**394.1 Advanced Corporate Finance - Valuation**

**Homework Assignment 2 – due on Tuesday October 8.**

**Please submit one Word or PDF document per group, and indicate group members’ names on the first page.**

**This assignment has a total of 140 points.**

**Question 1 (15 points):** Exercise 13.10 on Page 493 of G&T.

(Hint: Use the APV method in answering this question.)

Questions 2 through 4 make use of the following data:

OldBooks, a book selling company with market assets of $100M, equity beta of 1.2 and D/E=1, is considering expanding into the internet retail business.

They have the following estimations regarding their potential on-line operations:

a) Next period cash flows of $2M growing in perpetuity at 4%

b) Required investment $15M

c) Equity beta of a comparable internet retailer with a D/E ratio of 1/3 is 2.

Risk-free rate rf = 4%, and the market premium is 8%. Both OldBooks’ and the comparison firm’s debt are risk free.

Assume that the corporate tax rate is zero.

**Question 2 (10 Points):** According to these projections, should OldBooks expand into the internet business?

**Question 3 (7 Points):** Suppose that OldBooks decides to enter in the internet retail business. To do so, it issues securities to obtain the necessary capital for the investment (i.e., it ***does not*** use internally generated funds to invest). Find the value of the assets of the combined company after entering in the internet retail business. (Hint: Given that we are ignoring taxes, you can ignore the financing sources that OldBooks will use to make the required investment)

**Question 4 (8 Points):** Find the WACC of OldBooks before entering in the internet business and after doing so. Does it change? Explain briefly.

**Question 5 (25 points)**:

In 1985, GM was evaluating the acquisition of Hughes Aircraft Corporation. Recognizing that the appropriate WACC for discounting the projected cash flows were different from GM’s WACC, GM assumed that Hughes was of approximately the same risk as Lockheed and Northrop, which has low-risk defense contracts and products that were similar to those of Hughes. We will make use of the following information in this question:

Equity beta Current D/E

GM 1.20 0.40

Lockheed 0.90 0.90

Northrop 0.85 0.70

Target D/E ratio for acquisition of Hughes = 1 (will be maintained in the future, so the debt amount will be dynamically adjusted on a continuous basis to keep D/E at 1)

Comparison firms have constant, risk-free, perpetual debt (so they keep the debt amount, rather than the D/E ratio, constant).

Hughes expected unlevered cash flow next year = $300 million

Growth rate of expected unlevered cash flows for Hughes = 5% per year

Marginal Corporate tax rate = 34%

Risk-free rate = discount rate on debt = 8% (will remain the same in the future)

Expected return on the market portfolio = 14% (will remain the same in the future)

Assume that the debt is risk-free.

1. **(5 points)** Compute the unlevered betas of the comparison firms, and take their average to find the estimate of the unlevered beta of Hughes.

**.56 + .58 / 2 = .57**

1. **(5 points)** Compute the equity beta for the Hughes acquisition at the target debt level.

**B equity = (1+1)\*.57 = 1.14**

1. **(5 points)** Compute the WACC for the Hughes acquisition.

**Equity return = .148**

**WACC = .10**

1. **(5 points)** Compute the value of Hughes with the WACC you obtained in part c.

**PV = 6Bil**

1. **(5 points)** Compute the value of Hughes if the WACC of GM at its existing leverage ratio is used instead of the WACC computed from comparison firms.

**B unlevered = 1.81**

**B equity = 1.2**

**Return equity = .15**

**WACC = .12**

**PV = 4,285,714,286**

1. **(This part is optional)** Find Hughes’s value applying the APV method, using the information you obtained from comparison firms (i.e., do not use GM’s own leverage ratio). [**Hint:** You will need the debt amount D here. We know the target D/E ratio for Hughes, but we are not given the dollar value of debt. For this you can use the firm value found in part d].

**Question 6 (25 points):**

The Akron Company consists of $50 million in constant perpetual risk-free debt and $50 million in equity. The current market value of its assets is hence $100 million. The beta of the equity is 1.4. Risk-free rate is 8%, the expected return on the market portfolio is 12%, and CAPM holds.

**a) (5 points)** Compute the expected return on Akron’s equity and its WACC assuming a 35% corporate tax rate.

**b) (20 points)** Akron is considering an exchange offer where 60% of Akron’s outstanding debt (i.e., $30 million) will be retired. The purchase of this debt would be financed by issuing $30 million in equity to the debt holders of Akron. Assume that once the exchange offer is completed, Akron will have perpetual debt of $20 million; i.e. there will be no further changes in its debt. What will Akron’s new WACC be after the exchange offer?

**Question 7 (50 points): Present value of risky tax shields**

Your company is evaluating a project in an Eastern European country. As the analyst in the treasury department you have been asked to understand the tax code of the country. Here are the details of the tax code:

* Taxable income is operating income minus interest expense
* The tax rate depends on your taxable income:
  + 20% on the first $250,000
  + 30% on anything above $250,000 (i.e., 20% for the first $250,000 plus 30% on the difference between your taxable income and $250,000)
  + 0% on any losses (i.e., no tax refunds)

The project’s average operating income (EBIT) will be $255,000 per year, in perpetuity. Assume that EBIT is normally distributed (I will provide the standard deviation of EBIT below). Any debt for this project will have a 10% interest rate. The debt is risk-free; the interest payments will be made even when EBIT is negative. You can assume that 10% is the appropriate rate for calculating the present value of tax shields as well.

* 1. **(10 points)** Suppose the standard deviation of EBIT is 0, i.e. you are certain that earnings will be $255,000 per year in perpetuity.
* What is the present value of tax shields of $10 debt?
* What is the present value of tax shields of $1,000,000 debt?

(Hint: First calculate the tax saved per year and then find the PV using the perpetuity formula).

* 1. **(15 points)** Suppose EBIT is distributed normally with mean $255,000 and standard deviation of $75,000 (i.e., a different draw from the normal distribution every year, in perpetuity)
* What is the present value of tax shields of $10 debt?
* What is the present value of tax shields of $1,000,000 debt?

**Hint:** Here we need to estimate the expected tax savings per year. Since this expectation is difficult to calculate, we will estimate it using an Excel spreadsheet. Here is what a column of the spreadsheet will look like when you consider the effect of an additional $10 in debt (i.e. $1 interest expense per year):

A B

|  |  |  |
| --- | --- | --- |
| 1 | A random number | =RAND() |
| 2 | EBIT | =NORMINV(B1, mean, standard deviation) |
| 3 | Tax paid if interest expense I = 0 | =IF(EBIT<0…etc…….) |
| 4 | Tax paid if interest expense I = $1 | =IF((EBIT-I)<0…etc….) |
| 5 | Tax saving per year | = B3 – B4 |

Row 1 gives a random number between 0 and 1. Row 2 converts the random number into a draw from a normal distribution with the given mean and standard deviation. In rows 3 and 4 tax paid is calculated using the information given about the tax code. These are “if…then...” statements that calculate the tax paid according to the rules of the tax code.

In B5, you have an estimate of the tax savings. Note that this depends on a specific realization for EBIT (which is a random variable). In order to get a good estimate of the tax saving we need to consider a larger number of simulations and average over them. To do so, make 50 copies of column B. Each column is identical except for the realization of EBIT. Take an average of the tax savings; this is the expected cash flow from the tax shield per year. Using this estimate and the perpetuity formula find the PV of tax shields. When you hand in this, just print one or two columns of the spreadsheet; not all columns.

* 1. **(10 points)** Suppose EBIT is distributed normally with mean $255,000 and standard deviation of $175,000 (again in perpetuity).
* What is the present value of tax shields of $10 debt?
* What is the present value of tax shields of $1,000,000 debt?

**Hint:** You can use the same spreadsheet as in part b and just adjust the standard deviation.

d) (5 points) How do your answers for parts b and c above compare? Why does the PV of tax shields change when we change the volatility of EBIT?

**e)** **(10 points)** Suppose now that the tax code allows for one-year loss carry-forwards. Any losses incurred in year t can be deducted from EBIT in year t+1. Modify your spreadsheet to estimate the present value of tax shields from $1,000,000 debt (here assume that the standard deviation of EBIT is $175,000, as in part c).