Name: _____

Econ 135: Corporate Finance
Midterm Exam 2 – Answer key

Multiple Choice Questions (12 points)
Circle the right answer. Each question is worth 2 points.

1) The opportunity cost associated with the firm's capital investment in a project is called its:
   a) Cost of capital.
   b) Beta coefficient.
   c) Capital gains yield.
   d) Sunk cost.
   e) Internal rate of return.

2) Which of the following is FALSE regarding risk and return?
   a) The risk-free asset earns the risk-free rate of return.
   b) The reward for bearing risk is known as the standard deviation.
   c) Based on historical data, there are ample rewards for bearing risk.
   d) An increase in the risk of an investment will result in an increased risk premium.
   e) In general, the higher the risk the higher the expected return.

3) Spot charter rates for dry bulk capsize carriers fluctuate _____ than time charter rates, and spot rates greater than time charter rates indicate that spot rates will _____.
   a) less, fall
   b) less, rise
   c) more, fall
   d) more, rise

4) The discount rate that makes the net present value of an investment exactly equal to zero is the:
   a) Payback period.
   b) Internal rate of return.
   c) Average accounting return.
   d) Profitability index.
   e) Discounted payback period.

5) Which of the following statements is true?
   a) NPV should never be used if the project under consideration has nonconventional cash flows.
   b) NPV is similar to a cost/benefit ratio.
   c) If the financial manager relies on NPV in making capital budgeting decisions, she acts in the shareholders' best interests.
   d) NPV can normally be directly observed in the marketplace.
   e) IRR is generally preferred to NPV in making correct capital budgeting acceptance decisions.

6) When using the equity betas of competitors to find our cost of equity, we need to do the following:
   a) Delever competitors' betas using their target capital structure weights, take an average, and relever the average using our target capital structure weights.
   b) Delever competitors' betas using their actual capital structure weights, take an average, and relever the average using our target capital structure weights.
   c) Delever competitors' betas using their target capital structure weights, take an average, and relever the average using our actual capital structure weights.
   d) Delever competitors' betas using their actual capital structure weights, take an average, and relever the average using our actual capital structure weights.

Numerical problems (28 points)

Please **show all calculations**. If you're stuck, **assume a solution** to get full credit on a later part.

1) *(2 pts.)* How does diversification help reduce risk?
There are two types of risk: systematic (or market or non-diversifiable) and non-systematic (or diversifiable or firm-specific) risk *(1 pt.)*. By holding a large enough number of different assets in a portfolio, firm-specific events cancel each other out, reducing or even eliminating non-systematic risk *(1 pt.)*.

2) *(2 pts.)* What is the expected return on Microsoft stock if it has a beta of 0.8, the expected market risk premium is 6% and the risk-free rate is 2%?
E(R) = 2% + .8 (6%) = 6.8%

3) *(4 pts.)* A project promises the following cash flows: Yr 0 = –$800; Yr 1 = –$80; Yr 2 = $100; Yr 3 = $300; Yr 4 = $500; Yr 5 = $500.
   a) *(2 pts.)* Calculate the NPV of the following project using a discount rate of 10%: Should you accept the project?
   NPV = -$800 - 80 / 1.1 + 100 / 1.1^2 + 300 / 1.1^3 + 500 / 1.1^4 + 500 / 1.1^5 = $87.28 *(1.5 pts)*
   Yes, we should accept the project *(0.5 pts)*.

   b) *(2 pts.)* Calculate the profitability index.
   Profitability index = PV of cash inflows/ PV of cash outflows =
   [100 / 1.1^2 + 300 / 1.1^3 + 500 / 1.1^4 + 500 / 1.1^5] / [800 + 80 / 1.1] = 960/873 = 1.10

4) *(20 pts.)* Apple is planning to launch a new easy-to-use kitchen appliance with a touchscreen interface, the iToaster. Apple expects to be able to sell 100,000 and 200,000 units in the first two years after launch, respectively, and then to discontinue this product. Each unit will sell for $200 in the first year after launch, and $150 in the second year. The costs of components are $50 per unit, while salaries, wages and other expenses sum to $10 million per year in which the product is sold. The factory that manufactures the iToaster requires an $8 million investment right now and will take one year to complete. The factory has a 5-year tax life after completion and is depreciated straight to zero. However, Apple expects to be able to sell the factory at the end of the project for $5 million. To get production up and running, Apple has to buy components worth $500,000 immediately before the launch of the product, and add another $500,000 worth of components to its inventory exactly one year later.
   Assume the project is of approximately the same risk as the firm's existing operations. The firm's marginal tax rate is 35%. The following data are current:
   Stock: 9 million shares outstanding, price per share is $200, beta = 1.5
   Bonds: A) Book value =$600 million, 8% coupon, paid semi-annually, 20 years to maturity, market interest rate (YTM)=7%
   B) Book value =$400 million, 9% coupon, paid semi-annually, 30 years to maturity, YTM=8%
   Market: Treasury bills have a return of 0.1%, the market risk premium is 8.5%

   a) *(2 pts.)* What is the cost of equity?
   R_E = 0.001 + 1.5 (0.085) = 12.85%

   b) *(3 pts.)* What are the total market values of the two bond issues?
   P_A= 40/.035 [1-1/$(1.035)^{40}$]+1000/$(1.035)^{40}$= 854.20 + 252.57=1,106.78

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MV_A= \$600 million / \$1,000 * \$1,106.78 = \$664.07 million

P_B= 45/.04 [1-1/(1.04)^{60}]+1000/(1.04)^{60}= 1,018.06 + 95.06=1,113.12
MV_B= \$400 million / \$1,000 * \$1,113.12 = \$445.25 million

c) *(2 pts.)* What is the (pre-tax) cost of debt?
Total market value of debt = \$664.07 million + \$445.25 million = 1,109.32 million
R_D= 7% * 664.07/1,109.32 + 8% * 445.25/1,109.32 = 7.4%

d) *(3 pts.)* What is the weighted average cost of capital?
Market value of equity = 9 million x \$200 = \$1,800 million
Total firm value = D+E = \$1,109.32 million + \$1,800 million = \$2,909.32 million
WACC = 1,109.32/2,909.32 * 7.4% (1-35%) + 1,800/2,909.32 * 12.85% = 9.78%

e) *(2 pts.)* What is the after-tax salvage value of the factory at the end of the project?
Book value in year 4 = 8 million – 2 * (8 million/5) = 4.8 million
ATSV= 5 million - 0.35 (5 million – 4.8 million) = 4.93 million

f) *(3 pts.)* What are the operating cash flows in each year?
in million

End of year	0	1	2	3
Units sold			0.1	0.2
* Price (\$)			\$200	\$150
= Revenue			20	30
- COGS			5	10
- Other expenses			10	10
- Depreciation			1.6	1.6
= EBIT			3.4	8.4
- Taxes			1.19	2.94
+ Depreciation			1.6	1.6
= OCF			3.81	7.06

Lose 1 point if timing is wrong, e.g., by placing the cash flows in years 1 and 2

g) *(3 pts.)* What are the cash flows from assets in each year?
in million

End of year	0	1	2	3
OCF *(0.5 pts.)*			3.81	7.06
- change in NWC *(1 pt.)*		0.5	0.5	-1.0
- NCS *(1 pt.)*	8			-4.93
=CFFA *(0.5 pts.)*	-8	-0.5	3.31	12.99

h) *(2 pts.)* What is the NPV of the proposed project? Should Apple accept the project?
NPV = -8 - 0.5/(1.0978) + 3.31/(1.0978)^2 + 12.99/(1.0978)^3 = \$4.11 million *(1.5 pts.)*
Yes, Apple should accept it. *(0.5 pts.)*

Equation sheet

Cash flow calculations

OCF = EBIT + depreciation – taxes
OCF = (sales-costs)(1-T) + depreciation*T (without interest)
Net capital spending = Ending NFA – beginning NFA + depreciation
Change in NWC = Ending NWC – beginning NWC
CFFA = OCF – net capital spending – change in NWC
CF to creditors = interest paid – net new borrowing
CF to stockholders = dividends paid – net new equity raised

Some financial ratios

Current ratio = current assets / current liabilities
Quick ratio = (current assets – inventory)/current liabilities
Cash ratio = cash / current liabilities
Total debt ratio = (total assets – total equity) / total assets
Debt-equity ratio = total debt / total equity
Times interest earned ratio = EBIT/interest
Cash coverage ratio = (EBIT + depreciation) / interest
Inventory turnover = COGS / average inventory
Inventory period = 365 days / inventory turnover
A/R turnover = credit sales / average accounts receivable
A/R period = 365 days / accounts receivable turnover
A/P turnover = COGS / average accounts payable
A/P period = 365 days / accounts payable turnover
Operating cycle= inventory period + A/R period
Cash cycle = operating cycle – A/P period

Other equations

$$\text{Internal growth rate} = \frac{ROA * b}{1 - ROA * b}$$

$$\text{Sustainable growth rate} = \frac{ROE * b}{1 - ROE * b}$$

$$\text{Annuity PV} = \frac{C}{r}\left(1 - \frac{1}{(1+r)^t}\right)$$

$$\text{Perpetuity PV} = \frac{C}{r}$$

After-tax salvage = salvage – T_C*(salvage – book value)
Fisher effect: 1+r=(1+R)(1+h)

Stock valuation

$P_0=(D_1+P_1)/(1+k)$
Constant dividends: $P_0=D/k$

Dividend growth model: $P_t = \frac{D_t(1+g)}{k-g} = \frac{D_{t+1}}{k-g}$

Calculating returns and variability

Percentage return on stock: $R = D_{t+1}/P_t + (P_{t+1} - P_t)/P_t$

Historical

$$\bar{R} = \frac{1}{n}\sum_{i=1}^{n} R_i$$

$$\sigma^2 = \frac{1}{n-1}\sum_{i=1}^{n}(R_i - \bar{R})^2$$

$$\sigma = \sqrt{\sigma^2}$$

Expected

$$E(R) = \sum_{i=1}^{n} p_i R_i$$

$$\sigma^2 = \sum_{i=1}^{n} p_i (R_i - E(R))^2$$

$$\sigma = \sqrt{\sigma^2}$$

Portfolios

$$E(R_{Pi}) = \sum_{j=1}^{m} w_j E(R_{ij})$$

$$E(R_P) = \sum_{i=1}^{n} p_i E(R_{Pi})$$

$$\sigma^2 = \sum_{i=1}^{n} p_i (E(R_{Pi}) - E(R_P))^2$$

$$\beta_P = \sum_{j=1}^{m} w_j \beta_j$$

Capital market theory and the cost of capital

$$SML : E(R_M) - R_f = \frac{E(R_i) - R_f}{\beta_i}$$

$$CAPM : E(R_i) = R_f + \beta_i (E(R_M) - R_f)$$

$$WACC = \frac{E}{V} R_E + \frac{P}{V} R_P + \frac{D}{V} R_D (1 - T_C)$$

Value of financial leverage

PV of interest tax shield = $T_c D$

$$V_U = \frac{CFFA}{R}$$ if CFFA is constant forever

$$V_L = V_U + T_C D$$