equity	20	$0–$200,000	$200,000 ÷ 0.40 = $500,000	$0–$500,000
	24	$200,001 and above		Greater than $500,000

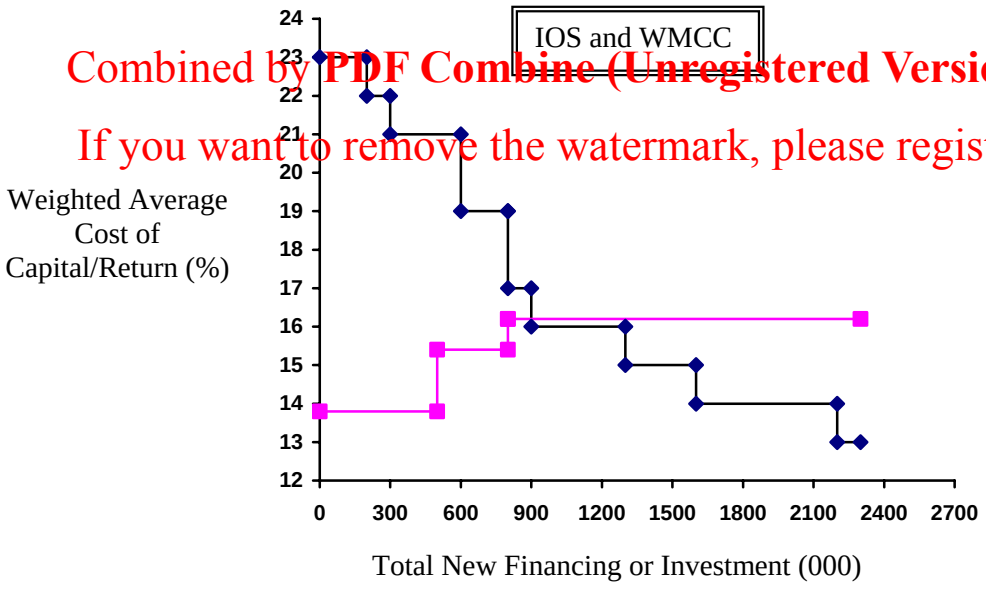
(b) WACC will change at $500,000 and $800,000.

(c) **WACC**

Range of Total New Financing	Source of Capital (1)	Target Proportion (2)	Cost % (3)	Weighted Cost (2) × (3) (4)
$0–$500,000	Debt	0.40	6	2.40%
	Preferred	0.20	17	3.40%
	Common	0.40	20	8.00%
				WACC = 13.80%
$500,000–$800,000	Debt	0.40	6%	2.40%
	Preferred	0.20	17%	3.40%
	Common	0.40	24%	9.60%
				WACC = 15.40%
Greater than $800,000	Debt	0.40	8%	3.20%
	Preferred	0.20	17%	3.40%
	Common	0.40	24	9.60%
				WACC = 16.20%

(d) **IOS Data for Graph**

Investment	IRR	Initial Investment	Cumulative Investment
E	23%	$200,000	$200,000
C	22	100,000	300,000
G	21	300,000	600,000
A	19	200,000	800,000
H	17	100,000	900,000
I	16	400,000	1,300,000
B	15	300,000	1,600,000
D	14	600,000	2,200,000
F	13	100,000	2,300,000



(e) The firm should accept investments E, C, G, A, and H, since for each of these, the internal rate of return (IRR) on the marginal investment exceeds the weighted marginal cost of capital (WMCC). The next project (i.e. D) cannot be accepted since its return of 16% is below the weighted marginal cost of the available funds of 16.2%.

P11-18. LG 4, 5, 6: Integrative–WACC, WMCC, and IOC

Challenge

(a) WACC: 0 to $600,000 = (0.5)(6.3%) + (0.1)(12.5%) + (0.4)(15.3%)
= 3.15% + 1.25% + 6.12%
= 10.52%

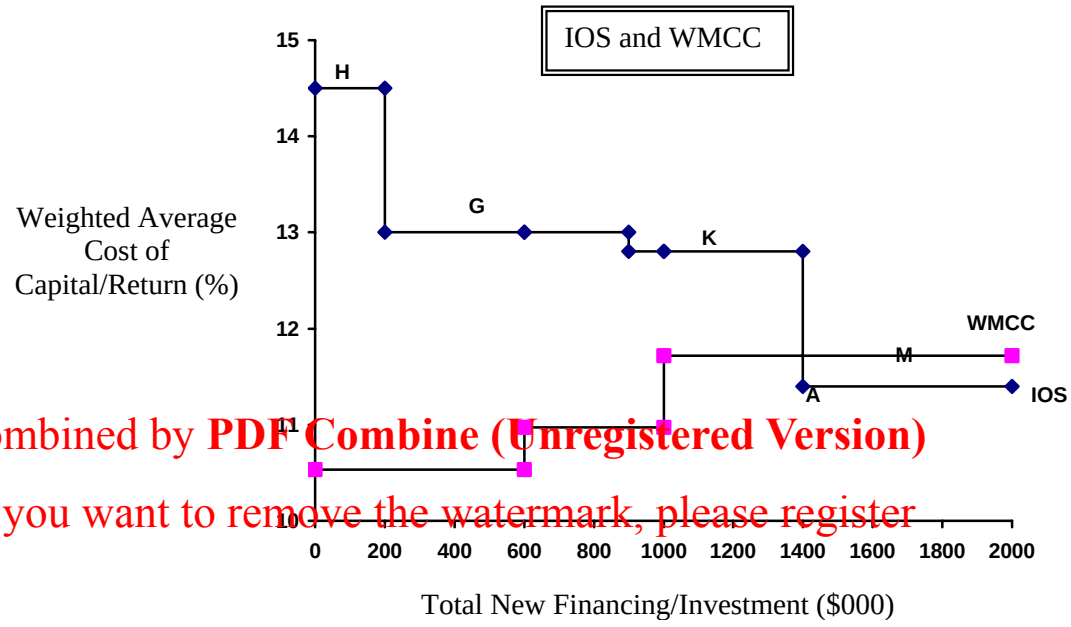
WACC: $600,001–$1,000,000 = (0.5)(6.3%) + (0.1)(12.5%) + (0.4)(16.4%)
= 3.15% + 1.25% + 6.56%
= 10.96%

WACC: $1,000,001 and above = (0.5)(7.8%) + (0.1)(12.5%) + (0.4)(16.4%)
= 3.9% + 1.25% + 6.56%
= 11.71%

See part (c) for the WMCC schedule.

(b) All four projects are recommended for acceptance since the IRR is greater than the WMCC across the full range of investment opportunities.

(c)



(d) In this problem, projects H, G, and K would be accepted since the IRR for these projects exceeds the WMCC. The remaining project, M, would be rejected because the WMCC is greater than the IRR.

P11-19. Ethics Problem

Intermediate

Analysts familiar with WorldCom complained that much of the $105 billion of its assets consisted of intangibles and goodwill amassed in the process of nearly 70 acquisitions. As a result, precise valuation of its assets was almost impossible. Many feared that assets were equally inflated as WorldCom's income statements. Indeed, after declaring Chapter 11, the company wrote off $35 billion in plant and equipment in addition to $45 billion in goodwill wiping out any equity left from the books.

Chapter 12
Leverage and Capital Structure

■ Solution to Problems

P12-1. LG 1: Breakeven Point–Algebraic

Basic

$$Q = \frac{FC}{(P - VC)}$$

$$Q = \frac{\$12,350}{(\$24.95 - \$15.45)} = 1,300$$

P12-2. LG 1: Breakeven Comparisons–Algebraic

Basic

(a) $Q = \dfrac{FC}{(P - VC)}$

Firm F: $Q = \dfrac{\$45,000}{(\$18.00 - \$6.75)} = 4,000 \text{ units}$

Firm G: $Q = \dfrac{\$30,000}{(\$21.00 - \$13.50)} = 4,000 \text{ units}$

Firm H: $Q = \dfrac{\$90,000}{(\$30.00 - \$12.00)} = 5,000 \text{ units}$

(b) From least risky to most risky: F and G are of equal risk, then H. It is important to recognize that operating leverage is only one measure of risk.

P12-3. LG 1: Breakeven Point–Algebraic and Graphic

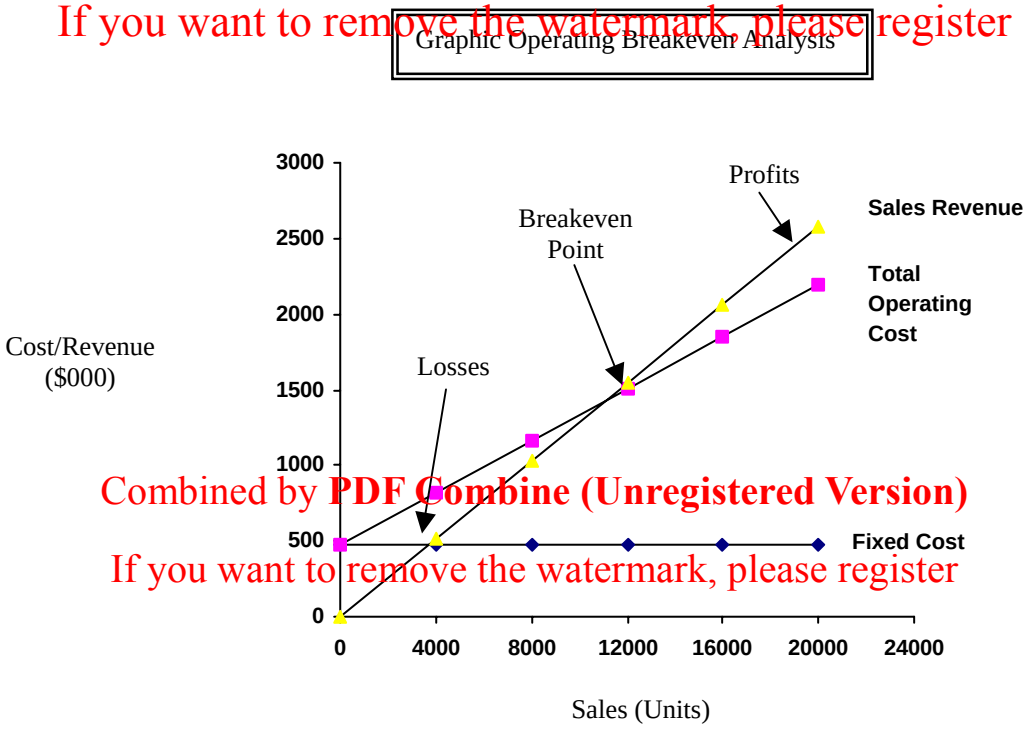
Intermediate

(a) $Q = FC \div (P - VC)$

$Q = \$473,000 \div (\$129 - \$86)$

$Q = 11,000 \text{ units}$

(b)



P12-4. LG 1: Breakeven Analysis

Intermediate

(a) $Q = \dfrac{\$73,500}{(\$13.98 - \$10.48)} = 21,000$ CDs

(b) Total operating costs = FC + (Q × VC)

Total operating costs = $73,500 + (21,000 × $10.48)

Total operating costs = $293,580

(c) 2,000 × 12 = 24,000 CDs per year. 2,000 records per month exceeds the operating breakeven by 3,000 records per year. Barry should go into the CD business.

(d) EBIT = (P × Q) – FC – (VC × Q)

EBIT = ($13.98 × 24,000) – $73,500 – ($10.48 × 24,000)

EBIT = $335,520 – $73,500 – $251,520

EBIT = $10,500

P12-5. LG 1: Breakeven Point–Changing Costs/Revenues

Intermediate

(a) $Q = F \div (P - VC)$ $Q = \$40{,}000 \div (\$10 - \$8) = 20{,}000$ books

(b) $Q = \$44{,}000 \div \$2.00 = 22{,}000$ books

(c) $Q = \$40{,}000 \div \$2.50 = 16{,}000$ books

(d) $Q = \$40{,}000 \div \$1.50 = 26{,}667$ books

(e) The operating breakeven point is directly related to fixed and variable costs and inversely related to selling price. Increases in costs raise the operating breakeven point, while increases in price lower it.

P12-6. LG 1: Breakeven Analysis

Challenge

(a) $$Q = \frac{FC}{(P - VC)} = \frac{\$4{,}000}{\$8.00 - \$6.00} = 2{,}000 \text{ figurines}$$

(b)

Sales	\$10,000
Less:	
Fixed costs	4,000
Variable costs ($6 × 1,500)	9,000
EBIT	–\$3,000

(c)

Sales	\$15,000
Less:	
Fixed costs	4,000
Variable costs ($6 × 1,500)	9,000
EBIT	\$2,000

(d) $$Q = \frac{EBIT + FC}{P - VC} = \frac{\$4{,}000 + \$4{,}000}{\$8 - \$6} = \frac{\$8{,}000}{\$2} = 4{,}000 \text{ units}$$

(e) One alternative is to price the units differently based on the variable cost of the unit. Those more costly to produce will have higher prices than the less expensive production models. If they wish to maintain the same price for all units they may have to reduce the selection from the 15 types currently available to a smaller number which includes only those that have variable costs of $6 or less.

P12-7. LG 2: EBIT Sensitivity

Intermediate

(a) and (b)

	8,000 units	10,000 units	12,000 units
Sales	\$72,000	\$90,000	\$108,000
Less: Variable costs	40,000	50,000	60,000
Less: Fixed costs	20,000	20,000	20,000
EBIT	\$12,000	\$20,000	\$28,000

(c)

Unit Sales	8,000	10,000	12,000
Percentage change in unit sales	(8,000 – 10,000) ÷ 10,000 = –20%	0	(12,000 – 10,000) ÷ 10,000 = +20%
Percentage change in EBIT	(12,000 – 20,000) ÷ 20,000 = –40%	0	(28,000 – 20,000) ÷ 20,000 = +40%

(d) EBIT is more sensitive to changing sales levels; it increases/decreases twice as much as sales.

P12-8. LG 2: Degree of Operating Leverage
Intermediate

(a) $Q = \frac{FC}{(P - VC)} = \frac{\$380,000}{\$63.50 - \$16.00} = 8,000 \text{ units}$

	9,000 units	10,000 units	11,000 units
(b)			
Sales	$571,500	$635,000	$698,500
Less: Variable costs	144,000	160,000	176,000
Less: Fixed costs	380,000	380,000	380,000
EBIT	$47,500	$95,000	$142,500
(c)			
Change in Unit Sales	–1,000	0	+1,000
% Change in Sales	–1,000 ÷ 10,000 = –10%	0	1,000 ÷ 10,000 = +10%
Change in EBIT	–$47,500	0	+$47,500
% Change in EBIT	–$47,500 ÷ 95,000 = –50%	0	$47,500 ÷ 95,000 = +50%
(d)			
$\frac{\%\text{ Change in EBIT}}{\%\text{ Change in Sales}}$	–50 ÷ –10 = 5		50 ÷ 10 = 5

(e) $DOL = \frac{[Q \times (P - VC)]}{[Q \times (P - VC)] - FC}$

$DOL = \frac{[10,000 \times (\$63.50 - \$16.00)]}{[10,000 \times (\$63.50 - \$16.00)] - \$380,000}$

$DOL = \frac{\$475,000}{\$95,000} = 5.00$

P12-9. LG 2: Degree of Operating Leverage–Graphic

Intermediate

(a) $Q = \frac{FC}{(P - VC)} = \frac{\$72,000}{\$9.75 - \$6.75} = 24{,}000 \text{ units}$

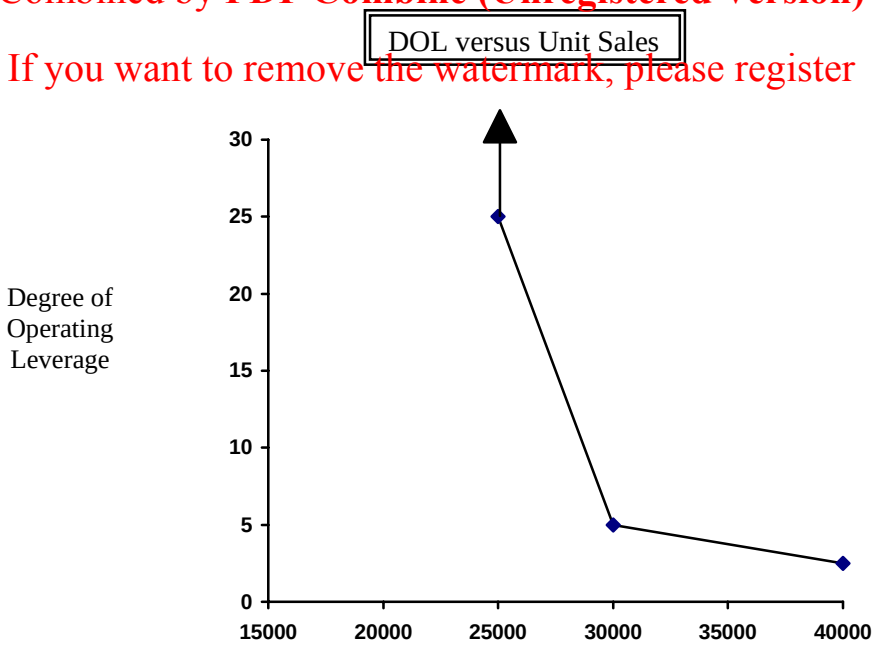
(b) $DOL = \frac{[Q \times (P - VC)]}{[Q \times (P - VC)] - FC}$

$DOL = \frac{[25{,}000 \times (\$9.75 - \$6.75)]}{[25{,}000 \times (\$9.75 - \$6.75)] - \$72{,}000} = 25.0$

$DOL = \frac{[30{,}000 \times (\$9.75 - \$6.75)]}{[30{,}000 \times (\$9.75 - \$6.75)] - \$72{,}000} = 5.0$

$DOL = \frac{[40{,}000 \times (\$9.75 - \$6.75)]}{[40{,}000 \times (\$9.75 - \$6.75)] - \$72{,}000} = 2.5$

(c)



(d) $DOL = \frac{[24{,}000 \times (\$9.75 - \$6.75)]}{[24{,}000 \times (\$9.75 - \$6.75)] - \$72{,}000} = \infty$

At the operating breakeven point, the DOL is infinite.

(e) DOL decreases as the firm expands beyond the operating breakeven point.

P12-10. LG 2: EPS Calculations
Intermediate

	(a)	(b)	(c)
EBIT	$24,600	$30,600	$35,000
Less: Interest	9,600	9,600	9,600
Net profits before taxes	$15,000	$21,000	$25,400
Less: Taxes	6,000	8,400	10,160
Net profit after taxes	$9,000	$12,600	$15,240
Less: Preferred dividends	7,500	7,500	7,500
Earnings available to common shareholders	$1,500	$5,100	$7,740
EPS (4,000 shares)	$0.375	$1.275	$1.935

P12-11. LG 2: Degree of Financial Leverage
Intermediate

(a)

EBIT	$80,000	$120,000
Less: Interest	40,000	40,000
Net profits before taxes	$40,000	$80,000
Less: Taxes (40%)	16,000	32,000
Net profit after taxes	$24,000	$48,000
EPS (2,000 shares)	$12.00	$24.00

(b) $$DFL = \frac{EBIT}{\left[EBIT - I - \left(PD \times \frac{1}{(1-T)}\right)\right]}$$

$$DFL = \frac{\$80,000}{[\$80,000 - \$40,000 - 0]} = 2$$

(c)

EBIT	$80,000	$120,000
Less: Interest	16,000	16,000
Net profits before taxes	$64,000	$104,000
Less: Taxes (40%)	25,600	41,600
Net profit after taxes	$38,400	$62,400
EPS (3,000 shares)	$12.80	$20.80

$$DFL = \frac{\$80,000}{[\$80,000 - \$16,000 - 0]} = 1.25$$

P12-12. LG 2; S: DFL and Graphic Display of Financing Plans

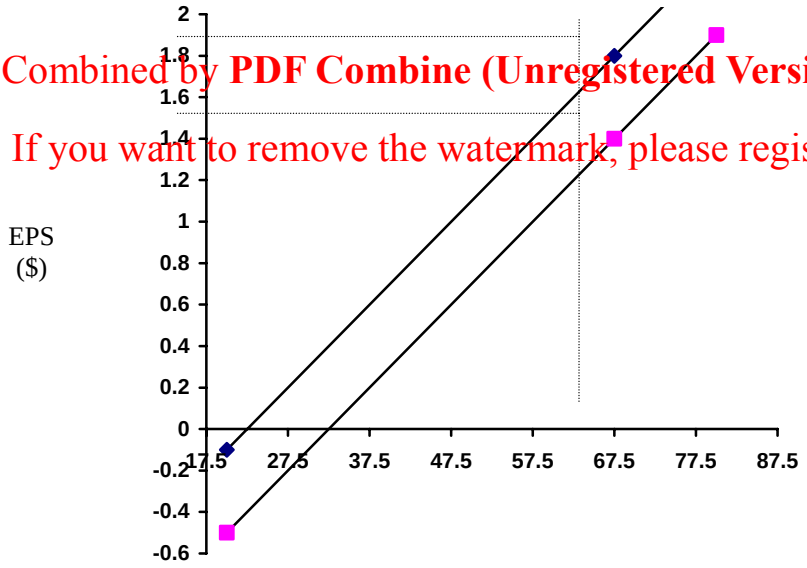
Challenge

(a) $$DFL = \frac{EBIT}{\left[EBIT - I - \left(PD \times \frac{1}{(1-T)}\right)\right]}$$

$$DFL = \frac{\$67,500}{[\$67,500 - \$22,500 - 0]} = 1.5$$

(b)

Graphic Display of Financing Plans



(c) $$DFL = \frac{\$67,500}{\left[\$67,500 - \$22,500 - \frac{\$6,000}{0.6}\right]} = 1.93$$

(d) See graph

(e) The lines representing the two financing plans are parallel since the number of shares of common stock outstanding is the same in each case. The financing plan, including the preferred stock, results in a higher financial breakeven point and a lower EPS at any EBIT level.

P12-13. LG 1, 2: Integrative–Multiple Leverage Measures

Intermediate

(a) $$\text{Operating breakeven} = \frac{\$28{,}000}{\$0.16} = 175{,}000 \text{ units}$$

(b) $$\text{DOL} = \frac{[Q \times (P - VC)]}{[Q \times (P - VC)] - FC}$$

$$\text{DOL} = \frac{[400{,}000 \times (\$1.00 - \$0.84)]}{[400{,}000 \times (\$1.00 - \$0.84)] - \$28{,}000} = \frac{\$64{,}000}{\$36{,}000} = 1.78$$

(c) $$EBIT = (P \times Q) - FC - (Q \times VC)$$

$$EBIT = (\$1.00 \times 400{,}000) - \$28{,}000 - (400{,}000 \times \$0.84)$$

$$EBIT = \$400{,}000 - \$28{,}000 - \$336{,}000$$

$$EBIT = \$36{,}000$$

$$\text{DFL} = \frac{EBIT}{\left[EBIT - I - \left(PD \times \frac{1}{(1 - T)}\right)\right]}$$

$$\text{DFL} = \frac{\$36{,}000}{\left[\$36{,}000 - \$6{,}000 - \left(\frac{\$2{,}000}{(1 - 0.4)}\right)\right]} = 1.35$$

(d) $$\text{DTL} = \frac{[Q \times (P - VC)]}{\left[Q \times (P - VC) - FC - I - \left(\frac{PD}{(1 - T)}\right)\right]}$$

$$\text{DTL} = \frac{[400{,}000 \times (\$1.00 - \$0.84)]}{\left[400{,}000 \times (\$1.00 - \$0.84) - \$28{,}000 - \$6{,}000 - \left(\frac{\$2{,}000}{(1 - 0.4)}\right)\right]}$$

$$\text{DTL} = \frac{\$64{,}000}{[\$64{,}000 - \$28{,}000 - \$9{,}333]} = \frac{\$64{,}000}{\$26{,}667} = 2.40$$

$$DTL = DOL \times DFL$$

$$DTL = 1.78 \times 1.35 = 2.40$$

The two formulas give the same result.

P12-14. LG 2: Integrative–Leverage and Risk

Intermediate

(a) $DOL_R = \dfrac{[100,000 \times (\$2.00 - \$1.70)]}{[100,000 \times (\$2.00 - \$1.70)] - \$6,000} = \dfrac{\$30,000}{\$24,000} = 1.25$

$DFL_R = \dfrac{\$24,000}{[\$24,000 - \$10,000]} = 1.71$

$DTL_R = 1.25 \times 1.71 = 2.14$

(b) $DOL_W = \dfrac{[100,000 \times (\$2.50 - \$1.00)]}{[100,000 \times (\$2.50 - \$1.00)] - \$62,500} = \dfrac{\$150,000}{\$87,500} = 1.71$

$DFL_W = \dfrac{\$87,500}{[\$87,500 - \$17,500]} = 1.25$

$DTL_R = 1.71 \times 1.25 = 2.14$

(c) Firm R has less operating (business) risk but more financial risk than Firm W.

(d) Two firms with differing operating and financial structures may be equally leveraged. Since total leverage is the product of operating and financial leverage, each firm may structure itself differently and still have the same amount of total risk.

P12-15. LG 1, 2: Integrative–Multiple Leverage Measures and Prediction

Challenge

(a) $Q = FC \div (P - VC)$ $Q = \$50,000 \div (\$6 - \$3.50) = 20,000$ latches

(b)

Sales ($6 × 30,000)	$180,000
Less:	
Fixed costs	50,000
Variable costs ($3.50 × 30,000)	105,000
EBIT	25,000
Less interest expense	13,000
EBT	12,000
Less taxes (40%)	4,800
Net profits	$7,200

(c) $DOL = \dfrac{[Q \times (P - VC)]}{[Q \times (P - VC)] - FC}$

$DOL = \dfrac{[30,000 \times (\$6.00 - \$3.50)]}{[30,000 \times (\$6.00 - \$3.50)] - \$50,000} = \dfrac{\$75,000}{\$25,000} = 3.0$

(d) $DFL = \dfrac{EBIT}{\left[EBIT - I - \left(PD \times \dfrac{1}{(1 - T)}\right)\right]}$

$DFL = \dfrac{\$25,000}{\$25,000 - \$13,000 - [\$7,000 \times (1 \div 0.6)]} = \dfrac{\$25,000}{\$333} = 75.08$

(e) $DTL = DOL \times DFL = 3 \times 75.08 = 225.24$

(f) Change in sales = $\frac{15,000}{30,000} = 50\%$

% Change in EBIT = % change in sales × DOL = 50% × 3 = 150%

New EBIT = $25,000 + ($25,000 × 150%) = $62,500

% Change in net profit = % change in sales × DTL = 50% × 225.24 = 11,262%

New net profit = $7,200 + ($7,200 × 11,262%) = $7,200 + $810,864 = $818,064

P12-16. LG 3: Various Capital Structures

Basic

Debt Ratio	Debt	Equity
10%	$100,000	$900,000
20%	$200,000	$800,000
30%	$300,000	$700,000
40%	$400,000	$600,000
50%	$500,000	$500,000
60%	$600,000	$400,000
90%	$900,000	$100,000

Theoretically, the debt ratio cannot exceed 100%. Practically, few creditors would extend loans to companies with exceedingly high debt ratios (>70%).

P12-17. LG 3: Debt and Financial Risk

Challenge

(a) **EBIT Calculation**

Probability	0.20	0.60	0.20
Sales	$200,000	$300,000	$400,000
Less: Variable costs (70%)	140,000	210,000	280,000
Less: Fixed costs	75,000	75,000	75,000
EBIT	$(15,000)	$15,000	$45,000
Less Interest	12,000	12,000	12,000
Earnings before taxes	$(27,000)	$3,000	$33,000
Less: Taxes	(10,800)	1,200	13,200
Earnings after taxes	$(16,200)	$1,800	$19,800

(b) EPS

Earnings after taxes	$(16,200)	$1,800	$19,800
Number of shares	10,000	10,000	10,000
EPS	$(1.62)	$0.18	$1.98

$$\text{Expected EPS} = \sum_{i=1}^{n} \text{EPS}_j \times \text{Pr}_j$$

Expected EPS = (–$1.62 × 0.20) + ($0.18 × 0.60) + ($1.98 × 0.20)

Expected EPS = –$0.324 + $0.108 + $0.396

Expected EPS = $0.18

$$\sigma_{EPS} = \sqrt{\sum_{i=1}^{n} (\text{EPS}_i - \text{EPS})^2 \times \text{Pr}_i}$$

$$\sigma_{EPS} = \sqrt{[(-\$1.62 - \$0.18)^2 \times 0.20] + [(\$0.18 - \$0.18)^2 \times 0.60] + [(\$1.98 - \$0.18)^2 \times 0.20]}$$

$$\sigma_{EPS} = \sqrt{(\$3.24 \times 0.20) + 0 + (\$3.24 \times 0.20)}$$

$$\sigma_{EPS} = \sqrt{\$0.648 + \$0.648}$$

$$\sigma_{EPS} = \sqrt{\$1.296} = \$1.138$$

$$CV_{EPS} = \frac{\sigma_{EPS}}{\text{Expected EPS}} = \frac{1.138}{0.18} = 6.32$$

(c)

EBIT *	$(15,000)	$15,000	$45,000
Less: Interest	0	0	0
Net profit before taxes	$(15,000)	$15,000	$45,000
Less: Taxes	(6,000)	6,000	18,000
Net profits after taxes	$(9,000)	$9,000	$27,000
EPS (15,000 shares)	$(0.60)	$0.60	$1.80

* From part (a)

Expected EPS = (–$0.60 × 0.20) + ($0.60 × 0.60) + ($1.80 × 0.20) = $0.60

$$\sigma_{EPS} = \sqrt{[(-\$0.60 - \$0.60)^2 \times 0.20] + [(\$0.60 - \$0.60)^2 \times 0.60] + [(\$1.80 - \$0.60)^2 \times 0.20]}$$

$$\sigma_{EPS} = \sqrt{(\$1.44 \times 0.20) + 0 + (\$1.44 \times 0.20)}$$

$$\sigma_{EPS} = \sqrt{\$0.576} = \$0.759$$

$$CV_{EPS} = \frac{\$0.759}{0.60} = 1.265$$

(d) **Summary Statistics**

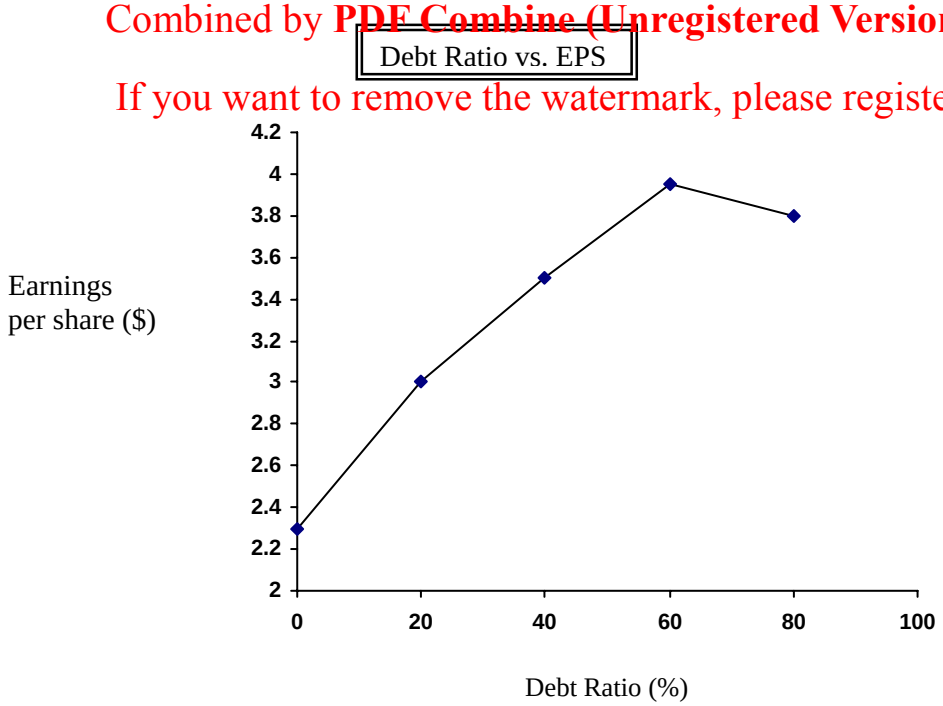
	With Debt	All Equity
Expected EPS	$0.180	$0.600
σ_{EPS}	$1.138	$0.759
CV_{EPS}	6.320	1.265

Including debt in Tower Interiors' capital structure results in a lower expected EPS, a higher standard deviation, and a much higher coefficient of variation than the all-equity structure. Eliminating debt from the firm's capital structure greatly reduces financial risk, which is measured by the coefficient of variation.

P12-18. LG 4: EPS and Optimal Debt Ratio

Intermediate

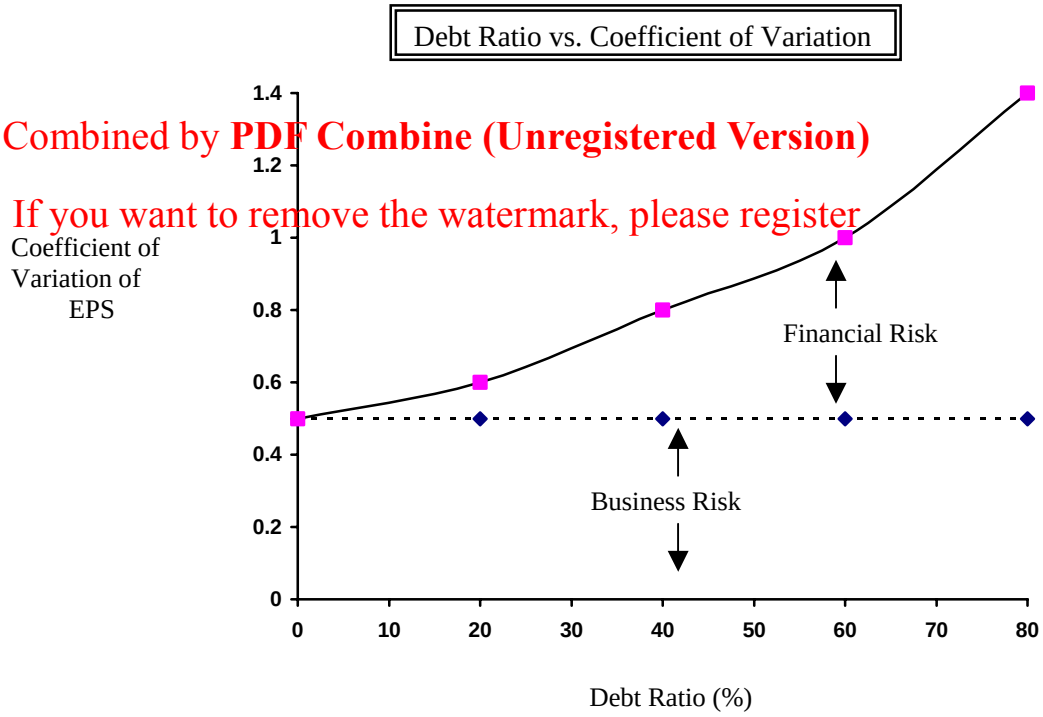
(a)



Maximum EPS appears to be at 60% debt ratio, with $3.95 per share earnings.

(b) $CV_{EPS} = \frac{\sigma_{EPS}}{EPS}$

Debt Ratio	CV
0%	0.5
20	0.6
40	0.8
60	1.0
80	1.4



P12-19. LG 5: EBIT-EPS and Capital Structure

Intermediate

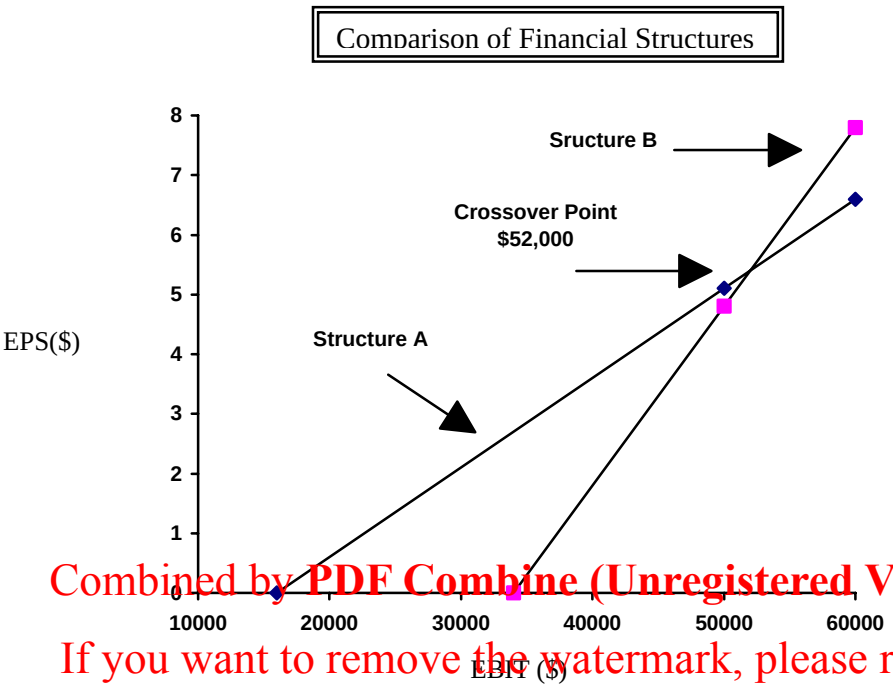
(a) Using $50,000 and $60,000 EBIT:

	Structure A		Structure B	
EBIT	$50,000	$60,000	$50,000	$60,000
Less: Interest	16,000	16,000	34,000	34,000
Net profits before taxes	$34,000	$44,000	$16,000	$26,000
Less: Taxes	13,600	17,600	6,400	10,400
Net profit after taxes	$20,400	$26,400	$9,600	$15,600
EPS (4,000 shares)	$5.10	$6.60		
EPS (2,000 shares)			$4.80	$7.80

Financial breakeven points:

Structure A	Structure B
$16,000	$34,000

(b)



(c) If EBIT is expected to be below $52,000, Structure A is preferred. If EBIT is expected to be above $52,000, Structure B is preferred.

(d) Structure A has less risk and promises lower returns as EBIT increases. B is more risky since it has a higher financial breakeven point. The steeper slope of the line for Structure B also indicates greater financial leverage.

(e) If EBIT is greater than $75,000, Structure B is recommended since changes in EPS are much greater for given values of EBIT.

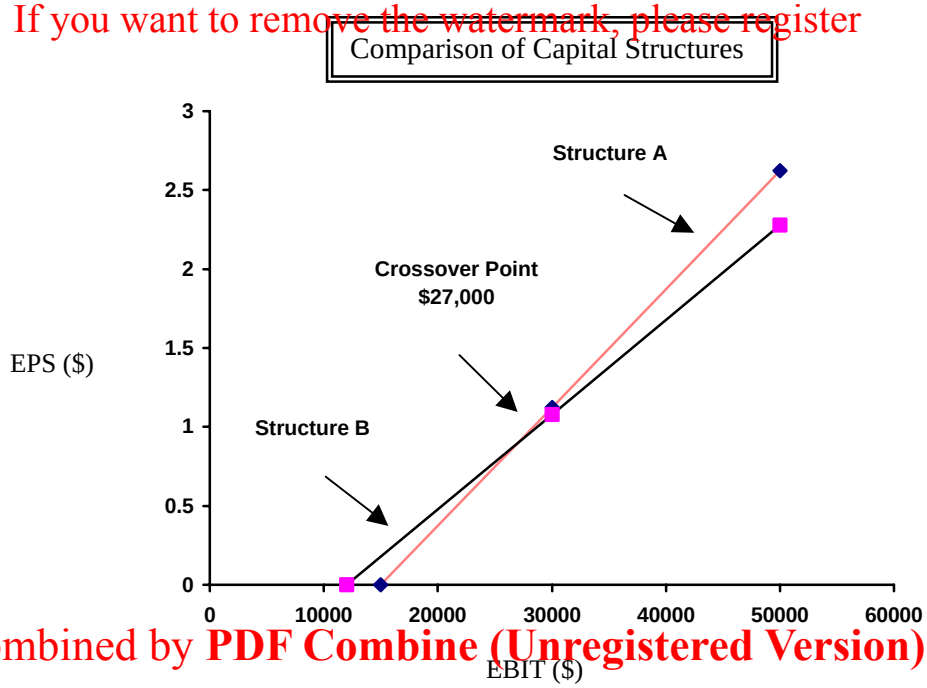
P12-20. LG 5: EBIT-EPS and Preferred Stock

Intermediate

(a)

	Structure A		Structure B	
EBIT	$30,000	$50,000	$30,000	$50,000
Less: Interest	12,000	12,000	7,500	7,500
Net profits before taxes	$18,000	$38,000	$22,500	$42,500
Less: Taxes	7,200	15,200	9,000	17,000
Net profit after taxes	$10,800	$22,800	$13,500	$25,500
Less: Preferred dividends	1,800	1,800	2,700	2,700
Earnings available for common shareholders	$9,000	$21,000	$10,800	$22,800
EPS (8,000 shares)	$1.125	$2.625		
EPS (10,000 shares)			$1.08	$2.28

(b)



(c) Structure A has greater financial leverage, hence greater financial risk.

(d) If EBIT is expected to be below $27,000, Structure B is preferred. If EBIT is expected to be above $27,000, Structure A is preferred.

(e) If EBIT is expected to be $35,000, Structure A is recommended since changes in EPS are much greater for given values of EBIT.

P12-21. LG 3, 4, 6: Integrative–Optimal Capital Structure

Intermediate

(a)

Debt Ratio	0%	15%	30%	45%	60%
EBIT	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000
Less interest	0	120,000	270,000	540,000	900,000
EBT	$2,000,000	$1,880,000	1,730,000	$1,460,000	$1,100,000
Taxes @40%	800,000	752,000	692,000	584,000	440,000
Net profit	$1,200,000	$1,128,000	$1,038,000	$876,000	$660,000
Less preferred dividends	200,000	200,000	200,000	200,000	200,000
Profits available to common stock	$1,000,000	$928,000	$838,000	$676,000	$460,000
# shares outstanding	200,000	170,000	140,000	110,000	80,000
EPS	$5.00	$5.46	$5.99	$6.15	$5.75

(b) $P_0 = \frac{EPS}{k_s}$

Debt: 0%

$P_0 = \frac{\$5.00}{0.12} = \$41.67$

Debt: 15%

$P_0 = \frac{\$5.46}{0.13} = \$42.00$

Debt: 30%

$P_0 = \frac{\$5.99}{0.14} = \$42.79$

Debt: 45%

$P_0 = \frac{\$6.15}{0.16} = \$38.44$

Debt: 60%

$P_0 = \frac{\$5.75}{0.20} = \$28.75$

(c) The optimal capital structure would be 30% debt and 70% equity because this is the debt/equity mix that maximizes the price of the common stock.

P12-22. LG 3, 4, 6: Integrative–Optimal Capital Structures

Challenge

(a) **0% debt ratio**

	Probability		
	0.20	**0.60**	**0.20**
Sales	$200,000	$300,000	$400,000
Less: Variable costs (70%)	80,000	120,000	160,000
Less: Fixed costs	100,000	100,000	100,000
EBIT	$20,000	$80,000	$140,000
Less Interest	0	0	0
Earnings before taxes	$20,000	$80,000	$140,000
Less: Taxes	8,000	32,000	56,000
Earnings after taxes	$12,000	$48,000	$84,000
EPS (25,000 shares)	$0.48	$1.92	$3.36

20% debt ratio:

Total capital = $250,000 (100% equity = 25,000 shares × $10 book value)

Amount of debt = 20% × $250,000 = $50,000

Amount of equity = 80% × 250,000 = $200,000

Number of shares = $200,000 ÷ $10 book value = 20,000 shares

	Probability		
	0.20	**0.60**	**0.20**
EBIT	$20,000	$80,000	$140,000
Less: Interest	5,000	5,000	5,000
Earnings before taxes	$15,000	$75,000	$135,000
Less: Taxes	6,000	30,000	54,000
Earnings after taxes	$9,000	$45,000	$81,000
EPS (20,000 shares)	$0.45	$2.25	$4.05

40% debt ratio:

Amount of debt = 40% × $250,000: = total debt capital = $100,000
Number of shares = $150,000 equity ÷ $10 book value = 15,000 shares

	Probability		
	0.20	**0.60**	**0.20**
EBIT	$20,000	$80,000	$140,000
Less Interest	12,000	12,000	12,000
Earnings before taxes	$8,000	$68,000	$128,000
Less: Taxes	3,200	27,200	51,200
Earnings after taxes	$4,800	$40,800	$76,800
EPS (15,000 shares)	$0.32	$2.72	$5.12

60% debt ratio:

Amount of debt = 60% × $250,000 = total debt capital = $150,000
Number of shares = $100,000 equity ÷ $10 book value = 10,000 shares

	Probability		
	0.20	**0.60**	**0.20**
EBIT	$20,000	$80,000	$140,000
Less: Interest	21,000	21,000	21,000
Earnings before taxes	$(1,000)	$59,000	$119,000
Less: Taxes	(400)	23,600	47,600
Earnings after taxes	$(600)	$35,400	$71,400
EPS (10,000 shares)	$(0.06)	$3.54	$7.14

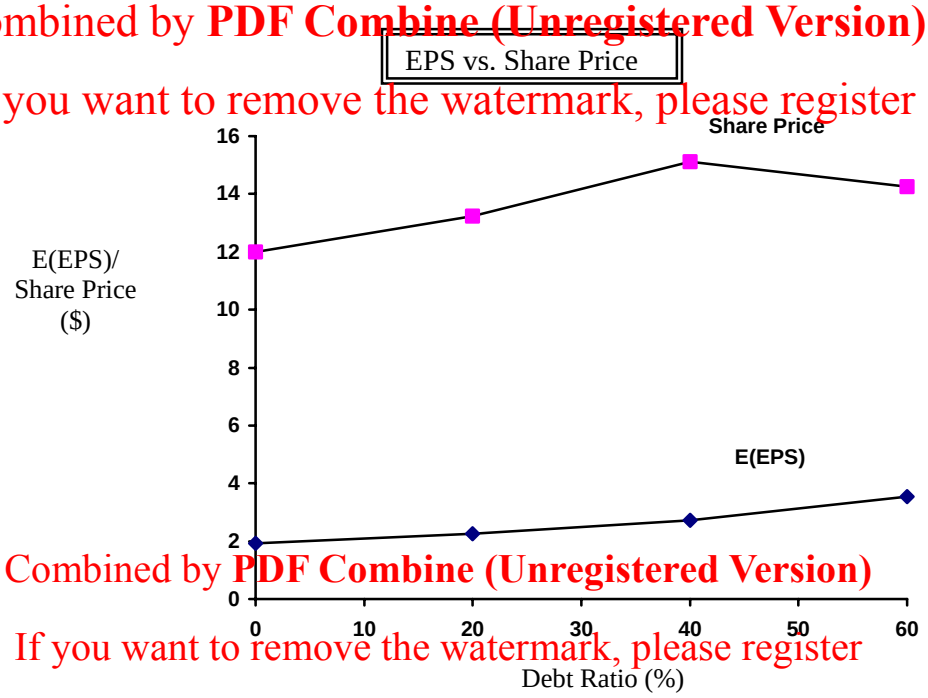
Debt Ratio	E(EPS)	σ(EPS)	CV (EPS)	Number of Common Shares	Dollar Amount of Debt	Share Price*
0%	$1.92	0.9107	0.4743	25,000	0	$1.92/0.16 = $12.00
20%	$2.25	1.1384	0.5060	20,000	$50,000	$2.25/0.17 = $13.24
40%	$2.72	1.5179	0.5581	15,000	$100,000	$2.72/0.18 = $15.11
60%	$3.54	2.2768	0.6432	10,000	$150,000	$3.54/0.24 = $14.75

* Share price: E(EPS) ÷ required return for CV for E(EPS), from table in problem.

(b) (1) Optimal capital structure to maximize EPS: 60% debt
40% equity

(2) Optimal capital structure to maximize share price: 40% debt
60% equity

(c)



P12-23. LG 3, 4, 5, 6: Integrative–Optimal Capital Structure

Challenge

(a)

% Debt	Total Assets	$ Debt	$ Equity	No. of Shares @ $25
0	$40,000,000	$0	$40,000,000	1,600,000
10	40,000,000	4,000,000	36,000,000	1,440,000
20	40,000,000	8,000,000	32,000,000	1,280,000
30	40,000,000	12,000,000	28,000,000	1,120,000
40	40,000,000	16,000,000	24,000,000	960,000
50	40,000,000	20,000,000	20,000,000	800,000
60	40,000,000	24,000,000	16,000,000	640,000

(b)

% Debt	$ Total Debt	Before Tax Cost of Debt, k_d	$ Interest Expense
0	$0	0.0%	$0
10	4,000,000	7.5	300,000
20	8,000,000	8.0	640,000
30	12,000,000	9.0	1,080,000
40	16,000,000	11.0	1,760,000
50	20,000,000	12.5	2,500,000
60	24,000,000	15.5	3,720,000

(c)

% Debt	$ Interest Expense	EBT	Taxes @40%	Net Income	# of Shares	EPS
0	$0	$8,000,000	$3,200,000	$4,800,000	1,600,000	$3.00
10	300,000	7,700,000	3,080,000	4,620,000	1,440,000	3.21
20	640,000	7,360,000	2,944,000	4,416,000	1,280,000	3.45
30	1,080,000	6,920,000	2,768,000	4,152,000	1,120,000	3.71
40	1,760,000	6,240,000	2,496,000	3,744,000	960,000	3.90
50	2,500,000	5,500,000	2,200,000	3,300,000	800,000	4.13
60	3,720,000	4,280,000	1,712,000	2,568,000	640,000	4.01

(d)

% Debt	EPS	k_S	P_0
0	$3.00	10.0%	$30.00
10	3.21	10.3	31.17
20	3.45	10.9	31.65
30	3.71	11.4	32.54
40	3.90	12.6	30.95
50	4.13	14.8	27.91
60	4.01	17.5	22.91

(e) The optimal proportion of debt would be 30% with equity being 70%. This mix will maximize the price per share of the firm's common stock and thus maximize shareholders' wealth. Beyond the 30% level, the cost of capital increases to the point that it offsets the gain from the lower-costing debt financing.

P12-24. LG 3, 4, 5, 6: Integrative–Optimal Capital Structure

Challenge

(a)

	Probability		
	0.30	0.40	0.30
Sales	$600,000	$900,000	$1,200,000
Less: Variable costs (40%)	240,000	360,000	480,000
Less: Fixed costs	300,000	300,000	300,000
EBIT	$60,000	$240,000	$420,000

(b)

Debt Ratio	Amount of Debt	Amount of Equity	Number of Shares of Common Stock*
0%	$0	$1,000,000	40,000
15%	150,000	850,000	34,000
30%	300,000	700,000	28,000
45%	450,000	550,000	22,000
60%	600,000	400,000	16,000

* Dollar amount of equity ÷ $25 per share = Number of shares of common stock.

(c)

Debt Ratio	Amount of Debt	Before Tax Cost of Debt	Annual Interest
0%	$0	0.0%	$0
15%	150,000	8.0	12,000
30%	300,000	10.0	30,000
45%	450,000	13.0	58,500
60%	600,000	17.0	102,000

(d) **EPS = [(EBIT – Interest) (1 – T)] ÷ Number of common shares outstanding.**

Debt Ratio	Calculation		EPS
0%	($60,000 – $0) × (0.6) ÷ 40,000 shares	=	$0.90
	($240,000 – $0) × (0.6) ÷ 40,000 shares	=	3.60
	($420,000 – $0) × (0.6) ÷ 40,000 shares	=	6.30
15%	($60,000 – $12,000) × (0.6) ÷ 34,000 shares	=	$0.85
	($240,000 – $12,000) × (0.6) ÷ 34,000 shares	=	4.02
	($420,000 – $12,000) × (0.6) ÷ 34,000 shares	=	7.20
30%	($60,000 – $30,000) × (0.6) ÷ 28,000 shares	=	$0.64
	($240,000 – $30,000) × (0.6) ÷ 28,000 shares	=	4.50
	($420,000 – $30,000) × (0.6) ÷ 28,000 shares	=	8.36
45%	($60,000 – $58,500) × (0.6) ÷ 22,000 shares	=	$0.04
	($240,000 – $58,500) × (0.6) ÷ 22,000 shares	=	4.95
	($420,000 – $58,500) × (0.6) ÷ 22,000 shares	=	9.86
60%	($60,000 – $102,000) × (0.6) ÷ 16,000 shares	=	–$1.58
	($240,000 – $102,000) × (0.6) ÷ 16,000 shares	=	5.18
	($420,000 – $102,000) × (0.6) ÷ 16,000 shares	=	11.93

(e) (1) $E(EPS) = 0.30(EPS_1) + 0.40(EPS_2) + 0.30(EPS_3)$

Debt Ratio	Calculation	E(EPS)
0%	$0.30 \times (0.90) + 0.40 \times (3.60) + 0.30 \times (6.30)$	
	$0.27 + 1.44 + 1.89$	$= \$3.60$
15%	$0.30 \times (0.85) + 0.40 \times (4.02) + 0.30 \times (7.20)$	
	$0.26 + 1.61 + 2.16$	$= \$4.03$
30%	$0.30 \times (0.64) + 0.40 \times (4.50) + 0.30 \times (8.36)$	
	$0.19 + 1.80 + 2.51$	$= \$4.50$
45%	$0.30 \times (0.04) + 0.40 \times (4.95) + 0.30 \times (9.86)$	
	$0.01 + 1.98 + 2.96$	$= \$4.95$
60%	$0.30 \times (-1.58) + 0.40 \times (5.18) + 0.30 \times (11.93)$	
	$-0.47 + 2.07 + 3.58$	$= \$5.18$

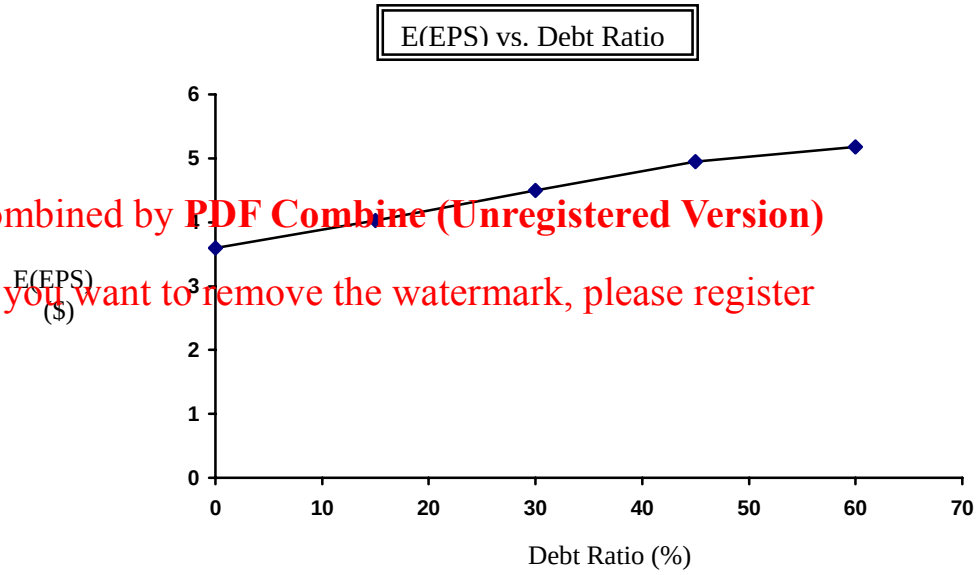
(2) σ_{EPS}

Debt Ratio	Calculation
0%	$\sigma_{EPS} = \sqrt{[(0.90 - 3.60)^2 \times 0.3] + [(3.60 - 3.60)^2 \times 0.4] + [(6.30 - 3.60)^2 \times 0.3]}$
	$\sigma_{EPS} = \sqrt{2.187 + 0 + 2.187}$
	$\sigma_{EPS} = \sqrt{4.374}$
	$\sigma_{EPS} = 2.091$
15%	$\sigma_{EPS} = \sqrt{[(0.85 - 4.03)^2 \times 0.3] + [(4.03 - 4.03)^2 \times 0.4] + [(7.20 - 4.03)^2 \times 0.3]}$
	$\sigma_{EPS} = \sqrt{3.034 + 0 + 3.034}$
	$\sigma_{EPS} = \sqrt{6.068}$
	$\sigma_{EPS} = 2.463$
30%	$\sigma_{EPS} = \sqrt{[(0.64 - 4.50)^2 \times 0.3] + [(4.50 - 4.50)^2 \times 0.4] + [(8.36 - 4.50)^2 \times 0.3]}$
	$\sigma_{EPS} = \sqrt{4.470 + 0 + 4.470}$
	$\sigma_{EPS} = \sqrt{8.94}$
	$\sigma_{EPS} = 2.99$
45%	$\sigma_{EPS} = \sqrt{[(0.04 - 4.95)^2 \times 0.3] + [(4.95 - 4.95)^2 \times 0.4] + [(9.86 - 4.95)^2 \times 0.3]}$
	$\sigma_{EPS} = \sqrt{7.232 + 0 + 7.187232}$
	$\sigma_{EPS} = \sqrt{14.464}$
	$\sigma_{EPS} = 3.803$
60%	$\sigma_{EPS} = \sqrt{[(-1.58 - 5.18)^2 \times 0.3] + [(5.18 - 5.18)^2 \times 0.4] + [(11.930 - 5.18)^2 \times 0.3]}$
	$\sigma_{EPS} = \sqrt{13.669 + 0 + 13.669}$
	$\sigma_{EPS} = \sqrt{27.338}$
	$\sigma_{EPS} = 5.299$

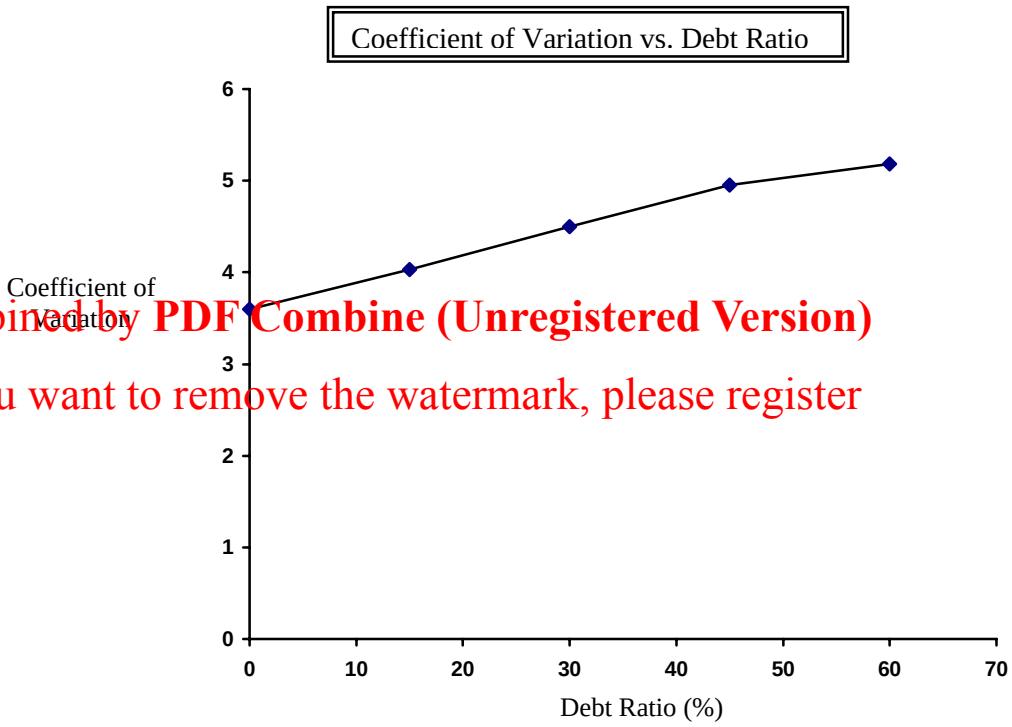
(3)

Debt Ratio	$\sigma_{EPS} \div E(EPS)$	= CV
0%	2.091 ÷ 3.60	= 0.581
15%	2.463 ÷ 4.03	= 0.611
30%	2.990 ÷ 4.50	= 0.664
45%	3.803 ÷ 4.95	= 0.768
60%	5.229 ÷ 5.18	= 1.009

(f) (1)

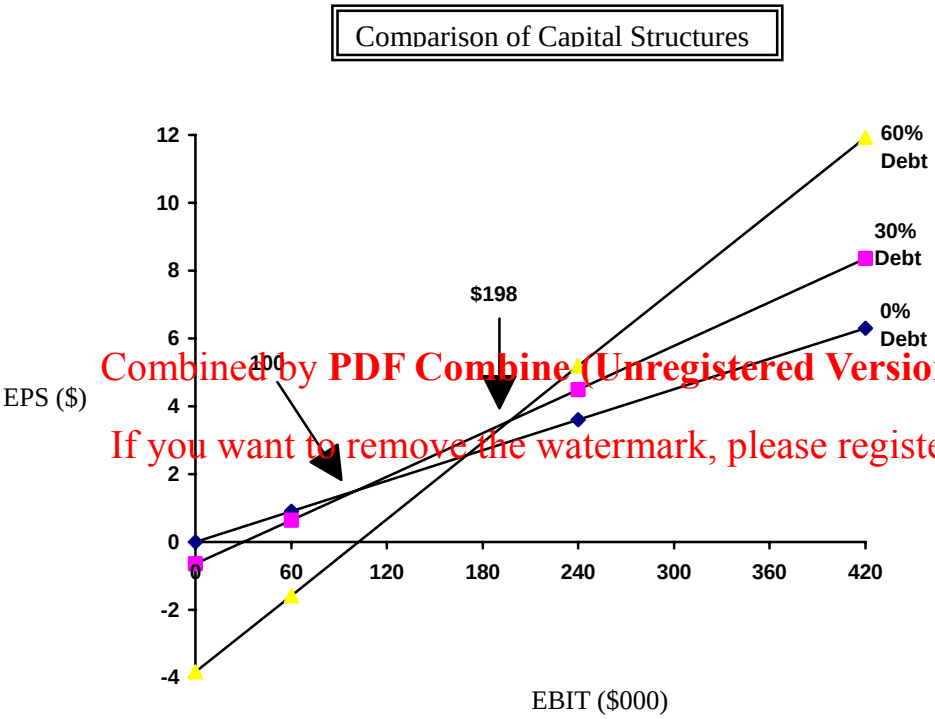


(2)



The return, as measured by the E(EPS), as shown in part (d), continually increases as the debt ratio increases, although at some point the rate of increase of the EPS begins to decline (the law of diminishing returns). The risk as measured by the CV also increases as the debt ratio increases, but at a more rapid rate.

(g)



The EBIT ranges over which each capital structure is preferred are as follows:

Debt Ratio	EBIT Range
0%	$0–$100,000
30%	$100,001–$198,000
60%	above $198,000

To calculate the intersection points on the graphic representation of the EBIT-EPS approach to capital structure, the EBIT level which equates EPS for each capital structure must be found, using the formula in Footnote 22.

$$EPS = \frac{(1 - T) \times (EBIT - I) - PD}{\text{number of common shares outstanding}}$$

Set EPS 0% = EPS 30%

EPS 30% = EPS 60%

The first calculation, EPS 0% = EPS 30%, is illustrated:

$$EPS_{0\%} = \frac{[(1 - 0.4)(EBIT - \$0) - 0]}{40{,}000 \text{ shares}}$$

$$EPS_{30\%} = \frac{[(1 - 0.4)(EBIT - \$30{,}000) - 0]}{28{,}000 \text{ shares}}$$

$$16{,}800\ EBIT = 24{,}000\ EBIT - 720{,}000{,}000$$

$$EBIT = \frac{720{,}000{,}000}{7{,}200} = \$100{,}000$$

The major problem with this approach is that is does not consider maximization of shareholder wealth (i.e., share price).

(h)

Debt Ratio	EPS ÷ k_s	Share Price
0%	$3.60 ÷ 0.100	$36.00
15%	$4.03 ÷ 0.105	$38.38
30%	$4.50 ÷ 0.116	$38.79
45%	$4.93 ÷ 0.140	$35.36
60%	$5.18 ÷ 0.200	$25.90

(i) To maximize EPS, the 60% debt structure is preferred.
To maximize share value, the 30% debt structure is preferred.

A capital structure with 30% debt is recommended because it maximizes share value and satisfies the goal of maximization of shareholder wealth.

P12-25. Ethics Problem

Intermediate

Information asymmetry applies to situations in which one party has more and better information than the other interested party(ies). This appears to be exactly the situation in which managers overleverage or lead a buyout of the company. Existing bondholders and possibly stockholders are harmed by the financial risk of overleveraging, and existing stockholders are harmed if they accept a buyout price less than that warranted by accurate and incomplete information.

The board of directors has a fiduciary duty toward stockholders, and hopefully bears an ethical concern toward bondholders as well. The board can and should insist that management divulge all information it possess on the future plans and risks the company faces (although, caution to keep this out of the hands of competitors is warranted). The board should be cautious to select and retain CEOs with high integrity, and continue to emphasize an ethical "tone at the top." (Students will no doubt think of other creative mechanisms to deal with this situation.)

Chapter 13
Dividend Policy

■ Solutions to Problems

P13-1. LG 1: Dividend Payment Procedures

Basic

(a)

	Debit	Credit
Retained earnings (Dr.)	$330,000	
Dividends payable (Cr.)		$330,000

(b) Ex dividend date is Thursday, July 6.

(c)

Cash	$170,000	Dividends payable	$0
		Retained earnings	$2,170,000

(d) The dividend payment will result in a decrease in total assets equal to the amount of the payment.

(e) Notwithstanding general market fluctuations, the stock price would be expected to drop by the amount of the declared dividend on the ex dividend date.

P13-2. LG 1: Dividend Payment

Intermediate

(a) Friday, May 7

(b) Monday, May 10

(c) The price of the stock should drop by the amount of the dividend ($0.80).

(d) She would be better off buying the stock at $35 and taking the dividend. Her $0.80 dividend would be taxed as the maximum rate of 15 percent and her $4 short-term capital gain would be taxed at you ordinary marginal tax rate, which is probably higher than the 15 percent. If she bought the stock post dividend for $34.20 she would pay her marginal ordinary tax rate on the full $4.80 of short-term capital gains.

P13-3. LG 2: Residual Dividend Policy

Intermediate

(a) *Residual dividend policy* means that the firm will consider its investment opportunities first. If after meeting these requirements there are funds left, the firm will pay the residual out in the form of dividends. Thus, if the firm has excellent investment opportunities, the dividend will be smaller than if investment opportunities are limited.

(b)

Proposed			
Capital budget	$2,000,000	$3,000,000	$4,000,000
Debt portion	800,000	1,200,000	1,600,000

Equity portion	1,200,000	1,800,000	2,400,000
Available retained earnings	$2,000,000	$2,000,000	$2,000,000
Dividend	800,000	200,000	0
Dividend payout ratio	40%	10%	0%

(c) The amount of dividends paid is reduced as capital expenditures increase. Thus, if the firm chooses larger capital investments, dividend payment will be smaller or nonexistent.

P13-4. LG 3: Dividend Constraints

Intermediate

(a) Maximum dividend: $\frac{\$1,900,000}{400,000} = \$4.75$ per share

(b) Largest dividend without borrowing: $\frac{\$160,000}{400,000} = \$0.40$ per share

(c) In (a), cash and retained earnings each decrease by $1,900,000.
In (b), cash and retained earnings each decrease by $160,000.

(d) Retained earnings (and hence stockholders' equity) decrease by $80,000.

P13-5. LG 3: Dividend Payment Procedures

Intermediate

(a) Maximum dividend: $\frac{\$40,000}{25,000} = \$1.60$ per share

(b) A $20,000 decrease in cash and retained earnings is the result of a $0.80 per share dividend.

(c) Cash is the key constraint, because a firm cannot pay out more in dividends than it has in cash, unless it borrows.

P13-6. LG 4: Low-Regular-and-Extra Dividend Policy

Intermediate

(a)

Year	Payout %	Year	Payout %
2001	25.4	2004	22.9
2002	23.3	2005	20.8
2003	17.9	2006	16.7

(b)

Year	25% Payout	Actual Payout	$ Diff.	Year	25% Payout	Actual Payout	$ Diff.
2001	$0.49	0.50	0.01	2004	0.55	0.50	–0.05
2002	0.54	0.50	–0.04	2005	0.60	0.50	–0.10
2003	0.70	0.50	–0.20	2006	0.75	0.50	–0.25

(c) In this example the firm would not pay any extra dividend since the actual dividend did not fall below the 25% minimum by $1.00 in any year. When the "extra" dividend is not paid due to the $1.00 minimum, the extra cash can be used for additional investment by placing the funds in a short-term investment account.

(d) If the firm expects the earnings to remain above the EPS of $2.20 the dividend should be raised to $0.55 per share. The 55 cents per share will retain the 25% target payout but allow the firm to pay a higher regular dividend without jeopardizing the cash position of the firm by paying too high of a regular dividend.

P13-7. LG 4: Alternative Dividend Policies

Intermediate

Year	Dividend	Year	Dividend
(a)			
1997	$0.10	2002	$1.28
1998	0.00	2003	1.12
1999	0.72	2004	1.28
2000	0.48	2005	1.52
2001	0.96	2006	1.60
(b)			
1997	$1.00	2002	$1.10
1998	1.00	2003	1.20
1999	1.00	2004	1.30
2000	1.00	2005	1.40
2001	1.00	2006	1.50
(c)			
1997	$0.50	2002	$0.66
1998	0.50	2003	0.50
1999	0.50	2004	0.66
2000	0.50	2005	1.14
2001	0.50	2006	1.30

(d) With a constant-payout policy, if the firm's earnings drop or a loss occurs the dividends will be low or nonexistent. A regular dividend or a low-regular-and-extra dividend policy reduces owner uncertainty by paying relatively fixed and continuous dividends.

P13-8. LG 4: Alternative Dividend Policies

Challenge

Year	Dividend	Year	Dividend
(a)			
1999	$0.22	2003	$0.00
2000	0.50	2004	0.60
2001	0.30	2005	0.78
2002	0.53	2006	0.70
(b)			
1999	$0.50	2003	$0.50
2000	0.50	2004	0.50
2001	0.50	2005	0.60
2002	0.50	2006	0.60
(c)			
1999	$0.50	2003	$0.50
2000	0.50	2004	0.62
2001	0.50	2005	0.84
2002	0.53	2006	0.74
(d)			
1999	$0.50	2003	$0.50
2000	0.50	2004	0.62
2001	0.50	2005	0.88
2002	0.53	2006	0.78

(e) Part (a) uses a constant-payout-ratio dividend policy, which will yield low or no dividends if earnings decline or a loss occurs. Part (b) uses a regular dividend policy, which minimizes the owners' uncertainty of earnings. Part (c) uses a low-regular-and-extra dividend policy, giving investors a stable income which is necessary to build confidence in the firm. Part (d) still provides the stability of Plans (b) and (c) but allows for larger future dividend growth.

P13-9. LG 5: Stock Dividend–Firm

Intermediate

	(a) 5% Stock Dividend	(b) (1) 10% Stock Dividend	(b) (2) 20% Stock Dividend
Preferred Stock	$100,000	$100,000	$100,000
Common Stock (xx,xxx shares @$2.00 par)	21,000[1]	22,000[2]	24,000[3]
Paid-in Capital in Excess of Par	294,000	308,000	336,000
Retained Earnings	85,000	70,000	40,000
Stockholders' Equity	$500,000	$500,000	$500,000

[1] 10,500 shares

[2] 11,000 shares

[3] 12,000 shares

(c) Stockholders' equity has not changed. Funds have only been redistributed between the stockholders' equity accounts.

P13-10. LG 5: Cash versus Stock Dividend

Intermediate

(a)

	Cash Dividend			
	$0.01	**$0.05**	**$0.10**	**$0.20**
Preferred Stock	$100,000	$100,000	$100,000	$100,000
Common Stock (400,000 shares @$1.00 par)	400,000	400,000	400,000	400,000
Paid-in Capital in Excess of Par	200,000	200,000	200,000	200,000
Retained Earnings	316,000	300,000	280,000	240,000
Stockholders' Equity	$1,016,000	$1,000,000	$980,000	$940,000

(b)

	Stock Dividend			
	1%	**5%**	**10%**	**20%**
Preferred Stock	$100,000	$100,000	$100,000	$100,000
Common Stock (xxx,xxx shares @$1.00 par)	404,000	420,000	440,000	480,000
Paid-in Capital in Excess of Par	212,000	260,000	320,000	440,000
Retained Earnings	304,000	240,000	160,000	0
Stockholders' Equity	$1,020,000	$1,020,000	$1,020,000	$1,020,000

(c) Stock dividends do not affect stockholders' equity; they only redistribute retained earnings into common stock and additional paid-in capital accounts. Cash dividends cause a decrease in retained earnings and, hence, in overall stockholders' equity.

P13-11. LG 5: Stock Dividend: Investor

Intermediate

(a) $\text{EPS} = \dfrac{\$80,000}{40,000} = \$2.00$

(b) $\text{Percent ownership} = \dfrac{400}{40,000} = 1.0\%$

(c) Percent ownership after stock dividend: 440 ÷ 44,000 = 1%; stock dividends maintain the same ownership percentage. They do not have a real value.

(d) Market price: $22 ÷ 1.10 = $20 per share

(e) Her proportion of ownership in the firm will remain the same, and as long as the firm's earnings remain unchanged, so, too, will her total share of earnings.

P13-12. LG 5: Stock Dividend–Investor

Challenge

(a) $\text{EPS} = \dfrac{\$120,000}{50,000} = \$2.40 \text{ per share}$

(b) $\text{Percent ownership} = \dfrac{500}{50,000} = 1.0\%$

His proportionate ownership remains the same in each case

(c) $\text{Market price} = \dfrac{\$40}{1.05} = \$38.10$

$\text{Market price} = \dfrac{\$40}{1.10} = \$36.36$

The market price of the stock will drop to maintain the same proportion, since more shares are being used.

(d) $\text{EPS} = \dfrac{\$2.40}{1.05} = \$2.29 \text{ per share}$

$\text{EPS} = \dfrac{\$2.40}{1.10} = \$2.18 \text{ per share}$

(e) Value of holdings: $20,000 under each plan.
As long as the firm's earnings remain unchanged, his total share of earnings will be the same.

(f) The investor should have no preference because the only value is of a psychological nature. After a stock split or dividend, however, the stock price tends to go up faster than before.

P13-13. LG 6: Stock Split–Firm

Intermediate

(a)	CS = $1,800,000	(1,200,000 shares	@ $1.50 par)
(b)	CS = $1,800,000	(400,000 shares	@ $4.50 par)
(c)	CS = $1,800,000	(1,800,000 shares	@ $1.00 par)
(d)	CS = $1,800,000	(3,600,000 shares	@ $0.50 par)
(e)	CS = $1,800,000	(150,000 shares	@ $12.00 par)

P13-14. LG 5, 6: Stock Split versus Stock Dividend–Firm

Challenge

(a) There would be a decrease in the par value of the stock from $3 to $2 per share. The shares outstanding would increase to 150,000. The common stock account would still be $300,000 (150,000 shares at $2 par).

(b) The stock price would decrease by one-third to $80 per share.

(c) Before stock split: $100 per share ($10,000,000 ÷ 100,000)
After stock split: $66.67 per share ($10,000,000 ÷ 150,000)

(d) (1) A 50% stock dividend would increase the number of shares to 150,000 but would not entail a decrease in par value. There would be a transfer of $150,000 into the common stock account and $5,850,000 in the paid-in capital in excess of par account from the retained earnings account, which decreases to $4,000,000.

(2) The stock price would change to approximately the same level.

(3) Before dividend: $100 per share ($10,000,000 ÷ 100,000)

After dividend: $26.67 per share ($4,000,000 ÷ 150,000)

(4) Stock splits cause an increase in the number of shares outstanding and a decrease in the par value of the stock with no alteration of the firm's equity structure. However, stock dividends cause an increase in the number of shares outstanding without any decrease in par value. Stock dividends cause a transfer of funds from the retained earnings account into the common stock account and paid-in capital in excess of par account.

P13-15. LG 5, 6: Stock Dividend Versus Stock Split–Firm

Challenge

(a) A 20% stock dividend would increase the number of shares to 120,000 but would not entail a decrease in par value. There would be a transfer of $20,000 into the common stock account and $380,000 [($30 − $1) × 20,000] in the paid-in capital in excess of par account from the retained earnings account. The per-share earnings would decrease since net income remains the same but the number of shares outstanding increases by 20,000.

$$\text{EPS stock dividend} = \frac{\$360{,}000}{120{,}000} = \$3.00$$

(b) There would be a decrease in the par value of the stock from $1 to $0.80 per share. The shares outstanding would increase to 125,000. The common stock account would still be $100,000 (125,000 shares at $0.80 par). The per-share earnings would decrease since net income remains the same but the number of shares outstanding increases by 25,000.

$$\text{EPS stock split} = \frac{\$360{,}000}{125{,}000} = \$2.88$$

(c) The option in part (b) the stock split, will accomplish the goal of reducing the stock price while maintaining a stable level of retained earnings. A stock split does not cause any change in retained earnings but reduces the price of the shares in the same proportion as the split ratio.

(d) The firm may be restricted in the amount of retained earnings available for dividend payments, whether cash or stock dividends. Stock splits do not have any impact on the firm's retained earnings.

P13-16. LG 6: Stock Repurchase

Intermediate

(a) $$\text{Shares to be repurchased} = \frac{\$400{,}000}{\$21.00} = 19{,}047 \text{ shares}$$

(b) $$\text{EPS} = \frac{\$800,000}{(400,000 - 19,047)} = \frac{\$800,000}{380,953} = \$2.10 \text{ per share}$$

If 19,047 shares are repurchased, the number of common shares outstanding will decrease and earnings per share will increase.

(c) Market price: $2.10 × 10 = $21.00 per share

(d) The stock repurchase results in an increase in earnings per share from $2.00 to $2.10.

(e) The pre-repurchase market price is different from the post-repurchase market price by the amount of the cash dividend paid. The post-repurchase price is higher because there are fewer shares outstanding.

Cash dividends are taxable to the stockholder when they are distributed and are taxed at the 15 percent tax rate. If the firm repurchases stock, taxes on the increased value resulting from the purchase are also due at the time of the repurchase. The additional $1 gain would be taxed at either the long-term capital gains rate of 15 percent, the same as the dividend, unless the stock was held for less than 1 year then the gain would be short-term and taxed at the higher marginal ordinary income rate. Which alternative is preferred by the shareholders would depend on the investors' holding period for the stock at the time the repurchase is made. Taxes would not have to be paid on the repurchase gains until the repurchase actually occurs.

P13-17. LG 6: Stock Repurchase

Challenge

(a) Shares outstanding needed $= \dfrac{(\$1{,}200{,}000 \times 0.40)}{\$2.00} = \dfrac{\$480{,}000}{\$2.00} = 240{,}000$

(b) 300,000 – 240,000 = 60,000 shares to repurchase

P13-18. Ethics Problem

Intermediate

Cash and investments at Ford equals $32 billion, and less the $4 billion pension need, the net amount settles at $28 billion. If we accept the guesstimate of a $5 billion loss per year during a recession (auto manufacturers are cyclical stocks), Ford could survive $28/$ 5 = 5.6 years of losses. This is more than a hypothetical question—Chrysler based its large cash and securities holdings on exactly this premise, arguing it could've avoided bankruptcy in the 1970s had it been more liquid.

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Chapter 16
Hybrid and Derivative Securities

■ Solutions to Problems

P16-1. LG 2: Lease Cash Flows

Basic

Firm	Year	Lease Payment (1)	Tax Benefit (2)	After-tax Cash Outflow [(1) – (2)] (3)
A	1–4	$100,000	$40,000	$60,000
B	1–14	80,000	32,000	48,000
C	1–8	150,000	60,000	90,000
D	1–25	60,000	24,000	36,000
E	1–10	20,000	8,000	12,000

P16-2. LG 2: Loan Interest

Intermediate

Loan	Year	Interest Amount
A	1	$1,400
	2	1,098
	3	767
	4	402
B	1	$2,100
	2	1,109
C	1	$312
	2	220
	3	117
D	1	$6,860
	2	5,822
	3	4,639
	4	3,290
	5	1,753
E	1	$4,240
	2	3,768
	3	3,220

4	2,585	
5	1,848	
6	995	

P16-3. LG 2: Loan Payments and Interest

Intermediate

Payment = $117,000 ÷ 3.889 = $30,085 (Calculator solution: $30,087.43)

Year	Beginning Balance	Interest	Principal	
1	$117,000	$16,380	$13,705	
2	103,295	14,461	15,624	
3	87,671	12,274	17,811	
4	69,860	9,780	20,305	
5	49,555	6,938	23,147	
6	26,408	3,697	26,388	$26,408
		$103,530	$117,000	$117,008

Note: Due to the PVIFA tables in the text presenting factors only to the third decimal place and the rounding of interest and principal payments to the second decimal place, the summed principal payments over the term of the loan will be slightly different from the loan amount. To compensate in problems involving amortization schedules, the adjustment has been made in the last principal payment. The actual amount is shown with the adjusted figure to its right.\P16-4. LG 2: Lease versus Purchase

Challenge

(a) **Lease**

After-tax cash outflow = $25,200 × (1 – 0.40) = $15,120/year for 3years + $5,000 purchase option in year 3 (total for year 3: $20,120)

Purchase

Year	Loan Payment (1)	Main-tenance (2)	Depre-ciation (3)	Interest at 14% (4)	Total Deductions (2 + 3 + 4) (5)	Tax Shields [(0.40) × (5)] (6)	After-tax Cash Outflows [(1 + 2) – (6)] (7)
1	$25,844	$1,800	$19,800	$8,400	$30,000	$12,000	$15,644
2	25,844	1,800	27,000	5,958	34,758	13,903	13,741
3	25,844	1,800	9,000	3,174	13,974	5,590	22,054

(b)

End of Year	After-tax Cash Outflows	$PVIF_{8\%,n}$	PV of Outflows	Calculator Solution
Lease				
1	$15,120	0.926	$14,001	
2	15,120	0.857	12,958	
3	20,120	0.794	15,975	
			$42,934	$42,934.87
Purchase				
1	$15,644	0.926	$14,486	
2	13,741	0.857	11,776	
3	22,054	0.794	17,511	
			$43,773	$43,773.06

(c) Since the PV of leasing is less than the PV of purchasing the equipment, the firm should lease the equipment and save $962 in present value terms.

P16-5. LG 2: Lease versus Purchase

Challenge

(a) **Lease**

After-tax cash outflows = $19,800 × (1 – 0.40) = $11,880/year for 5 years plus $24,000 purchase option in year 5 (total $35,880).

Purchase

Year	Loan Payment (1)	Main-tenance (2)	Depre-ciation (3)	Interest at 14% (4)	Total Deductions (2 + 3 + 4) (5)	Tax Shields [(0.40) × (5)] (6)	After-tax Cash Outflows [(1 + 2) – (6)] (7)
1	$23,302	$2,000	$16,000	$11,200	$29,200	$11,680	$13,622
2	23,302	2,000	25,600	9,506	37,106	14,842	10,460
3	23,302	2,000	15,200	7,574	24,774	9,910	15,392
4	23,302	2,000	9,600	5,372	16,972	6,789	18,513
5	23,302	2,000	9,600	2,862	14,462	5,785	19,517

(b)

End of Year	After-tax Cash Outflows	$PVIF_{9\%,n}$	PV of Outflows	Calculator Solution
Lease				
1	$11,880	0.917	$10,894	
2	11,880	0.842	10,003	
3	11,880	0.772	9,171	
4	11,880	0.708	8,411	
5	35,880	0.650	23,322	
			$61,801	$61,807.41
Purchase				
1	$13,622	0.917	$12,491	
2	10,460	0.842	8,807	
3	15,392	0.772	11,883	
4	18,513	0.708	13,107	
5	19,517	0.650	12,686	
			$58,974	$58,986.46

(c) The present value of the cash outflows is less with the purchasing plan, so the firm should purchase the machine. By doing so, it saves $2,827 in present value terms.

P16-6. LG 2: Capitalized Lease Values

Intermediate

Lease	Table Values	Calculator Solution
A	$40,000 × 6.814 = $272,560	$272,547.67
B	120,000 × 4.968 = 596,160	596,116.77
C	9,000 × 6.467 = 58,203	58,206.78
D	16,000 × 2.531 = 40,496	40,500.72
E	47,000 × 7.963 = 374,261	374,276.42

P16-7. LG 3: Conversion Price

Basic

(a) $1,000 ÷ 20 shares = $50 per share

(b) $500 ÷ 25 shares = $20 per share

(c) $1,000 ÷ 50 shares = $20 per share

P16-8. LG 3: Conversion Ratio

Basic

(a) $1,000 ÷ $43.75 = 22.86 shares

(b) $1,000 ÷ $25.00 = 40 shares

(c) $600 ÷ $30.00 = 20 shares

P16-9. LG 3: Conversion (or Stock) Value

Basic

(a) Bond value = 25 shares × $50 = $1,250

(b) Bond value = 12.5 shares × $42 = $525

(c) Bond value = 100 shares × $10.50 = $1,050

P16-10. LG 3: Conversion (or Stock) Value

Basic

Bond	Conversion Value
A	25 × $42.25 = $1,056.25
B	16 × $50.00 = $800.00
C	20 × $44.00 = $880.00
D	5 × $19.50 = $97.50

P16-11. LG 4: Straight Bond Values

Intermediate

Bond	Years	Payments	Factors	PV	Calculator Solution
A	1–20	$100	6.623	$662.30	
	20	1,000	0.073	73.00	
				$735.30	$735.07
B	1–14	$96	5.724	$549.50	
	14	800	0.141	112.80	
				$662.30	$662.61
C	1–30	$130	6.177	$803.01	
	30	1,000	0.012	12.00	
				$815.01	$814.68
D	1–25	$140	5.766	$807.24	
	25	1,000	0.020	20.00	
				$827.24	$827.01

P16-12. LG 4: Determining Values–Convertible Bond

Challenge

(a)

Years	Payments	Factor, 12%	PV	Calculator Solution
1–20	$100	7.469	$746.90	
20	1,000	0.104	104.00	
			$850.90	$850.61

(b) Conversion value = 50 shares × market price

50 × $15 = $750
50 × $20 = 1,000
50 × $23 = 1,150
50 × $30 = 1,500
50 × $45 = 2,250

(c)

Share Price	Bond Value
$15	$850.90
20	1,000.00
23	1,150.00
30	1,500.00
45	2,250.00

As the share price increases the bond will start trading at a premium to the pure bond value due to the increased probability of a profitable conversion. At higher prices the bond will trade at its conversion value.

(d) The minimum bond value is $850.90. The bond will not sell for less than the straight bond value, but could sell for more.

P16-13. LG 4: Determining Values–Convertible Bond

Challenge

(b) **Straight Bond Value**

Years	Payments	Factor, 12%	PV	Calculator Solution
1–15	$130	5.575	$724.75	
15	1,000	0.108	108.00	
			$832.75	$832.74

(b) **Conversion value**

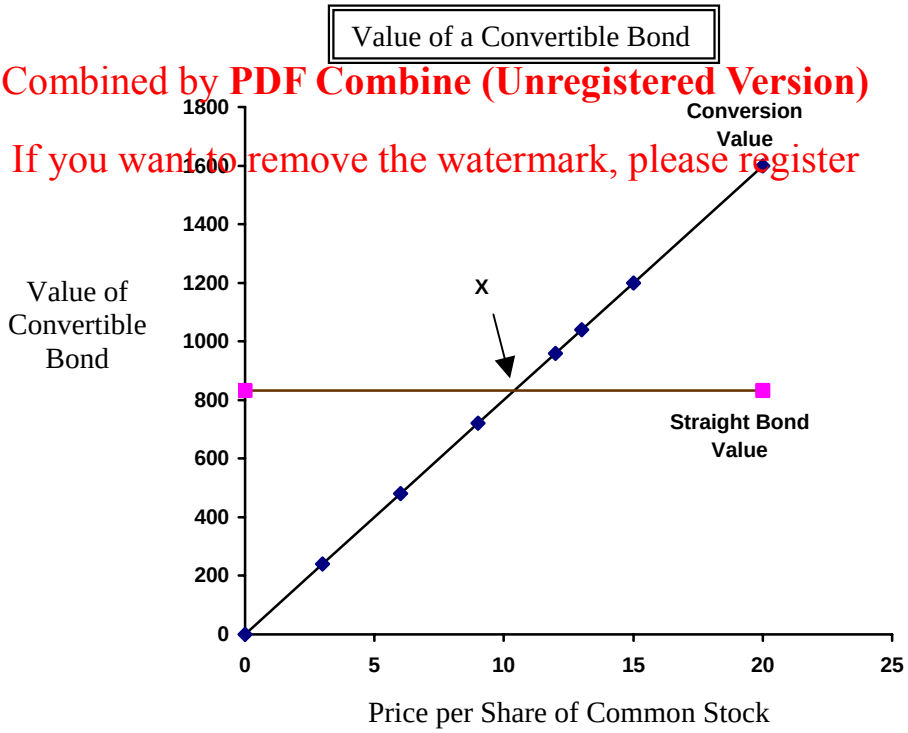
$9.00 × 80 = $720
12.00 × 80 = 960
13.00 × 80 = 1,040
15.00 × 80 = 1,200
20.00 × 80 = 1,600

(c)

Share Price	Bond Value	
$9.00	$832.75	(Bond will not sell below straight bond value)
12.00	960.00	
13.00	1,040.00	
15.00	1,200.00	
20.00	1,600.00	

As the share price increases the bond will start trading at a premium to the pure bond value due to the increased probability of a profitable conversion. At higher prices the bond will trade at its conversion value.

(d)



Up to Point X, the Straight Bond Value is the minimum market value. For stock prices above Point X, the Conversion Value Line is the market price of the bond.

P16-14. LG 5: Implied Price of Attached Warrants

Intermediate

Implied price of all warrants = Price of bond with warrants – Straight bond value

$$\text{Price per warrant} = \frac{\text{Implied Price of all warrants}}{\text{Number of warrants}}$$

Straight Bond Value:

Bond	Years	Payments	Factors	PV	Solution Calculator
A	1–15	$120	6.462 (13%)	$775.44	
	15	1,000	0.160	160.00	
				$935.44	$935.38
B	1–10	$95	5.650 (12%)	$536.75	
	10	1,000	0.322	322.00	
				$858.75	$858.75
C	1–20	$50	7.963 (11%)	$398.15	
	20	500	0.124	62.00	
				$460.15	$460.18
D	1–20	$110	7.469 (12%)	$821.59	
	20	1,000	0.104	104.00	
				$925.59	$925.31

Price Per Warrant:

Bond	Price with Warrants	–	Straight Bond Value	=	Implied Price	÷	Number of Warrants	=	Price per Warrant
A	$1,000	–	$935.44	=	$64.56	÷	10	=	$6.46
B	1,100	–	858.75	=	241.25	÷	30	=	8.04
C	500	–	460.15	=	39.85	÷	5	=	7.97
D	1,000	–	925.59	=	74.41	÷	20	=	3.72

P16-15. LG 5: Evaluation of the Implied Price of an Attached Warrant

Challenge

(a) Straight Bond Value

Years	Payments	PVIF (13%)	PV	Calculator Solution
1–30	$115	7.496	$862.04	
30	1,000	0.026	26.00	
			$888.04	$ 887.57

(b) Implied price of all warrants = (Price with warrants – Straight Bond Value)
Implied price of warrant = $1,000 – $888.04
Implied price of warrant = $111.96

(c) Price per warrant = Implied price of all warrants ÷ Number of warrants
Price per warrant = $111.96 ÷ 10
Price per warrant = $11.20

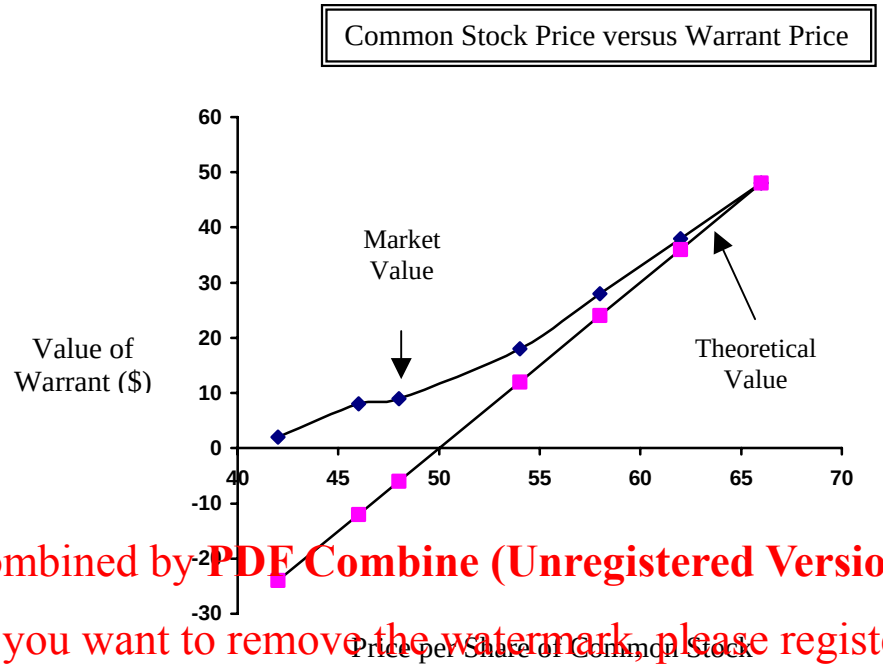
(d) The implied price of $11.20 is below the theoretical value of $12.50, which makes the bond an attractive investment.

P16-16. LG 5: Warrant Values

Challenge

(a) $TVW = (P_0 - E) \times N$
$TVW = (\$42 - \$50) \times 3 = -\$24$
$TVW = (\$46 - \$50) \times 3 = -\$12$
$TVW = (\$48 - \$50) \times 3 = -\$6$
$TVW = (\$54 - \$50) \times 3 = \$12$
$TVW = (\$58 - \$50) \times 3 = \$24$
$TVW = (\$62 - \$50) \times 3 = \$36$
$TVW = (\$66 - \$50) \times 3 = \$48$

(b)



(c) It tends to support the graph since the market value of the warrant for the $50 share price appears to fall on the market value function presented in the table and graphed in part (b). The table shows that $50 is one-third of the way between the $48 and the $54 common stock value; adding one-third of the difference in warrant values corresponding to those stock values (i.e., ($18 – $9) ÷ 3) to the $9 warrant value would result in a $12 expected warrant value for the $50 common stock value.

(d) The warrant premium results from a combination of investor expectations and the ability of the investor to obtain much larger potential returns by trading in warrants rather than stock. The warrant premium is reflected in the graph by the area between the theoretical value and the market value of the warrant.

(e) Yes, the premium will decline to zero as the warrant expiration date approaches. This occurs due to the fact that as time diminishes, the possibilities for speculative gains likewise decline.

P16-17. LG 5: Common Stock versus Warrant Investment

Challenge

(a) $8,000 ÷ $50 per share = 160 shares
$8,000 ÷ $20 per warrant = 400 warrants

(b) 160 shares × ($60 – $50) = $1,600 profit $1,600 ÷ $8,000 = 20%

(c) 400 shares × ($45 – $20) = $10,000 profit $10,000 ÷ $8,000 = 125%

(d) Ms. Michaels would have increased profitability due to the high leverage effect of the warrant, but the potential for gain is accompanied with a higher level of risk.

P16-18. LG 5: Common Stock versus Warrant Investment

Challenge

(a) $6,300 ÷ $30 per share = 210 shares purchased
210 shares × ($32 – $30) = $420 profit $420 ÷ $6,300 = 6.67%

(b) $6,300 ÷ $7 per warrant = 900 warrants purchased
Profit on original investment = [($4 per share × 2) – $7 price of warrant] = $1
$1 gain × 900 warrants = $900 profit $1 ÷ $7 = 14.29% total gain

(c) Stock (1) $6,300 investment – $6,300 proceeds from sale = $0
(2) 210 shares × ($28 – $30) = –$420 (–6.67%)

Warrants (1) [($2 gain per share × 2 shares) – $7 price of warrant] × 900 warrants
= –$3 × 900 = –$2,700 = –42.85%
(2) Since the warrant exercise price and the stock price are the same, there is no reason to exercise the warrant. The full investment in the warrant is lost:
$7 × 900 warrants = $6,300 – $7 ÷ $7 = –100%

(d) Warrants increase the possibility for gain and loss. The leverage associated with warrants results in higher risk as well as higher expected returns.

P16-19. LG 6: Option Profits and Losses

Intermediate

Option

A 100 shares × $5/share = $500
$500 – $200 = $300

B 100 shares × $3/share = $300
$300 – $350 = –$50

The option would be exercised, as the loss is less than the cost of the option.

C 100 shares × $10/share = $1,000
$1,000 – $500 = $500

D –$300; the option would not be exercised.

E –$450; the option would not be exercised.

P16-20. LG 6: Call Option

Intermediate

(a) Stock transaction:

$70/share – $62/share = $8/share profit

$8/share × 100 shares = $800

(b) Option transaction:

($70/share × 100 shares) =	$7,000
– ($60/per share × 100 shares) =	–6,000
– $600 cost of option =	–600
profit =	$400

(c) $600 ÷ 100 shares = $6/share

The stock price must rise to $66/share to break even.

(d) If Carol actually purchases the stock, she will need to invest $6,200 ($62/share × 100 shares) and can potentially lose this full amount. In comparison, in the option purchase, Carol only risks the purchase price of the option, $600. If the price of the stock falls below $56/share, the option purchase is favored. (Below $56/share, the loss in stock value of $600 [($62 – $56) × 100 shares], would exceed the cost of the option). Due to less risk exposure with the option purchase, the profitability is correspondingly lower.

P16-21. LG 5: Put Option

Intermediate

(a) ($45 – $46) × 100 shares = –$100

The option would not be exercised above the striking price; therefore, the loss would be the price of the option, $380.

($45 – $44) × 100 shares = $100

$100 – $380 = –$280

The option would be exercised, as the amount of the loss is less than the option price.

($45 – $40) × 100 shares = $500

$500 – $380 = $120

($45 – $35) × 100 shares = $1,000

$1,000 – $380 = $620

(b) The option would not be exercised above the striking price.

(c) If the price of the stock rises above the striking price, the risk is limited to the price of the put option.

P16-22. Ethics Problem

Challenge

When a company issues a stock and sells it at market price and keeps the proceeds then it increases the number of shares outstanding and dilution of earnings takes place. However, when the company issues stock to acquire assets, or pays a part of operating costs, these costs become expenses. Similarly, when the company issues stock in exchange for options to be exercised by employees below the market price, this is equivalent to issuing the stock at the market price and paying the difference to the employees in cash, which is clearly an expense.

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No :164/K/STIE YAI/VIII/2020 Jakarta, 26 Agustus 2020

Kepada Yth:
Ibu Ida Musdafia Ibrahim., SE.,MM
Dosen Sekolah Tinggi Ilmu Ekonomi Y.A.I
Di –
Tempat

Perihal : ***Ucapan Terima Kasih***

Sekolah Tinggi Ilmu Ekonomi Y.A.I, menyampaikan penghargaan dan ucapan terima kasih kepada Bapak/Ibu yang telah berpartisipasi dalam proses belajar mengajar di Semester Genap 2019/2020.

Menurut data yang ada pada kami, mata kuliah Bapak/Ibu pada semester Genap 2019/2020yang Bapak/Ibu asuh, sebagai berikut:

NO	MATA KULIAH	JUMLAH PERTEMUAN
1	Manajemen Keuangan II	13 Kali Pertemuan
2	Market Analysis and Portofolio Theory	13 Kali Pertemuan

Untuk mata kuliah yang sudah memenuhi persyaratan 14 kali tatap muka, kami harap Bapak/Ibu dapat mempertahankannya dan untuk mata kuliah yang jumlah tatap mukanya kurang dari yang ditentukan, kami sangat mengharapkan Bapak/Ibu dapat meningkatkan jumlah kehadirannya di semester yang akan datang guna meningkatkan kualitas belajar mengajar di Sekolah Tinggi Ilmu Ekonomi Y.A.I.

Atas perhatian dan kerjasamanya, kami sampaikan terima kasih.

SEKOLAH TINGGI ILMU EKONOMI Y.A.I

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- Arsip