

**Boston College**  
**MF 127: Corporate Finance**  
**Professor Strahan**  
**First Midterm**  
**Spring 2003**

Name: \_\_\_\_\_

**There are 80 points for the exam, and 80 minutes.**

**You are allowed to have 1 sheet of paper with formulas, and a calculator.**

**Read all of the questions carefully!**

**There are 7 pages (some blank), plus an annuity table. Write on the back if you need extra space. Be brief, but show all relevant calculations (partial credit will be assigned).**

True, False, Uncertain.

Explain why the following statements are true, false, or uncertain (5 points each).

1. The Weinstein Trading company owns an empty warehouse that could be used to store a new line of pinball machines. Since Weinstein already owns the warehouse, they should not include the value of the warehouse in deciding whether or not to produce the new line of pinball machines.

F. Weinstein could use the warehouse for other projects, or it could sell the warehouse, or it could rent out the space. The best of these alternative uses is the opportunity cost of the warehouse, and should be counted in evaluating the pinball machine project.

2. A company's value can be increased by taking on a project with an expected return of 15%, even if the company's cost of capital is 20%.

T. If a company takes a positive NPV project, it increases value. NPV is determined by discounting expected cash flows at a rate that reflects the risks of the project, not the risks of the firm's assets, which is reflected by the firm's costs of capital.

3. Company A's shares were first sold to its investment banker at an offer price of \$10 per share. After the first day of trading, the market value of the stock was \$15 per share. This underpricing represents a portion of the cost to Company A of issuing the stock.

T. Underpricing is an indirect cost of selling stock. In this case, the market value of the stock is \$15 per share, but the issuer only received \$10. Thus, by selling stock in an IPO the issuer effectively pays \$5 per share, plus additional direct fees to the investment bank.

4. Callable bonds tend to have higher yields than otherwise identical but non-callable bonds.

True. Callable bonds may be repaid early by the borrower at a fixed price. This option reduces the gains that normally would be enjoyed by the bondholder if interest rates fall, or if the credit quality of the borrower rises. Thus, in order to give people an incentive to buy callable bonds, they must be offered a higher yield.

### Longer Problems

5. You are working for General Motors (GM) in capital budgeting, and your responsibility is to figure out the right discount rate for various contemplated projects. GM's equity beta is 1.1, the market value of its assets is \$200 billion and the market value of its risk-free debt is \$100 billion. The risk-free interest rate is 3%, and the expected return on the market is 9%.

IGNORE TAXES FOR THIS QUESTION!

a) What is the discount rate that you would use to determine whether GM should build additional automobile-making factories? (7 points)

$$\text{Unlevered beta} = 1.1 (E/A) = 1.1 (100/200) = 0.55$$

$$\text{So, Discount rate} = 3\% + 0.55(9\% - 3\%) = 6.3\%$$

b) Suppose GM is considering research and development (R&D) investment to produce **new** software that would allow cars to avoid accidents by sensing objects and automatically engaging the brakes. The software is very expensive to develop, but virtually free to distribute once it is completed and tested. GM hopes to be able to add the software to its own cars, and to be able to sell the software to other car makers. **Describe** in words how you might estimate a discount rate for this project. Will this discount rate be higher or lower than the one calculated above, and why? (8 points)

The project described is new, so we can't use a comparable company. Instead, recognize that the demand for the software will mimic the demand for cars. Thus, the 6.3% discount rate offers a starting point. However, because all of the costs are fixed in the software case, the new project has much higher operating leverage than the production of cars. For example, if demand for cars is weak, GM saves costs in car production by not having to buy materials and pay its workers as much. This cost reduction in the face of weak demand acts as a natural hedge that is not available for the software. So, the appropriate discount rate would be somewhat higher than the discount rate of 6.3%. It is hard to say exactly how much higher; a prudent manager would probably consider various assumptions for the discount rate.

6. Consider the following scenarios, assuming for our purposes that they're all true. Please tell me if you believe they violate the efficient markets hypothesis or if they are consistent with the hypothesis. Briefly (2 or 3 sentences should suffice) explain your answers. If you believe any violations can be tied to specific forms of the EMH (weak, semi-strong and strong), then please indicate the appropriate form(s) and explain why this is so.

a) Stocks that rise 10% above their 52 week low rise an additional 10% over the following two weeks. (5 points)

Inconsistent with weak form because you can devise a profitable trading strategy by looking only at past prices: Buy stock whenever you see them rise 10% above the 52 week low and hold for 2 weeks.

b) The S&P 500 index returns in November are positively correlated with that index's returns in October. (5 points)

Inconsistent with weak form because you can devise a profitable trading strategy by looking only at past prices: Buy stock in November if stock prices rose in October; sell if stock in November if prices fell in October.

c) Stocks that announce unexpectedly weak earnings fall very sharply immediately following the announcement. (5 points)

Consistent with all forms, but mainly relevant for semi-strong form, because prices adjust fully and immediately to news about earnings. Thus, you can't profit by reading in public sources that the firm's earnings fell short of expectations.

d) Fidelity's Growth-stock mutual fund earns a higher average rate of return than Fidelity's money market fund. (5 points)

Consistent with all forms. We expect riskier funds (growth-stock) to have a higher average return than safe funds.

7. A widget manufacturer currently produces 200,000 units per year. It has contracted to buy widget lids over the next 6 years from an outside supplier for \$2 per lid. The plant manager thinks that it would be cheaper to make the lids rather than buy them. Direct production costs are estimated to be \$1.5 per lid. The necessary machinery to make the lids would cost \$150,000. This investment could be depreciated over its 6 year life using straight line depreciation. The manager estimates that the operation would require an additional immediate investment in working capital of \$30,000, which is fully recoverable at the end of the 6 years. If the tax rate is 35% and the opportunity cost of capital is 15 percent, would you support the plant manager's proposal? State clearly any additional assumptions that you need to make. (25 points)

First, compute the after tax PV of the costs of buying the lids:

$$\text{Cost} = -(1-0.35) \times \$400,000 / 0.15 \times (1 - 1/1.15^6) = -983,966$$

Second, compute after tax PV of the costs of producing lids:

T	0	1	2	3	4	5	6
	-150000						
	-30000						30000
		-186,250	-186,250	-186,250	-186,250	-186,250	-186,250

First row is cash flow from LT investment; second row is cash flow from ST investment; third row is cash flow from operations, computed as follows ( $D=150,000/6=25,000$ ):

$$\text{CF from Operations} = \text{NOI}(1-t) + Dt = (-1.5)(200,000)(1-0.35) + 25,000(0.35) = -186,250$$

So

$$\begin{aligned} \text{PV of Cost} &= -180,000 - \$186,250 / 0.15 \times (1 - 1/1.15^6) + 30000 / 1.15^6 = \\ &= -180,000 - 704,860 + 12,970 = -871,890 \end{aligned}$$

So, Cheaper to MAKE rather than BUY!