ECONOMICS 422
MIDTERM EXAM 1

R. W. Parks   Autumn 1995

Answer all questions on the examination sheets. Weights are given in parentheses. In general you should try to show your work. If you only present a numerical answer and it is wrong, then you get no credit. If you show what you are doing and you make a numerical error you will receive some credit for a correct approach.

1.(25) Josephine lives in a two period Fisherian world. Her utility function for consumption streams can be written as $U(c_0, c_1) = c_0^2 c_1$, hence her marginal rate of substitution is $MRS = -2c_1 / c_0$.
Her endowment of present and future resources is (40000, 288400). She can borrow or lend at a market real interest rate of 3 percent.

a. What is her wealth?

b. Write the equation for her budget constraint.

c. Derive the marginal rate of substitution.

d. What is her optimal consumption in the present and in the future?

e. What financial transaction is required to attain the optimal consumption stream? Indicate what is exchanged for what, and indicate the amounts involved.

2. (25) The diagram of Figure 1 (attached) refers to a two period Fisherian model. Point E represents a person's initial endowment. The curve EDF represents all of the consumption streams that are attainable by real investment starting from E. The person can borrow or lend at the real rate of interest r. The slope of the line AB is -(1+r).

Instructions: Answer the questions below based on Figure 1, the above information, and the following convention. In Figure 1 treat each letter as indicating a *location* and not a quantity, so that in answering parts A and C of the question *you need to indicate quantities by two letters* such that the distance between them refers to the relevant quantity. For example, the endowment at point E involves the quantity OE of present resources.

In some instances, you may need to augment the diagram and to indicate points that are not yet labeled. In doing so, please use the letters M, N, P, Q, but not O (which is already used to indicate the origin.

A. Based on the diagram, please indicate:

(a.) the optimal amount of investment._____

(b.) the optimal consumption stream (show the amount of both present and future consumption._____

(c.) the attained wealth associated with the optimal investment._____

(d.) the attained wealth associated with investing an amount LE._____

(e.) the net present value associated with investing LE._____

B. What is the relation between the marginal rate of substitution at C, the marginal rate of transformation at D, and the real rate of interest?
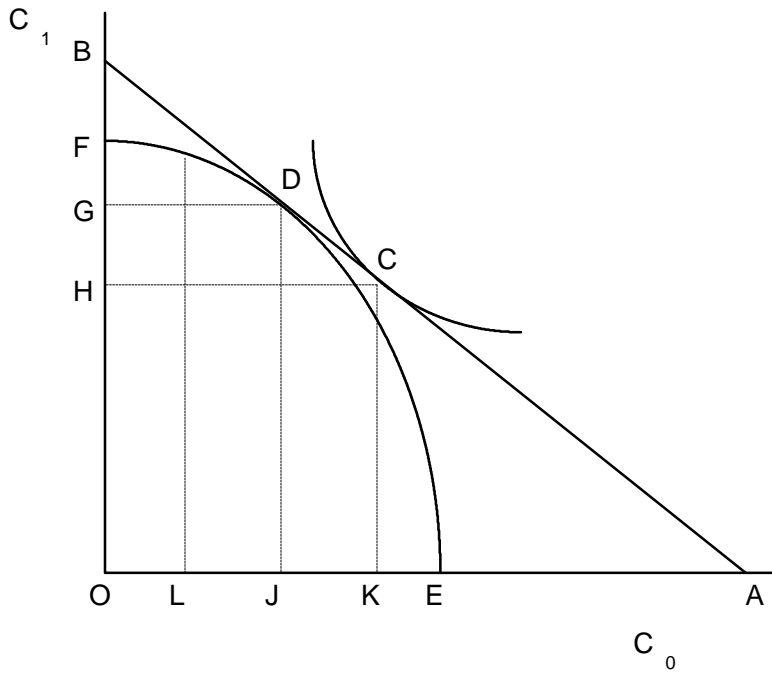_____

C. Indicate whether the person borrows or lends and how much.
_____

D. If there is a rise in the real rate of interest, what happens to the optimal amount of real investment? _____
Show the new optimum in the diagram.
[Don't worry about optimal consumption.]

FIGURE 1

3.(15) State the Fisher separation theorem.

Does it apply in the situation shown in problem 2?Explain.

Indicate a financial problem that is simplified or resolved if the theorem holds, at least approximately.

Indicate a situation in which the theorem would fail to hold.

4.(25) You have just won the mini sweeps contest, and you have the choice of one of the following prizes:
a. $100,000 now
b. $136,499 to be paid in five years
c. $5,880 per year to start next year and continue indefinitely.
d. $14,130 per year to start next year and continue for a total of 10 payments.
e. $3,150 to be paid next year, followed by annual payments that grow at 3 percent per year and continue indefinitely.

If the interest rate is 5 percent, which is the most valuable prize?
Show your work. i.e. evaluate each prize.

5.(10) Yields and prices of zero coupon bonds.

a. A four year zero coupon (pure discount) bond sells for 83:16. What is its yield?

b. The yield on a five year zero coupon bond is 4.68 percent. What is its price?

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MIDTERM EXAM 2

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Answer all questions. Weights are given in parentheses. In general you should try to show your work. If you only present a numerical answer and it is wrong, then you get no credit. If you show what you are doing and you make a numerical error you will receive some credit for a correct approach.

1. (18) The following table gives the yields on four zero coupon Treasury bonds:

Maturity Date	Years from now	Yield
May 1996	0.5	5.84
Nov 1996	1.0	6.00
May 1997	1.5	6.04
Nov 1997	2.0	6.16

Note that the yields are annual yields, but they assume semi annual compounding.

a. What is the price of a two year, 6.0 percent coupon Treasury bond, paying semi-annual coupons?

b. Define the yield to maturity of a bond. Is the yield to maturity of the bond in part a higher of lower than the coupon rate? Explain.

c. Suppose that in 1993 you invest $10,000 in an asset and that in 1994, one year later, you invest another $5,000. At the present time, two years after the initial investment, the asset is worth $18,144. What has been your rate of return on the investment?

2. (16) The Zephyr Company has to choose between two machines which do the same job but have different lives: the A machine provides service for three years, while the B machine provides service for four years. The two machines have the following costs, expressed in real terms: (Neither has a scrap value at the end of its life.)

Year	Machine A	Machine B
0	$20,000	$25,000
1	$5,000	$4,000
2	$5,000	$4,000
3	$5,000	$4,000
4		$4,000

Assuming that the opportunity cost of capital is 6 percent in real terms and ignoring taxes, which machine would you choose? Explain and show your work.

3. (20) A person whose utility of wealth function is $U(W)=\log_e(W)$, i.e. the person's utility associated with any given level of wealth is equal to the natural log of the wealth level. If the person chooses occupation A his or her wealth is given by the following wealth distribution:

Wealth:	1,400,000	2,400,000
Probability:	0.8	0.2

If the person chooses occupation B his or her wealth is given by the following wealth distribution:

Wealth:	1,500,000	1,700,000
Probability:	0.5	0.5

a. Which occupation will the person choose and why? Or will the person be indifferent to the alternatives? Explain.

b. Compute the certainty equivalent wealth for occupation A.

4. (18) Two companies have stock for which the expected returns and standard deviations of return are forecast as:

Company:	A	B
Expected Return:	0.20	0.20
Standard Deviation of Return	0.30	0.30

The correlation coefficient between the two rates of return is 0.

a. What are the expected return and variance of returns for a portfolio made up, 60 percent of A and 40 percent of B?

b. Since the two stocks' returns and standard deviations are the same, does it make any sense to combine them in a portfolio, or would you be just as well off holding either one of the stocks separately? Explain.

5. (18) A stock currently sells for $100 per share. The distribution of its price in one year is:

Price:	90	100	110	120
Probability:	.10	.20	.50	.20

a. What is the probability distribution of the stock's rate of return?

b. Compute the expected value of the rate of return over the next year.

c. Compute the variance of the rate of return.

6. (10)

a. A share of Kayak Co. stock is expected to pay a dividend of $10 next year and dividends are expected to grow at 2 percent per year thereafter. Estimate the price of a share of Kayak Co.'s stock if the relevant discount rate is 15 percent.

b. Since I plan to hold XYZ's stock for at most five years, I am not concerned about XYZ's dividends after that horizon date. True, False or Uncertain. Explain

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Name:_____

ECONOMICS 422
FINAL EXAMINATION

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*Two hours. Answer all questions on these exam sheets. Question weights (total=120)
are given in parentheses.*

1. (4 each) Provide brief definitions of the following:

   a.   The Fisher separation theorem.

   b.   The distribution of a random variable.

   c.   The expected utility hypothesis.

   d.   The yield to maturity of a bond.

   e.   The principal result of the capital asset pricing model

2. Your company is considering a project which costs $1,600,000 now and is expected to generate net cash flows of $1,000,000 <u>in real terms</u> at the end of each of the next two years. The project has risk that is comparable to that of the company's current assets. The company has a debt/equity ratio of 1/2, and the beta for the company's stock is 2.0 while the beta for its debt is 0.5. Based on the monthly returns for five recent years, the standard deviation of the rate of return on the company's stock is 0.379 while that for the market portfolio is 0.2. The current risk-free interest rate is 0.06, the expected market risk premium is 0.08, and the expected rate of inflation over the next two years is 4 percent per year..

    a.(5) The correct <u>nominal</u> discount rate for the company to use in evaluating this project is:
        (1)   .06
        (2)   .08
        (3)   .10
        (4)   .12
        (5)   .14
        (6)   .16
        (7)   .18

    b.(5) The Net Present Value of the Project is
        (1) $46,661
        (2) $58,144
        (3) $65,642
        (4)   -$34,358
        (5)   -$20,321
        (6) $0

    c.(2) The project is
        (1)   Not worth doing
        (2)   Marginal
        (3)   Worth doing

3. Efficient Market Hypothesis

a.(5) State the efficient market hypothesis.

b.(3 each) Which of the following observations would appear to contradict the efficient market hypothesis (EMH)? For any case or cases that <u>contradict</u> EMH, place an X to the left of the item number and indicate in the blank the form of the efficient market hypothesis that is contradicted

(1) The average return over five years on a group of 200 stocks is greater than zero._____

(2). For five of the Dow Jones stocks the correlation between the return in week t and the return in week t+1 is -0.49._____

(3) You could have made a superior return by buying stock after a 5 percent rise in price over the previous day and holding it until it fell by 5 percent over the previous day, at which point you take a short position._____

(4) One could have made higher than average capital gains by holding shares with low dividend yields._____

(5) An investor systematically buys Treasury bonds immediately after the Federal Reserve announces that it has lowered the discount rate. The investor's return from pursuing this strategy over a five year period is above average._____

c.(5) Analysis of five years of monthly data on Pillsbury's stock returns produces the following estimates: α=1.65 percent and β=0.6. If in a subsequent month the market return is 8 percent while Pillsbury's stock return is 7 percent, what is the abnormal return for Pillsbury?

(1) -6.45%
(2) -0.55%
(3) 0.0%
(4) 0.55%
(5) 6.45%
(6) 7%

4. (10) If you buy a 9-month Treasury bill future, you undertake to buy a 3-month T-bill 9 months from now. Suppose that Treasury bills currently offer the following yields:

Months to Maturity	Annual yield %
3	5.43
6	5.43
9	5.39
12	5.37

What price would you expect to see quoted for a 9-month T-bill future? Explain and show your analysis.

5. (15) BioGenCo's stock sells for $172. It has a beta of 1.2, the standard deviation of the rate of return is 0.4, and it has not paid dividends. The risk free interest rate is 5.5 percent. The value of a one year European put option on BioGenCo with an exercise price of $165 is:

      a. $18.97
      b. $20.10
      c. $22.86
      d. $34.57

      Would an American put option be worth more or less? _____
      Why?

6. (20)A firm has assets with a market value of $10,000,000. The standard deviation of the rate of return on these assets is 0.4. The firm has debt in the form of a zero coupon bonds, maturing in 4 years. The present value of the payment promised at the bonds' maturity, using an annually compounded risk-free interest rate of 6 percent is $5,000,000.

a. Find the future value of the promised debt payment.

b. Find the market value of the firm's equity. [Hint:option]

c. Find the market value of the debt. Is the debt risky or riskfree?

d. What is the yield to maturity on the bonds?

7. (8) The table below contains spot and 12-month futures prices for two commodities.
For each of them indicate whether or not the prices are consistent. There may be some
money-making opportunities. If you find any, explain the transactions that you could use
to take advantage of the opportunities. The risk-free one year interest rate is 5.5 percent.

Commodity	Spot Price	Futures Price	Comments
Gold, per oz	$385.25	$402.90	PV(storage)=PV(convenience)
Silver, per oz.	$5.295	$5.348	PV(storage)- PV(convenience)=$.05

8.(5) You invest $20,000 in a mutual fund with instructions that all dividend and capital
gains distributions are to be reinvested. Two and one half years later your account shows
that you have $29,931.24. What has been your average annual rate of
return?_____

9.(5) You sold short 100 shares of XYZ Corp. on a day when the shares' price is $120.
On a subsequent "date A" the price of XYZ was $140, and on a different subsequent "date
B" the price of XYZ was $105. On one of these two dates, A or B, the date on which is
was more advantageous to do so, you traded to close the short position. What was your
profit or loss?_____