Corporate Finance

Question 1. Finance companies

Finance companies are firms that lend money to people and companies. BlueHorse Finance Co. has 1000 zero-coupon, one-year loans outstanding, each for a face amount of $1 million. Goldfish Co. has 10 zero-coupon, one-year loans outstanding, each for $100 million. The face amounts of all the loans are due to be paid one year from today. Each loan has the same probability of default. Each loan has the same rate of loss in the event of default. Assume that the chance of default is completely idiosyncratic for each loan. Therefore the uncertainty of a loan's payoff is uncorrelated with the uncertainty of any other loan's payoff.

a. (4 points) Is the expected payoff on Bluehorse's portfolio greater, equal, or less than the expected payoff on Goldfish's portfolio? EXPLAIN YOUR ANSWER!

b. (4 points) Is the standard deviation of the payoff on Bluehorse's portfolio greater, equal, or less than the standard deviation of the payoff on Goldfish's portfolio? A solution that briefly explains the intuition is sufficient. You may use a mathematical formula, but you do not need to use one.

c. (4 points) Which loan book has a higher market value as of today? EXPLAIN YOUR ANSWER!

Question 2. Portfolio composition

Properties of the returns to two stocks are listed in the table below. The risk-free rate is also reported. The correlation between the stock returns is 40%.

	Expected return	Standard deviation of return
Alta, Inc	14%	30%
Snowbird, Inc.	8%	45%
Risk-free asset	2%	0%

a. (5 points) What is the expected return and return standard deviation of a portfolio that has a weight of 0.8 on Alta, Inc and a weight of 0.2 on Snowbird, Inc? SHOW YOUR WORK!

b. (5) Assume that the only three assets in the economy are these two stocks and a risk-free asset. Using only the numbers reported in the table and your results for part (a), explain why you know the portfolio in part (a) is not on the efficient frontier.

Question 3. Pet food

WhiteDog, Inc. makes pet food. It has a total market value of equity of $60MM. It has debt of $25MM, cash on hand of 35MM, and a market beta of equity of 1.5. The debt has a market beta of zero. The risk-free rate is 3% and the market risk premium is 4%. The corporate tax rate is 35%. The firm will have positive after-tax profits forever.

a. (3 points) What is WhiteDog's enterprise value? SHOW YOUR WORK!

b. (5 points) What is the beta of WhiteDog's enterprise value? SHOW YOUR WORK!

c. (6 points) Assume the CAPM is correct. What is the after-tax weighted average cost of capital for WhiteDog's projects? SHOW YOUR WORK!

d. (5 points) Assume the CAPM is correct. PurpleCat, Inc. is a large, diversified company that is deciding whether to market a line of pet food. The project has economic risks similar to those of WhiteDog's projects. What is the discount rate appropriate for PurpleCat's unlevered project? SHOW YOUR WORK!

Question 4. Cost of capital

YellowDuck, Inc. has $10MM in debt, equity of $15MM. Equityholders have a required expected return of 7% and debtholders have an expected required return of 2%. The corporate tax rate is 30 percent.

a. (5 points) Bondholders believe the bonds have a 2 percent chance of default per year. If default occurs, the loss rate in the event of default will be 50 percent. Estimate the yield on YellowDuck's debt. SHOW YOUR WORK!

b. (7 points) Assume the CAPM is correct, but make no assumption about either the risk-free rate or the expected return to the market, other than the assumption that both are positive. Explain why, based on the expected returns specified in this problem, that it is highly unlikely that the stock return has a negative market beta. This is a relatively hard problem.

Question 5. Beyond Modigliani and Miller

(5 points) Redbird, Inc. is an all-equity firm that has stable, large annual EBITDA and stable, large cash flows. However, because it has substantial depreciation, Redbird's EBIT is zero. Redbird uses the cash flows to invest in new projects and purchase smaller companies. Explain why the shareholders of Redbird may prefer that Redbird take on substantial debt, using the borrowed funds to buy back shares. Do not adopt the perfect market assumptions of Modigliani and Miller.

Question 6. Risky debt

BrownBear, Inc. is an all-equity firm. If it does not change its capital structure, the market value of its equity one year from today will be either $150MM or $80MM. Both possibilities are equally likely. The risk of the firm is entirely diversifiable. The risk-free rate is 5 percent.

a. (3 points) What is BrownBear's current market value of equity?

b. (6 points) Assume that BrownBear issues debt today, and immediately uses the funds to buy back shares. The debt matures a year from today, and pays no interest during the next year. At maturity, the promised payment is $100MM. Using all of the perfect market assumptions of Modigliani and Miller, including no taxes, what is today's market value of the debt?

c. (8 points) The CEO of BrownBear wants to issue the debt in order to benefit the shareholders. The CEO tells you, "I know that the perfect market assumptions of M&M imply that issuing the debt has no effect on shareholders. But their argument relies on the ability of shareholders to engage in the same financial transactions that the firm engages in. Our debt will be risky; the firm might default on the debt. Unless we issue that risky debt, neither shareholders nor anybody else can buy or sell it. Therefore the M&M argument is irrelevant."

Show the CEO that she is wrong by constructing a portfolio of the unlevered firm and risk-free debt that replicates the payoff of the risky debt.

Question 7. A recapitalization

CandyCane Inc. is financed entirely with equity, with a market value of $120MM. Equityholders require an expected return of 10 percent. The risk-free rate is 4 percent. CandyCane is considering issuing perpetual debt to buy back some of the firm's stock. It plans to issue enough debt so that the debt/equity ratio (after buying back the stock) is 0.5. With this amount of debt, bondholders treat the debt as risk-free. Reminder: with perpetual debt, the borrower pays only interest. The principal does not change through time. Assume the firm will have sufficient EBIT to pay the interest every year.

a. (5 points) Using all of the perfect market assumptions of M&M, **including** the assumption of no taxes, what will be the market value of the firm's debt? SHOW YOUR WORK!

b. (4 points) Using all of the perfect market assumptions of Modgiliani and Miller, **including** the assumption of no taxes, what will be the expected return to equity? SHOW YOUR WORK!

c. (7 points) Assuming a corporate tax rate of 25%, but retaining all other perfect market assumptions of M&M, what will be the market value of the firm's debt? SHOW YOUR WORK!

d. (9 points) Assuming a corporate tax rate of 25%, but retaining all other perfect market assumptions of M&M, what will be the expected return to equity, as a function of the expected return to the unlevered firm, the risk-free rate, the debt/equity ratio, and the tax rate? Your answer should be a formula. Hint and recommendation: we did not derive this formula in class. You should derive it by thinking of equity as a portfolio. The solution to this question does not require the solution to part (c), so you should not use the solution to part (c) here – since you might have done that question incorrectly. SHOW YOUR WORK!