Original

Examination: Management VII (Financial Management) **Winter term 2001/02**

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The following aids can be used: pocket calculator

Examination questions:

1. A company is considering investing in a machine that produces bowling balls. The cost of the machine is €100,000. Production per year during the five-year life of the machine is expected to be as follows: 5,000 units, 8,000 units, 12,000 units, 10,000 units, and 6,000 units.

   The interest in bowling is declining and hence the management believes that the price of bowling balls will increase at only 2% per year, compared with the general rate of inflation of 5%. The price of bowling balls in the first year will be €20.

   On the other hand, plastic used to produce bowling balls is rapidly becoming more expensive. Because of this, production costs are expected to grow at 10% per year. First-year production cost will be €10 per unit.

   Depreciation of the machine will be straight-line for five years, after which time the salvage value will be zero. The company's tax rate is 40% and its cost of capital in real terms is 15%. Should the project be undertaken? **(15%)**

2. A firm has to choose between two investment projects. The projects have equal initial costs C and each project produces a *single* cash inflow in the future. The inflow for project A occurs one year in the future and the inflow for project B occurs two years in the future.

   The firm calculates that the internal rate of return (IRR) of the two projects are 40% per year for project A and 30% per year for project B. Since the projects have the same initial cost and A has a higher IRR, some of the firm's management argue that A should be chosen over B. However, other management people note that the appropriate discount rate for projects like A and B is 10% per year and wonder if that fact should affect the decision.

   Which project would you recommend the firm to accept? Explain why!
   (Hint: Express the cash flows in terms of C.) **(10%)**

3. A company pays no taxes and is financed entirely by common stock. The stock has a beta of 0.8, a price-earnings ratio of 12.5 and is priced to offer an 8% expected return. The management decides to repurchase half of the common stock and substitute an equal value of debt. The debt yields a *risk-free* 5%.

   (a) What is the risk premium on the stock before the refinancing?

   (b) Determine the beta of the common stock and the required return and risk-premium on the stock after the refinancing.

   (c) What is the required return on the company (i.e., stock and debt combined) after the refinancing.

   (d) Assume that the operating profit of the firm is expected to remain constant in perpetuity. What is the new price-earnings ratio?

   (10%)

4. (a) Define mean-variance portfolio frontier and mean-variance efficient portfolio.

   (b) What is the statement of the two-fund separation theorem? What are the consequer this theorem?

5. You currently have 40% of your wealth invested in a risk-free asset and 60% in the two below.

asset	expected return	standard deviation	beta (β)	% of wealth invested
1	18.4%	20%	0.8	40%
2	23.2%	30%	1.4	20%

   (a) Assuming that the assets are priced according to the CAPM determine the equation security market line.

   (b) You decide to reduce your diversifiable risk by switching to a combination of the ri asset and the market portfolio.

   If you want to maintain the same expected return on your wealth as you have now, percentage of your wealth must you invest in the market portfolio?

   (c) If you sold your current holdings of risky assets and invested the proceeds in the r portfolio, what would be the expected return and beta on your wealth?

   (d) The risk of the market portfolio is 16%. Determine the equation of the capital marke

   (e) The correlation between assets 1 and 2 is 0.5. What is the systematic and the unsyste risk of (i) your original portfolio, (ii) the portfolio constructed in (5c)?

6. The following bonds are traded at the market (face value of each bond = 100):

Bond #	Price	Maturity	Coupon
1	100	2 years	5%
2	93	1 year	zero
3	89	3 years	zero

   (a) Construct the spot-rate curve which is implicitely given by the bonds. Which inforr can be inferred from the spot rate curve?

   (b) What yield to maturity would have to be offered to sell a 2-year bond with 10% coup

   (c) There is a further zero coupon bond (with face value = 100) traded at this market: price = 92, time to maturity: 2 years.
   Is this price consistent with the other bonds or is there an arbitrage possibility? If the case, construct an arbitrage strategy.

   Would the price be consistent with bonds #2 and #3 if bond #1 were not traded? Ex