

**SLOAN SCHOOL OF MANAGEMENT
MASSACHUSETTS INSTITUTE OF TECHNOLOGY**

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15.414

Financial Management
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Final exam II

Instructions:

You have 1 hour 20 minutes for the exam. To receive full credit, you must hand in your exam promptly at the end of the allotted time. Be sure to answer all **4 questions**.

You may use the lecture notes and the textbook during the exam. You can also use a calculator or a laptop.

Show your work for each question. The logic underlying your analysis is more important than the final answer.

I have tried to leave a generous amount of space to answer each question. Do not feel that you need to fill up all the space.

When in doubt, ask. I will rarely be sympathetic if you answer a question incorrectly because you misinterpreted it.

Good luck!

Name

1. True or false? Briefly explain.

(a) _____ Your firm, a U.S.-based financial services company, is considering an aggressive expansion into Asia. If management is very uncertain about the forecasted cashflows, then the cost of capital for the project should be high to compensate for the high risks.

(b) _____ The stock market reacts negatively to seasoned equity offers (SEOs).

(c) _____ Your firm sells packaging materials. The business is very stable and investors have rewarded the firm with a low cost of capital, estimated at 8%. You are evaluating a new project. You should require an 8% return on the project since this represents the cost of external financing for the firm.

1. (cont.)

(d) _____ You have the opportunity to invest in a portfolio of junk bonds (bonds rated BB or below by Moody's). The probability of default is high for these bonds. Therefore, the portfolio is very risky and you should demand a high risk premium.

(e) _____ In 1978, Massey-Ferguson had financial troubles because its new 81-horsepower tractor failed to gain market share in the U.S.

(f) _____ Your firm needs to raise \$20 million for a new project. You forecast that EPS next year will be \$1.45 if the firm issues new equity, but \$1.55 if the firm issues new debt. Therefore, debt is a better source of financing.

2. You have saved \$100,000 for retirement. The money is invested in a diversified portfolio of U.S. stocks, but your financial advisor is trying to convince you to move some money into one of the following mutual funds. The table shows the funds' performance from 1990 – 2000. Over the same period, the S&P 500 returned 13.7% annually, had a standard deviation of 15.9%, and the Tbill rate averaged 4.5%.

Fund	Average return	Std deviation	Beta
Lucky Street	11.3%	21.8%	0.7
Bull Market Value Fund	13.9	27.2	1.1
High Five Growth	16.3	29.1	1.3

(a) Which mutual fund invests in the riskiest stocks? Why?

(b) Would you want to invest in any of the funds? Why or why not?

3. You are the CFO of Newbury Printing and Publishing (NPP). You are currently reviewing the firm's capital structure, as well as considering a new project. Selected financial information for NPP appears below.

	2000	1999	1998	1997	1996
Sales	438.7	413.8	386.4	367.3	345.2
EBIT	97.8	89.8	77.7	75.7	73.9
Interest	6.5	5.5	4.1	3.7	2.9
Tax	36.5	33.7	29.4	28.8	28.4
Net income	54.8	50.6	44.2	43.2	42.6
Dividends	27.4	25.8	23.3	22.8	20.6
L-T debt	108.5	90.8	67.8	61.9	48.4
Equity (book value)	516.7	489.3	464.5	443.6	423.2
Equity (mkt value)	746.1	875.5	590.6	610.5	521.2
M/B (equity)	1.44	1.79	1.27	1.38	1.23
P/E	13.62	17.30	13.38	14.14	12.24
D / (D + E) (book)	17.4%	15.7%	12.7%	12.2%	10.3%
D / (D + E) (mkt)	12.7%	9.4%	10.3%	9.2%	8.5%
Sales growth	6.0%	7.1%	5.2%	6.4%	5.9%
NI / Sales	12.5%	12.2%	11.4%	11.8%	12.3%
ROE	10.6%	10.3%	9.5%	9.7%	10.1%
Beta	1.11				

The interest rate on the firm's debt is 6% and the tax rate is 40%. Also, the Tbill rate is 4.5% and the market risk premium is 5%.

- (a) Using the information above, estimate the firm's WACC. Show your work.

3. (cont.)

- (b) Given the information above, do you think the mix of debt and equity is optimal? Be precise: How much leverage should the firm have? Why? What other information would be useful?

3. (cont.)

NPP is considering a leverage recapitalization. Suppose the firm decides to sell \$100 million in new debt and use the proceeds to repurchase stock.

(c) If this transaction had been completed at the beginning of 2000, how would it have affected the firm's interest expense, taxes, and net income for the year?

(d) How would this transaction affect the firm's value and WACC?

3. (cont.)

- (e) NPP has the opportunity to invest \$50 million in a new project. If it decides to go ahead with the project, NPP will finance the project entirely with debt. The project has the same risks as the firm's current business, and you forecast that the project will generate after-tax cashflows of \$8 million in perpetuity. What is the NPV of the project?

4. The following table shows intercept estimates when a portfolio's excess return $R_i - r_f$ is regressed on the market excess return $R_M - r_f$.

Estimate of α_i from the regression: $R_i - r_f = \alpha_i + \beta_i (R_M - r_f) + \varepsilon_i$

α_i in % monthly

Size and B/M portfolios

Size quintile	B/M quintile				
	Low	2	3	4	High
Small	-0.22	0.15	0.30	0.42	0.54
2	-0.18	0.17	0.36	0.39	0.53
3	-0.16	0.15	0.23	0.39	0.50
4	-0.05	-0.14	0.12	0.35	0.57
Big	-0.04	-0.07	-0.07	0.20	0.21

Provide an economic interpretation of these estimates. Are they consistent with the CAPM? Why or why not?

Formula sheet

Old formulas:

$$\text{NPV} = \text{CF}_0 + \frac{\text{CF}_1}{(1+r)} + \frac{\text{CF}_2}{(1+r)^2} + \frac{\text{CF}_3}{(1+r)^3} + \frac{\text{CF}_4}{(1+r)^4} + \dots$$

$$\text{PV of an annuity} = C \times \left[\frac{1}{r} - \frac{1}{r(1+r)^T} \right]$$

$$\text{PV of a perpetuity} = \frac{C}{r}$$

$$\text{PV of a growing perpetuity} = \frac{C}{r-g}$$

$$\text{Stock price} = \frac{\text{Div}_1}{(1+r)} + \frac{\text{Div}_2}{(1+r)^2} + \frac{\text{Div}_3}{(1+r)^3} + \frac{\text{Div}_4}{(1+r)^4} + \dots$$

$$\text{Stock price (constant growth)} = \frac{\text{Div}_1}{r-g}$$

$$\text{Plowback ratio} = \text{Reinvestment} / \text{Earnings}$$

$$\text{Growth} = g = \text{ROE} \times \text{plowback ratio}$$

New formulas:

$$E[R_p] = w_1 E[R_1] + w_2 E[R_2]$$

$$\begin{aligned} \text{var}(R_p) &= w_1^2 \cdot \text{var}(R_1) + w_2^2 \cdot \text{var}(R_2) + 2 w_1 w_2 \text{cov}(R_1, R_2) \\ &= w_1^2 \cdot \text{var}(R_1) + w_2^2 \cdot \text{var}(R_2) + 2 w_1 w_2 \text{corr}(R_1, R_2) \text{stdev}(R_1) \text{stdev}(R_2) \end{aligned}$$

$$E[R_p] = \sum_i w_i E[R_i]$$

$$\begin{aligned} \text{var}(R_p) &= \sum_i w_i^2 \text{var}(R_i) + \sum \sum_{i \neq j} w_i w_j \text{cov}(R_i, R_j) \\ &= \sum_i w_i^2 \text{var}(R_i) + \sum \sum_{i \neq j} w_i w_j \rho_{i,j} \text{stdev}_i \text{stdev}_j \end{aligned}$$

$$\text{Sharpe ratio} = \frac{E[R_p] - r_f}{\sigma_p}$$

$$\beta_i = \text{cov}(R_i, R_M) / \text{var}(R_M)$$

Market-model regression: $R_i = \alpha_i + \beta_i R_M + \varepsilon_i$ or $R_i - r_f = \alpha_i + \beta_i (R_M - r_f) + \varepsilon_i$

$$\text{var}(R_i) = \beta_i^2 \text{var}(R_M) + \text{var}(\varepsilon_i)$$

CAPM: $E[R_i] = r_f + \beta_i E[R_M - r_f]$

FF 3-factor regression: $R_i - r_f = \alpha_i + \beta_i (R_M - r_f) + s_i R_{SMB} + h_i R_{HML} + \varepsilon_i$

FF 3-factor: $r_i = r_f + \beta_i E[R_M - r_f] + s_i E[R_{SMB}] + h_i E[R_{HML}]$

Capital structure, no taxes:

$$r_A = (D/V) r_D + (E/V) r_E$$

$$\beta_A = (D/V) \beta_D + (E/V) \beta_E$$

$$r_E = r_A + (D/E) (r_A - r_D)$$

$$\beta_E = \beta_A + (D/E) (\beta_A - \beta_D)$$

Capital structure with taxes:

$$\text{PV}(\text{interest tax shields}) = \tau D$$

$$\text{WACC} = (D/V) (1 - \tau) r_D + (E/V) r_E$$

$$r_E = r_A + (D/E) (1 - \tau) (r_A - r_D)$$

$$\text{WACC} = (1 - \tau D/V) r_A$$

$$r_A = \frac{1}{1 - \tau D/V} \text{WACC}$$

$$V_L = V_U + \text{PV}(\text{interest tax shields})$$