

Quiz 1 Solutions

Security Analysis - Finance 40610

Professor Shane A. Corwin

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Instructions: Please answer all of the questions completely and show all of your work. You may use a formula sheet and a calculator. The quiz is worth 25 points.

1. (4 points) You are analyzing a firm that has just made a major strategic decision affecting the direction of the firm's future research and development. This new strategic plan is expected to substantially increase both the expected growth and the riskiness of the firm's future cash flows. Which of the following statements best describes the impact of this new strategy on the valuation of the firm based on discounted cash flow analysis?

- a) The value of the firm will increase
- b) The value of the firm will decrease
- c) The value of the firm will stay the same
- d) The effect on firm value cannot be determined based on the information provided.

The correct answer is (d). This results from the fact that the new strategy causes two counteracting effects on firm value. The increase in growth will have a positive impact on firm value. However, the increased riskiness of the cash flows leads to a higher discount rate and therefore has a negative effect on firm value. The overall effect on firm value depends on the relative magnitudes of the two effects.

2. (10 points) Consider the Balance Sheet and Income Statement for firm XYZ provided on the last page of the quiz.
- a) Use this information to calculate the Total Capital Turnover, Profit Margin, and Return on Capital (ROC) for firm XYZ in 2005. Show your work either here on the back page and use your calculations to complete the table below.

Financial Ratios:	Firm ABC		Firm XYZ	
	2004	2005	2004	2005
Return on Equity	53.30%	61.60%	55.40%	61.81%
Effective Tax Rate	35.00%	35.00%	35.00%	35.00%
Debt-to-Capital Ratio	0.5300	0.6200	0.4396	0.4135
Total Capital Turnover	0.7500	0.7100	0.7300	
Profit Margin	0.3340	0.3300	0.4103	
Return on Capital	36.00%	29.00%	25.80%	

- b) Based on your calculations and the numbers provided above, briefly discuss any notable differences in the time trends of profitability and efficiency for firm XYZ and its major competitor, firm ABC. Which of these two firms would you recommend as a long-term stock holding based on this limited information?

See answers on page 3.

3. (11 points) You are valuing the equity of a mature manufacturing firm using a discounted cash flow model based on free cash flows to the firm (FCFF). You expect cash flows to grow at an annual rate of 3% for each of the next 8 years. Following this period of positive growth, you expect the firm to enter a period of decline, with annual earnings growth of negative 1% in perpetuity. The free cash flow to the firm in the most recent year (year 0) was \$375 million and the market value of the firm's debt is currently \$1.2 billion. You estimate the firm's cost of equity to be 11.7% and its weighted average cost of capital (WACC) to be 9.0%.

Based on the information provided above, what is the value of equity in this firm?

The firm has eight years of positive growth followed by negative growth in perpetuity. We can value the cash flows from the first eight years using the formula for the present value of a growing annuity. We can value the cash flows from the remaining years and arrive at a terminal value using the formula for a growing perpetuity. Because we are valuing free cash flows to the firm, the appropriate discount rate is the WACC, or 9.0%.

To estimate the terminal value, we need to know the cash flow in the first year of the stable growth stage (year 9). This cash flow equals:

$$CF_9 = 375(1 + .03)^8 (1 + (-.01)) = \$470.29$$

We can then estimate the terminal value as of year eight and the present value of the terminal value today:

$$TerminalValue_8 = \frac{470.29}{(.09 - (-.01))} = \frac{470.29}{.10} = \$4702.88m$$

$$PV \text{ of Terminal Value} = \frac{4702.88}{(1.09)^8} = \$2360.22m$$

To estimate the present value of the cash flows during the growth stage, we need to know the cash flow in year one. This cash flow equals:

$$CF_1 = 375(1 + .03) = \$386.25$$

The present value of cash flows during the eight-year growth stage can then be estimated as follows:

$$PV \text{ of Growth Cash Flows} = 386.25 \left(\frac{1 - \left(\frac{1.03}{1.09}\right)^8}{(.09 - .03)} \right) = 386.25 * 6.0708 = \$2344.86m$$

Finally, because we have analyzed free cash flows to the firm (FCFF), the resulting value equals the value of the firm, not the value of equity. To get the value of equity, we must subtract out the value of debt. The value of equity is then calculated as follows:

$$Total \text{ Firm Value} = 2344.86 + 2360.22 = \$4705.08m$$

$$Equity \text{ Value} = 4705.08 - 1200 = \$3,505.08m$$

Consolidated Financial Statements - Firm XYZ

Income Statement (in millions):		
	2004	2005
Sales	1,360	1,575
Cost of Goods Sold and Expenses	602	633
EBIT	758	942
Interest Expense	76	74
Taxable Income	682	868
Tax Expense	124	143
Net Income	558	725

Balance Sheet (in millions):		
	2004	2005
Assets		
Total Current Assets	829	896
Net Property, Plant, and Equipment	1,636	1,641
Total Assets	2,465	2,537
Liabilities and Owners' Equity		
Total Current Liabilities	372	363
Long-Term Debt	920	899
Long-Term Debt, less current installments	902	884
Total Liabilities	1,292	1,262
Total Stockholders Equity	1,173	1,275

For both Total Capital Turnover and Return on Capital, you could use either the values of Debt and Equity from the beginning period balance sheet (2004), or the average from the beginning and ending period balance sheets. I will use the 2004 balance sheet values.

$$\text{Total Capital Turnover} = \frac{\text{Sales}}{\text{Debt}_{2004} + \text{Equity}_{2004}} = \frac{1575}{920 + 1173} = 0.753$$

$$\text{Profit Margin} = \frac{\text{Net Income}}{\text{Sales}} = \frac{725}{1575} = 46.03\%$$

The Return on Capital depends on the effective tax rate. I mistakenly listed the tax rate in the table as 35%, while the effective tax rate estimated from the income statement equals 16.47%. I will show the answers using both tax rates, either one of which is acceptable.

$$\text{Return on Capital (ROC)} = \frac{\text{EBIT}(1-T)}{\text{Debt}_{2004} + \text{Equity}_{2004}} = \frac{942(1-.35)}{920 + 1173} = 29.25\% \quad \text{or} \quad \frac{942(1-.1647)}{920 + 1173} = 37.59\%$$

Discussion: Both firms have an increasing ROE. However, firm ABC has increased ROE by increasing leverage while the firm's ROC has been decreasing. The decreasing Return on Capital reflects lower efficiency, as both the Capital Turnover and Profit Margins have decreased. In contrast, firm XYZ has increased ROE by improving Return on Capital. The firm has improved Capital Turnover and Profit Margins and has also decreased leverage. Based on this limited information, the trend at firm XYZ reflects better underlying operations and I would recommend this firm.