

FINM3093 Investments

Lecture 7 Exercises

Solutions

1. The expiration of the patent means that General Weedkillers will soon face considerably greater competition from its competitors. We would expect prices and profit margins to fall and total industry sales to increase somewhat as prices decline. The industry will probably enter the consolidation stage in which producers are forced to compete more extensively on the basis of price.
2.
 - a. Expected profit = Revenues – Fixed costs – Variable costs
$$= \$120,000 - \$30,000 - [(1/3) \times \$120,000] = \$50,000$$
 - b.
$$\text{DOL} = 1 + \frac{\text{Fixed costs}}{\text{Profits}} = 1 + \frac{\$30,000}{\$50,000} = 1.60$$
 - c. If sales are only \$108,000, profit will fall to:
$$\$108,000 - \$30,000 - [(1/3) \times \$108,000] = \$42,000$$

This is a 16% decline from the forecasted value.
 - d. The decrease in profit is $16\% = \text{DOL} \times 10\%$ drop in sales.
 - e. Profit must drop more than 100% to turn negative. For profit to fall 100%, revenue must fall by:
$$\frac{100\%}{\text{DOL}} = \frac{100\%}{1.60} = 62.5\%$$

Therefore, revenue would be only 37.5% of the original forecast.
 - f. At this level, revenue will be: $0.375 \times \$120,000 = \$45,000$
 - g. If revenue is \$45,000, profit will be:
$$\$45,000 - \$30,000 - (1/3) \times \$45,000 = \$0$$

3. a. Relevant data from the table supporting the conclusion that the retail auto parts industry as a whole is in the maturity stage of the industry life cycle are:
- The population of 18–29 year olds, a major customer base for the industry, is gradually declining.
 - The number of households with income less than \$35,000, another important consumer base, is not expanding.
 - The number of cars 5 to 15 years old, an important end market, has experienced low annual growth (or actual decline in some years), so the number of units that potentially need parts is not growing.
 - Automotive aftermarket industry retail sales have been growing slowly for several years.
 - Consumer expenditures on automotive parts and accessories have grown slowly for several years.
 - Average operating margins of all retail autoparts companies steadily declined.
- b. (i) Relevant data from the table supporting the conclusion that Wigwam Autoparts Heaven, Inc. (WAH) and its principal competitors are in the consolidation stage of their life cycle are:
- Sales growth of retail autoparts companies with 100 or more stores have been growing rapidly and at an increasing rate.
 - Market share of retail autoparts stores with 100 or more stores has been increasing but is still less than 20 percent → room for much more growth.
 - Average operating margins for retail autoparts companies with 100 or more stores are high and rising.
- (ii) Because of industry fragmentation (i.e., most of the market share is distributed among many companies with only a few stores), the retail autoparts industry apparently is undergoing marketing innovation and consolidation. The industry is moving toward the “category killer” format, in which a few major companies control large market shares through proliferation of outlets. The evidence suggests that a new “industry within an industry” is emerging in the form of the “category killer” large chain-store company. This industry subgroup is in its consolidation stage (i.e., rapid growth with high operating profit margins and emerging market leaders) despite the fact that the industry is in the maturity stage of its life cycle.

4. a. $k = r_f + \beta \times [E(r_m) - r_f] = 6\% + 1.25 \times (14\% - 6\%) = 16\%$

$$g = \frac{2}{3} \times 9\% = 6\%$$

$$D_1 = E_0 \times (1 + g) \times (1 - b) = \$3 \times (1.06) \times \frac{1}{3} = \$1.06$$

$$P_0 = \frac{D_1}{k - g} = \frac{\$1.06}{0.16 - 0.06} = \$10.60$$

b. Leading $P_0/E_1 = \$10.60/\$3.18 = 3.33$

Trailing $P_0/E_0 = \$10.60/\$3.00 = 3.53$

c. $PVGO = P_0 - \frac{E_1}{k} = \$10.60 - \frac{\$3.18}{0.16} = -\9.275

The low P/E ratios and negative PVGO are due to a poor ROE (9%) that is less than the market capitalization rate (16%).

d. Now, you revise b to $1/3$, g to $1/3 \times 9\% = 3\%$, and D_1 to:

$$E_0 \times (1 + g) \times (2/3)$$

$$\$3 \times 1.03 \times (2/3) = \$2.06$$

Thus:

$$V_0 = \$2.06/(0.16 - 0.03) = \$15.85$$

e. V_0 increases because the firm pays out more earnings instead of reinvesting a poor ROE.

This information is not yet known to the rest of the market.

5. a. $k = D_1/P_0 + g$

$$D_1 = 0.5 \times \$2 = \$1$$

$$g = b \times \text{ROE} = 0.5 \times 0.20 = 0.10$$

$$\text{Therefore: } k = (\$1/\$10) + 0.10 = 0.20, \text{ or } 20\%$$

b. Since $k = \text{ROE}$, the NPV of future investment opportunities is zero:

$$PVGO = P_0 - \frac{E_1}{k} = \$10 - \$10 = 0$$

- c. Since $k = \text{ROE}$, the stock price would be unaffected by cutting the dividend and investing the additional earnings.

6.

Time:	0	1	5	6
E_t	\$10.000	\$12.000	\$24.883	\$27.123
D_t	\$ 0.000	\$ 0.000	\$ 0.000	\$10.849
b	1.00	1.00	1.00	0.60
g	20.0%	20.0%	20.0%	9.0%

The year-6 earnings estimate is based on growth rate of $0.15 \times (1-0.40) = 0.09$.

a.
$$V_5 = \frac{D_6}{k - g} = \frac{\$10.85}{0.15 - 0.09} = \$180.82 \Rightarrow$$

$$V_0 = \frac{V_5}{(1 + k)^5} = \frac{\$180.82}{1.15^5} = \$89.90$$

- b. The price should rise by 15% per year until year 6: because there is no dividend, the entire return must be in capital gains. Therefore the price in one year should be \$103.39.
- c. The price should rise by 15% per year until year 6: because there is no dividend, the entire return must be in capital gains. Therefore the price in two years should be \$118.89.

d.

Time:	0	1	5	6
E_t	\$10.000	\$12.000	\$24.883	\$27.869
D_t	\$ 0.000	\$ 0.000	\$ 0.000	\$5.574
b	1.00	1.00	1.00	0.80
g	20.0%	20.0%	20.0%	12.0%

The year-6 earnings estimate is based on growth rate of $0.15 \times (1-0.20) = 0.12$.

$$V_5 = \frac{D_6}{k - g} = \frac{\$5.57}{0.15 - 0.12} = \$185.79 \Rightarrow$$

$$V_0 = \frac{V_5}{(1 + k)^5} = \frac{\$185.79}{1.15^5} = \$92.37$$

7. a. The industry's estimated P/E can be computed using the following model:

$$\frac{P_0}{E_1} = \frac{\text{Payout ratio}}{k - g}$$

However, since k and g are not explicitly given, they must be computed using the following formulas:

$$g_{\text{ind}} = \text{ROE} \times \text{Retention rate} = 0.25 \times 0.40 = 0.10$$

$$\begin{aligned} k_{\text{ind}} &= \text{Government bond yield} + (\text{Industry beta} \times \text{Equity risk premium}) \\ &= 0.06 + (1.2 \times 0.05) = 0.12 \end{aligned}$$

Therefore:
$$\frac{P_0}{E_1} = \frac{0.60}{0.12 - 0.10} = 30.0$$

- b. i. Forecast growth in real GDP would cause P/E ratios to be generally higher for Country A. Higher expected growth in GDP implies higher earnings growth and a higher P/E.
- ii. Government bond yield would cause P/E ratios to be generally higher for Country B. A lower government bond yield implies a lower risk-free rate and therefore a higher P/E.
- iii. Equity risk premium would cause P/E ratios to be generally higher for Country B. A lower equity risk premium implies a lower required return and a higher P/E.

Inventory Turnover Ratio:

8. a.
$$\frac{COGS}{\text{Inventory}_{\text{Average}}} = \frac{\$2,850,000}{(\$480,000 + \$490,000) / 2} = 5.88$$

- b. Debt/Equity Ratio in 2020:

$$\frac{Debt_{2020}}{Equity_{2020}} = \frac{\$3,340,000}{\$960,000} = 3.48$$

c.

Cash flow from operating activities in 2020:	
Net Income =	\$410,000
+ Depreciation =	\$280,000
– Increase (decrease) in Accounts receivable =	(\$660,000 – 690,000)
– Increase (decrease) in Inventories =	(\$490,000 – 480,000)
+ Increase (decrease) in Accounts Payable =	\$340,000 – 450,000
Cash flow from operations in 2020 =	\$600,000

Average Collection Period:

$$d. \frac{\text{Receivables}_{\text{Average}}}{\text{Sales} / 365} = \frac{(\$660,000 + \$690,000) / 2}{\$5,500,000 / 365} = 44.80 \text{ Days}$$

Asset Turnover Ratio:

$$e. \frac{\text{Sales}}{\text{Assets}_{\text{Average}}} = \frac{\$5,500,000}{(\$4,300,000 + 4,010,000) / 2} = 1.32$$

Interest Coverage Ratio:

$$f. \frac{\text{EBIT}}{\text{Interest Expense}} = \frac{\$870,000}{\$130,000} = 6.69$$

Operating Profit Margin or Return on Sales:

$$g. \frac{\text{EBIT}}{\text{Sales}} = \frac{\$870,000}{\$5,500,000} = .16$$

Return on Equity:

$$h. \frac{\text{Net Income}}{\text{Shareholders' Equity}_{\text{Average}}} = \frac{\$410,000}{(\$960,000 + 810,000) / 2} = .46$$

P/E Ratio:

$$i. \frac{\text{Price}_{\text{share}}}{\text{Earnings}_{\text{share}}} = \text{Insufficient Information, unable to calculate}$$

Compound Leverage Ratio (CLR)

$$\text{CLR} = \text{Interest Burden} \times \text{Leverage}$$

$$\begin{aligned} \text{j.} \quad &= \frac{\text{EBIT} - \text{Interest Expense}}{\text{EBIT}} \times \frac{\text{Assets}_{\text{Average}}}{\text{Equity}_{\text{Average}}} \\ &= \frac{\$870,000 - 130,000}{\$870,000} \times \frac{(\$4,300,000 + 4,010,000) / 2}{(\$960,000 + 810,000) / 2} \\ &= 0.8506 \times 4.6949 = 3.99 \end{aligned}$$

Net Cash Flow from Operations:

k. \$600,000 (from part c.)

9. a. CF from operating activities = \$260 – \$85 – \$12 – \$35 = \$128

b. CF from investing activities = –\$8 + \$30 – \$40 = –\$18

c. CF from financing activities = –\$32 – \$37 = –\$69

10. a. QuickBrush has had higher sales and earnings growth (per share) than SmileWhite. Margins are also higher. But this does not mean that QuickBrush is necessarily a better investment. SmileWhite has a higher ROE, which has been stable, while QuickBrush's ROE has been declining. We can see the source of the difference in ROE using DuPont analysis:

Component	Definition	QuickBrush	SmileWhite
Tax burden $(1 - t)$	Net profits/pretax profits	67.4%	66.0%
Interest burden	Pretax profits/EBIT	1.000	0.955
Profit margin	EBIT/Sales	8.5%	6.5%
Asset turnover	Sales/Assets	1.42	3.55
Leverage	Assets/Equity	1.47	1.48
ROE	Net profits/Equity	12.0%	21.4%

While tax burden, interest burden, and leverage are similar, profit margin and asset turnover differ. Although SmileWhite has a lower profit margin, it has a far higher asset turnover.

Sustainable growth = ROE × Plowback ratio

			Sustainable	Ludlow's
		Plowback	Growth	Estimate of
	ROE	Ratio	Rate	Growth
				Rate
QuickBrush	12.0%	1.00	12.0%	30%
SmileWhite	21.4	0.34	7.3	10

Ludlow has overestimated the sustainable growth rate for both companies. QuickBrush has little ability to increase its sustainable growth—plowback already equals 100%. SmileWhite could increase its sustainable growth by increasing its plowback ratio.

- b. QuickBrush's recent EPS growth has been achieved by increasing book value per share, not by achieving greater profits per dollar of equity. A firm can increase EPS even if ROE is declining as is true of QuickBrush. QuickBrush's book value per share has more than doubled in the last two years.

Book value per share can increase either by retaining earnings or by issuing new stock at a market price greater than book value. QuickBrush has been retaining all earnings, but the increase in the number of outstanding shares indicates that it has also issued a substantial amount of stock.