The exam has 12 questions. The exam will be collected at 4:20 p.m. You may use a calculator. The formula sheet is on the last 2 pages, which you may take off from the rest of the exam. You do not have to return the formula sheet. Please show your work to receive credit, i.e. even if you are using a calculator to find the answers you should set up the equation using appropriate formulas.

Good Luck!

Fin 350 B, Winter 2009 Middle Term Exam 2 98 6 Feb. 24, 2009

1. You and your friend are talking about investing. Your friend notes that utility stocks have P/E ratios around 10 while technology stocks (such as Google) have a P/E ratio around 30! He/she says, "Why would anyone buy Google --it's way overpriced relative to the utility stocks--they're a bargain!" Is this analysis correct? Why or why not? (5 pts.)

P/E ratios, or price to earnings ratios, measure the ratio between stock price & earnings per share. First, our friends analysis is incorrect. A higher PE ratio generally means that investors expect a higher return in the future. Investors will not pay extra for something that is unlikely to pay off for them. Looking at google & utility, we further enforce this theory as utilities are not often thought of as volatile while google is renowned for high returns, but also high risk.

2. You are in charge of coming-up with a value for a private company that will be going public soon. The company, Wegman's, is a large regional grocery store chain. You look-up the price-to-cash flow ratio for two other regional grocery store chains and find that Albertson's is 12.2 and Safeway's is 12.1. This year's cash flow for Wegman's is $1 billion. What's your best guess for what Wegman's is worth? (5 pts.)

$\frac{\text{Albertsons} + \text{Safeway}}{2} \rightarrow \frac{12.2 + 12.1}{2} = 12.15$ average grocery store price to CF

12.15 (price to cf ratio) × 1 billion cashflow = $12.15 billion dollars.

Double check

Price (found above) : Cashflow (given)

$12.15 B : $1B

12.15 : 1

3. You work for Nike and you are negotiating with Lucasfilm to get the rights to sell a shoe called "Air Skywalker". You think you should be able to sell $400 million worth of these shoes per year for 3 years, starting next year. ~~You have spent $5 million designing and test marketing the shoes~~. Production of the shoes will cost $200 million per year (this includes salaries of new managers and employees). You will have to buy new production equipment worth $80 million. This equipment will have a 4-year life and will be depreciated to zero over that life. You plan to sell the equipment for $25 million at the end of the third year. Production of the new shoe will also require you to increase your working capital from $20 million to $25 million immediately (t=0). Working capital will decrease back down to $20 million at the end of the third year. Nike's current corporate overhead amounts to $75 million per year. Lucasfilm wants $200 million (now) in exchange for the rights to produce the shoe. Your tax rate is 40%. If the cost of capital for this project is 10%, should you take their offer? (10 pts)

Year	0	1	2	3
Δ Revenue		400 m	400 m	400M
-Δ Cost		200 m	200 m	200 m
-Δ Depreciation		20M	20 M	20M
EBIT		180 M	180 M	180 M
- Tax (40%)		72 M	72 M	72 m
NI		108 M	108 M	108 M
+ Δ Depreciation		20 m	20 m	20 M
- Cost of Capital	80 M			
- Cost of rights	200 M			
+ Proceeds				23 M
-Δ NWC	5 M		—	-5 m
FCF	285 M	128 M	128 M	156 M

Equipment → 80/4 = 20 million depreciation/year

Proceeds = 25 M − (.4)(25 − 20) = 23 M
(actual, NBV)

$$NPV = -285M + \frac{128M}{1+.1} + \frac{128M}{1.1^2} + \frac{156M}{1.1^3}$$

$$= 54.354\ M$$

NPV is positive so, yes, take the offer.

4. You must decide between 2 competing investments, each with a different lifespan. You plan to reinvest in the same investment indefinitely upon its completion. The cash flows from each investment are:

	Today	1 yr	2 yr	3 yr	4yr	5 yr
A	-22	6	6	6	6	6
B	-18	7	7	7		

Which investment should you choose? Assume your discount rate is 10%. (10 pts)

$NPV_A = -22 + 6\left(\frac{1}{.1} - \frac{1}{.1(1.1)^5}\right)$

$= .744721$

Now find EAA of project A

$.744721 = EAA\left(\frac{1}{.1} - \frac{1}{.1(1.1)^3}\right)$

$EAA = .196456$ ← Measures value of the investment yearly. in terms of NPV.

$NPV_B = -18 + 7\left(\frac{1}{.1} - \frac{1}{.1(1.1)^3}\right)$

$= -.59203$

Normally, we would find the EAA for project B then compare with that of project A, but here, when project B has a negative NPV, we know its EAA will be negative. Therefore, Project A is more lucrative.

good

5. You own shares in a privately-held tavern, and want to know how much your shares are worth. The firm does not pay dividends currently, but has announced that it will pay a dividend of $1.75 per shares exactly 3 years from today. Afterwords, it plans to continue paying annual dividends into perpetuity, with the dividends growing at 3% per year. Your discount rate for this stock is 16%. What is the value of the stock? (5 pts)

$\frac{\text{Divid}}{rE - g} = P_0$ $\frac{\$1.75}{16\% - 3\%} = \$13.46$ this is the value

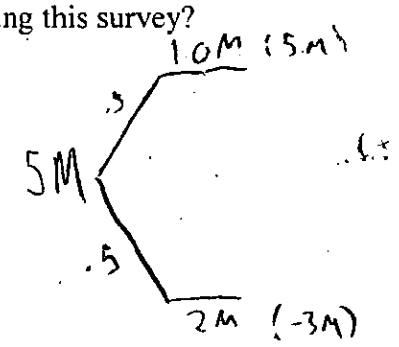
$\frac{}{1.16^2}$

-2

D

6. You are considering making a Howlin' Mad Murdock action figure to capitalize on what you are sure will be a massive resurgence in A-Team fever. Production will cost $5 million. If A-Team fever strikes, you will sell action figures worth $10 million (in present value). If the foolish youth of today do not catch the fever, you will only sell action figures worth $2 million. Each scenario has a 50% chance of happening. Before beginning production, you can carry out a marketing survey to determine which scenario will happen. The survey costs $1.2 million. (10 pts)

a) Is it worthwhile to use the survey at the current cost? What's the maximum price you would pay for doing this survey?



Project value (No survey) = (.5)(5M) + (.5)(-3M)

= 1M

Project value (w/survey) = (.5)(5M) − 1.2M

= 1.3M greater w/survey

Yes, the survey is worthwile. The maximum price paid for the survey would be the existing price plus the boost in earnings of .3M. This brings a max price of 1.5 million.

b) How has the survey added value? Explain

The survey hasn't exactly added value, but rather subtracted negative value. By accepting the ADDED cost of the survey, the company is able to eliminate the 50% chance of the product doing poorly (and thus eliminate the negative NPV of that likelyhood). Because the survey eliminated the possibility of going forward with the 50% chance of failing, it eliminated 50% × -3M = 1.5M of negative project value. 1.5M > 1.2M meaning a net gain is achieved

7. You bought 100 shares of AOL at the beginning of the year for $200 each. You also bought 100 shares of AT&T at the same time for $80 each. At the end of the year, you sold all of your AOL stock for $130 per share. You also sold all of your AT&T stock for $139 per share right after receiving a $1 dividend for each share. What was the return on your portfolio of AOL and AT&T? (10 pts)

100 shares × $200 = $20,000 AOL → $28,000 portfolio
100 shares × $80 = $ 8,000 ATT

$w_{AOL} = \frac{20,000}{28,000} = .7142$

$w_{ATT} = \frac{8000}{28,000} = .2857$

AOL return $= \frac{130-200}{200} = -35\%$

ATT return $= \frac{1}{80} + \frac{139-80}{80} = 75\%$ (1 = Dividend)

$R_{portfolio} = w_1 R_1 + w_2 R_2$

$= (.7142 \times -.35) + (.2857 \times .75)$

$= -.03569 =$ **-3.6% return**

8. You are considering investing in a stock with a beta of 2. It currently has a price of $30 and you expect it to have a price of $34 after 1 year when you have to liquidate your portfolio. The company declared a $1 dividend two weeks ago. The record date for receiving this dividend is tomorrow, however it usually takes three days to transfer a stock title from the seller to the buyer. So the ex-dividend date was yesterday. Should you buy the stock? (Assume the return on the market portfolio is 9% and the return on T-bill is 2%.) (5 pts)

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The Important Dates of a Dividend

There are four major dates in the process of a company paying dividends:

- *Declaration date*– This is the date on which the board of directors announces to shareholders and the market as a whole that the company will pay a dividend.
- *Ex-date or Ex-dividend date*– On (or after) this date the security trades without its dividend. If you buy a dividend paying stock one day before the ex-dividend you will still get the dividend, but if you buy on the ex-dividend date, you won't get the dividend. Conversely, if you want to sell a stock and still receive a dividend that has been declared you need to sell on (or after) the ex-dividend day. The ex-date is the second business day before the date of record.
- *Date of record*– This is the date on which the company looks at its records to see who the shareholders of the company are. An investor must be listed as a holder of record to ensure the right of a dividend payout.
- *Date of payment (payable date)* – This is the date the company mails out the dividend to the holder of record. This date is generally a week or more after the date of record so that the company has sufficient time to ensure that it accurately pays all those who are entitled.

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First we must address whether or not we will get the dividend. Because the ex-dividend date, or date on which security trades w/o a dividend was yesterday, we will receive no dividend. Now we must see if the stock is still worth buying.

$$CAPM = r_f + \beta(R_F - r_f)$$
$$= .02 + 2(.09 - .02)$$
$$= 16\%$$

$$My\,E[R] = \frac{34 - 30}{30} = 13.3\%$$

16% > 13.3% ✓

Because you expect 13.3% return, but CAPM indicates a stock with this much systematic risk should return 16%, this stock should not be purchased. Doing so with your expectation would be paying for more risk than you will be compensated for

9. You own a portfolio of two stocks, A and B. Stock A accounts for 40% of the portfolio, and Stock B accounts for 60%. Stock A has an expected return of 10%, while stock B has an expected return of 13%. Stock A's standard deviation is 0.5, whereas stock B's standard deviation is 0.2. They have a correlation (ρ: rho) of 0.5. (10 pts)

$E[R_A] = 10\%$ $E[R_B] = 13\%$ $\rho = .5$

$\sigma_A = .5$ $\sigma = .2$

a. Find the expected return on the portfolio.

$E[R_{port}] = w_A E[R_A] + w_B E[R_B]$

$= (.4 \cdot .1) + (.6 \cdot .13)$

$= .118 = \boxed{11.8\%}$ ✓

b. Find the standard deviation of the portfolio. Is it lower or higher than the weighted average standard deviation of the two stocks individually? Explain why.

Use equation on sheet

$\sigma^2 = w_A^2 \sigma_A^2 + w_B^2 \sigma_B^2 + 2 w_A w_B \sigma_A \sigma_B \rho$

$\sigma^2 = (.4)^2(.5)^2 + (.6)^2(.2)^2 + 2(.4)(.6)(.5)(.2)(.5)$

$\sqrt{\sigma} = .04 + .0144 + .024 = \sqrt{.0784}$

$\sigma = .28 = 28\%$ ✓

This is higher than B's but lower than A's SD individually. Though diversification eliminates much unsystematic risk, it cannot eliminate all risk. These two stocks are closely correlated, thus the average SD was not lower. much

−2

c. If the correlation is -1 between A and B. Can you construct a portfolio that has perfectly predicable returns? What weights would you assign to stock A and stock B?

Yes. To do this, you could assume returns to be the average of expected returns as all deviations would be offset directly by the other stock. For each deviation to offset the other in full, weights must be ...

$w_A \sigma_A - w_B \sigma_B = 0$ ... $w_A \cdot .5 - w_B \cdot .2$

$w_A + w_B = 1$ → $\frac{.5}{.5+.2} = .714$ $\frac{.2}{.5+.2} = .2857$

$w_A = 28.57\%$

$w_B = 71.4\%$ ✓

10. Risk: (10 pts)

a) Explain the relationship among total risk, systematic risk and unsystematic risk.
Total risk is the sum of systematic (market) risk and unsystematic (unique risk) diversifiable.
The goal of diversification is to eliminate unsystematic risk so portfolio risk is almost purely systematic. Both types of risk are present in individual securities.

b) How do we quantify the first two types of risk? (i.e. how do we measure them?)
total risk is measured by standard deviation
systematic risk is measured by beta.

c) Which type of risk is compensated and which type is not? Why?
Systematic risk is compensated and unsystematic risk is not. This is because systematic risk cannot be diversified away.

d) To the best of your knowledge, companies in which following industries have more risk than others. Explain why intuitively?

	More or Less Risk?	Why?
Consumer Staples	Less	Nomatter what is going on in the market cycle, consumers need consumer staples. Few fluctuations, little volatility. (unsystematic risk present; droughts etc)
Energy	less.	Energy is likely the riskiest of the less risky. Because of high startup costs, competition is pretty set in stone, but rapid changes in supply & demand of green energy could change this. Shifting oil tariffs requires lots of funds and is still uncertain.
Healthcare	Less	People need healthcare all the time, nomatter the mkt. often sheltered from cyclical problems.
Technology	More	Technology has proved a highly volatile industry due to rapid change, low startup costs, and rapid obsolescence.
Financials	More	Financials are extremely sensitive to systematic risk and tend to rise and fall w/ the market. look at us now
Utilities	Less	Like consumer staples and healthcare, utilities tend to have few fluctuations in supply & demand and are often sheltered from the mkt cycle.
Industrials	More.	Of the risky groups, industrials are the least risky. There is more unsystematic risk than the market but these stocks also tend to move w/ the mkt.

11. True / False (2 pts each)

The net present value (NPV) of a stock is calculated by discounting cash flows arising from this stock using the risk-free interest rate.

F

Historical evidence on the returns of large portfolios of stock and bonds shows that investments with higher volatility have rewarded investors with higher returns.

T

There is a clear link between the volatility of returns for individual stocks and and the returns for individual stocks.

F

Transaction costs from issuing equity or debt to finance a new project are included when determining a project's incremental cash flow in the capital budgeting process.

F

The cash flow effect from a change in Net Working Capital is always equal in size and opposite in sign to the changes in Net Working Capital.

T

12. Multiple Choice Questions (circle one letter for each question) (2 pts each)

1. Which of the following is FALSE:

a. Common stock is the residual claim on the firm's cash flows
b. Common stock typically has voting rights
c. The difference between preferred stock and common stock is that if a preferred dividend is missed, the company can be forced into bankruptcy.
d. Senior debt holders have the first claim to a company's assets in comparison to junior debt holders, preferred shareholders and common shareholders.

2. Which of the following statements is FALSE?

a. The payback investment rule is based on the notion that an opportunity that pays back its initial investments quickly is a good idea.
b. A net present value (NPV) will always exist for an investment opportunity.
c. In general, there can be as many internal rates of return (IRRs) as the number of times the project's cash flows change sign over time.
d. NPV is a preferred method than IRR, therefore, very few (less than 10 percent) of all US public companies actually use IRR in evaluating projects.

3. Which of the following statements is FALSE?

a. The payback rule is useful in cases where the cost of making an incorrect decision might not be large enough to justify the time required for calculating the net present value (NPV).
b. The payback rule is reliable because it considers the time value of money and depends on the cost of capital.
c. For most investment opportunities expenses occur initially and cash is received later.
d. The static NPV valuation method incorporates the value of managerial flexibilities, making it a better method than both the IRR and the payback period.

4. The market value of a firm's equity is determined by:

a. multiplying current share price by shares outstanding.
b. multiplying share price issued at IPO by shares outstanding.
c. the difference between book values of assets and liabilities.
d. the difference between book value of assets and market value of liabilities.

5. We can reduce volatility by investing in less than perfectly correlated assets through diversification because the expected return of a portfolio is the weighted average of the expected returns of its stocks, while the volatility of a portfolio

a. is higher than the weighted average volatility.
b. is independent of weights in the stocks.
c. is less than the weighted average volatility.
d. depends on the expected return.

Formula Sheet

$$FV_{n\cdot m} = PV\left(1+\frac{r}{m}\right)^{n\cdot m} \qquad PV = \frac{FV_{n\cdot m}}{\left(1+\frac{r}{m}\right)^{n\cdot m}}$$

$$r = \left[\left(\frac{FV}{PV}\right)^{\frac{1}{n\cdot m}} - 1\right]\cdot m \qquad n = \frac{1}{m}\left[\frac{\ln\left(\frac{FV}{PV}\right)}{\ln\left(1+\frac{r}{m}\right)}\right]$$

$$1+EAR = \left(1+\frac{APR}{m}\right)^{m} \qquad PV(annuity) = CF\left[\frac{1}{\frac{r}{m}} - \frac{1}{\frac{r}{m}*\left(1+\frac{r}{m}\right)^{m*n}}\right]$$

$$PV_0(perpetuity) = \frac{CF_1}{r} \qquad PV_0(growing\_perpetuity) = \frac{CF_1}{r-g}$$

1+nominal_rate=(1+real_rate)*(1+inflation)

$$\left(1+\frac{\text{nominal\_rate}}{\text{m}}\right)^{\text{m}} = \left(1+\frac{\text{real\_rate}}{\text{m}}\right)^{\text{m}} * \left(1+\frac{\text{inflation}}{\text{m}}\right)^{\text{m}}$$

Coupon amount = Coupon_rate*Par_value*(1/m)

Current yield = (coupon received in a year) / current price

Rate_of_return = (Selling_price – purchase_price + coupon received) / (Purchase_price)

Expected Return:

(1) Given the probability of outcomes

$$E[R] = \bar{R} = p_1 R_1 + p_2 R_2 + ... + p_n R_n = \sum_{i=1}^{n} p_i R_i \quad , \text{ where the sum of } p_i = 1.$$

(2) Given the historical returns

$$E[R] = \frac{1}{T} \sum_{i=1}^{T} R_i$$

Variance:

(1) Given the probability of outcomes

$$Var[R] = \sigma^2(R) = p_1(R_1 - \bar{R})^2 + p_2(R_2 - \bar{R})^2 + ... + p_n(R_n - \bar{R})^2 = \sum_{i=1}^{n} p_i (R_i - \bar{R})^2$$

where the sum of $p_i = 1$.

Standard Deviation (R) = $\sigma(R) = \sqrt{\sum_{i=1}^{n} p_i (R_i - \bar{R})^2}$

(2) Given the historical returns

$$Var[R] = \sigma_R^2 = \frac{1}{T-1} \sum_{i=1}^{T} \left(R_i - \bar{R}\right)^2$$

A Multi-Asset Portfolio:

$$E(R_P) = \sum_i w_i R_i = w_1 R_1 + w_2 R_2 + ... + w_n R_n$$

A Two-Asset Portfolio:

$$\sigma_P^2 = w_A^2 \sigma_A^2 + w_B^2 \sigma_B^2 + 2 w_A w_B Cov(R_A, R_B)$$

$$Cov(R_A, R_B) = \sigma_A \cdot \sigma_B \cdot \rho_{AB}$$

$$\sigma_P^2 = w_A^2 \sigma_A^2 + w_B^2 \sigma_B^2 + 2 w_A w_B \cdot \sigma_A \cdot \sigma_B \cdot \rho_{AB}$$

$$CAPM : E(R_i) = r_f + \beta_i * (E(R_m) - r_f)$$

$$\beta_{portfolio} = \sum_{i=1}^{n} w_i * \beta_i$$

$$\beta_{assets} = w_{Common\_Equity} * \beta_{Common\_Equity} + w_{preferred\_Equity} * \beta_{preferred\_Equity} + w_{Debt} * \beta_{Debt}$$

$$= \frac{CE}{V} * \beta_{Common\_Equity} + \frac{PE}{V} * \beta_{preferred\_Equity} + \frac{D}{V} * \beta_{Debt}$$