

Corporate Finance & Options: MGT 891
Assignment #6
Due Tuesday Feb. 20

1.

A. In year 1 a firm producing widgets will earn \$1,000 before interest and taxes. The market expects these earnings to grow at a rate of 1% per year. Assume that the corporate tax rate equals 40%. Right now the firm has \$3,000 in risk free debt and \$8,977.78 in equity. The company plans to keep its debt level at \$3,000 for all time. If the risk free rate equal 5%, and the expected return on the market equals 15%, what is the beta of the firm's assets? What is its equity beta?

B. Suppose the question stated that the firm planned to maintain a constant debt-equity ratio. Explain why the present value of the tax shield would no longer equal the tax rate times the market value of the debt.

2.

Salmoneous Shipping

Public Offering Statement for the sale of 100% of the equity in Salmoneous Shipping.

Corporate Objective

Salmoneous shipping currently provides commercial shipping services for the major Greek olive oil and wine companies. The firm also seeks to enter the lucrative arms and smuggling trades.

Current and Forecasted Revenues and Expenses

Current revenues (arriving in year 1): 100,000 drachmas.

Projected revenues: Salmoneous shipping expects revenues to grow at a rate of 3% per year into the foreseeable future.

Current costs (payable in year 1): Salmoneous shipping incurs two primary costs –

New galleys and wages: Starting in year 1 the Salmoneous Shipping will need to purchase additional fleet capacity and replace worn out capacity at a cost of 60,000 drachmas per year. Salmoneous Shipping currently pays a total of 20,000 drachmas in wages (due initially in year 1). Both expenses are expected to grow at the same rate as revenues.

Financial Factors

Betas and Market Rates: The risk free rate equals 5%, and the expected return on the market equals 15%. Revenues have a beta of .8.

Debt - Equity Policy: Salmoneous Shipping has recently issued 90,000 drachmas worth of perpetual debt with a beta of .1. Every two years Salmoneous Shipping plans to either add or retire debt in order to maintain its current debt-equity ratio.

Taxes: Salmoneous Shipping pays taxes at the rate of 40% on its reported profits. In order to discourage the use of galley slaves the Athenian government has decided to allow firms (for the first time) to deduct 50% of all wages prior to calculating taxable income! Since no one has yet invented the check or credit card Salmoneous Shipping runs on a 100% cash basis. This allows the less than scrupulous management team to report only 50% of its operating profits (revenues minus costs) to the government. For tax purposes interest is a fully deductible expense. Salmoneous, being rather clever, reports 100% of the firm's interest payments to the authorities.

Financial Analyst Reports the Following:

Salmoneous Shipping expects to earn 100,000 drachmas in revenues and incur 60,000 drachmas in costs from new ship purchases and 20,000 drachmas in wages. This leaves a taxable operating pretax profit of $100,000 - 60,000 - .5(20,000) = 30,000$ drachmas. The debt has a beta of .1 and thus requires interest payments of 6% per year, which on a base of 90,000 drachmas implies total interest payments of 5,400 drachmas. Since Salmoneous Shipping will only report half of its operating profits to the government and 100% of the interest payments, it expects to owe $.4(15,000 - 5,400) = 3,840$ drachmas in taxes. This will leave $20,000 - 5,400 - 3,840 = 10,760$ drachmas for the shareholders.

This analysis values Salmoneous Shipping via the well known and reliable Adjusted Present Value method. If the firm were all equity financed it would produce after tax profits of

$$100,000 - 60,000 - 20,000 - .4(.5(100,000 - 60,000 - .5(10,000))) = 14,000$$

in year 1, and these would then grow at a rate of 3%. These profits have a beta of .8 and should thus be discounted at 13%. While the valuation of a growing stream of infinitely lived cash flows may prove daunting to some, I have used the prputitity formula to value this firm. Using this formula results in an all equity present value of 140,000 drachmas. The debt produces a tax shield of $.4(5,400) = 2,160$. This tax shield is risk free and should thus be discounted at a rate of 5% per year. Again with the help of the perpetuity formula, I conclude that the debt tax shield has a present value of 106,442.31 drachmas. Therefore the total value of the equity comes to $140,000 + 106,442.31 - 90,000 = 156,442.31$.

Investor: Looking over the analysis you quickly conclude that the analyst has correctly estimated the beta of the firm's revenues, and knows both the tax code and Salmoneous Shipping's tendency to under report its income. However, having graduated from Yale's School of Management you quickly figure out the analyst's "game". You run out, grab the local investigator from the Olympus Security and Exchange Commission and demand he arrest the analyst for fraudulently reporting Salmoneous Shipping's equity value! Of course, the analyst simply claims he is incompetent and gets off.

Correctly calculate the value of Salmoneous Shipping's equity and explain where Autolycus went wrong.

3. Another Typical Finance Problem

A company currently maintains a debt-equity ratio of 1:3. The firm pays interest at a rate of 6% and taxes at a rate of 40%. The firm's equity has a beta of 1.4. The return on the market equals 15% and the risk free rate equals 5%.

- a. Calculate the expected return on the firm's equity.
- b. Calculate the firm's WACC

The firm proposes an expansion project that has the same risk as the firm's current assets. This expansion project will generate \$10 million per year forever.

- c. Calculate the present value of the expansion project.

Suppose the expansion project had a beta that did not have the same risk as the firm's current assets.

- d. Explain how you would value the expansion project in this case.

4. A firm has an asset beta of $3/4$. It can issue risky debt whose beta depends upon the amount of debt outstanding. Let w_D represent the fraction of the firm's financing via debt. Assume that the debt beta $\beta_D = w_D/2$. Calculate the equity beta for w_D equal to 0, $1/4$, $1/2$, and $3/4$. Compare these results on the equity beta to the case where the debt is risk free. Briefly explain why this difference occurs.

5. A firm currently has assets with a beta of .9. The firm is financed 60% with equity and 40% with risk free debt.

A) Calculate the beta of the firm's equity.

You look at the firm's financial statements and conclude that its assets are composed of \$100 million in revenues, \$40 million in variable costs and \$10 million in fixed costs. An announcement from the firm then arrives that it plans to expand its operations. These new operations have revenues valued at \$40 million, variable costs at \$20 million, and fixed costs at \$10 million.

B) When the assets are in place what will the firm's new asset beta equal? Assume the beta of the firm's revenues remain unchanged.

C) Assume it continues to finance its operations with 60% equity and 40% risk free debt. What will its equity beta equal?