

ECONOMICS 422
MIDTERM EXAM 1

R. W. Parks

Spring 1992

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.(28) The diagram of Figure 1 (attached) refers to a two period Fisherian model. Point E represents a person's initial endowed wealth. The curve EDF represents all of the consumption streams that are attainable by real investment starting from E. The person can borrow and lend at the real rate of interest r . The slope of the line AB is $-(1+r)$. Write your name and the answers to the following questions on Figure 1 and hand it in with the rest of your exam answers.

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 level 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.

2.(12) In a newly settled country, resources are likely to have great potential but are as yet undeveloped. Would you expect the real interest rate to be high or low? Comparing situations in which the new country is or is not in close contact with the rest of the world, in which situation will the interest rate be higher? In which situation will more investment take place? Explain.

3.(32) Yields and prices of zero coupon bonds; computing forward rates.

On April 15, 1992 the following zero coupon stripped Treasury bonds were available:

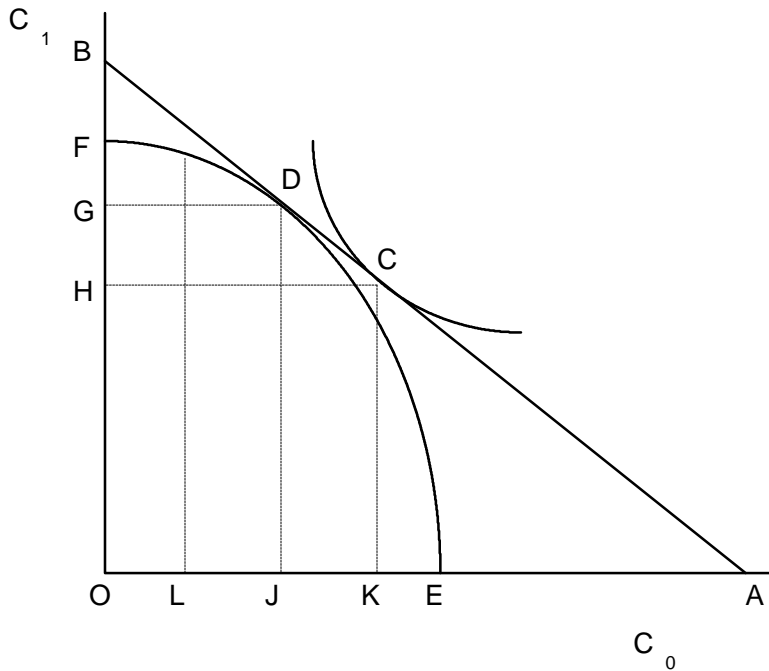
Maturity	Price
May 15, 1993	95.5
May 15, 1994	89.875
May 15, 1995	83.40625

- a. Treating the time from April 15, 1992 to the May 15, 1993 maturity date as 1.0822 years, compute the interest rate or yield to maturity on each of the three bonds. This gives you the spot interest rates that make up the term structure for 1.0822, 2.0822, and 3.0822 years.
- b. Using the prices or the term structure rates, compute the forward interest rate connecting May '93 and May '94 and the forward interest rate connecting May '94 and May '95
- c. A friend thinks that inflation is going to slow down over the next few years. Based on the information contained in the interest rates would you agree with your friend or not. Explain.
- d. If the one year spot interest rate is 4.35 percent and the rate of inflation is expected to be 3.25 percent, what is the expected real rate of interest? Give both the approximate and the exact solutions, labeled to indicate which is which.

4.(28) Bonds and Stocks

- a. Compute the value of a three year coupon bond, paying interest annually at a coupon rate of 8.5 percent when the yield on comparable bonds is 5.84 percent.
- b. Each share of the stock in the XYZ Corp. is expected to pay a dividend of \$10.00 next year and is expected to sell for \$110 next year. If the return on comparably risky stock is 12 percent, what is its price today?
- c. ABC Corp.'s stock sells for \$50 today. It is expected to increase by \$10 over the next year and to pay a dividend of \$5 in one year. What is the expected rate of return on the stock?

FIGURE 1



Instructions: In Figure 1 treat each letter as indicating a *location* so that in answering parts A and C of question 1 you need to indicate quantities by two letters such that the distance between them refers to the relevant quantity.

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

Answers for question 1:

A.

- (a) _____
- (b) _____
- (c) _____
- (d) _____
- (e) _____

C. _____

B.

NAME: _____

ECONOMICS 422
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. (24) A stock currently sells for \$20 per share. The distribution of its price in one year is:

Price:	19	20	21	22
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.

2. (16) Portfolio Analysis

a. What is meant by the set of mean, standard deviation efficient portfolios?

b. Given a set of risky assets, suppose that there is risk free lending but not borrowing. Sketch the efficient set.

c. Would the two-fund separation result hold? Explain.

3. (20) Ms. Boesky has invested 10 percent of her portfolio in shares of company A, 20 percent in those of company B, and the remainder in shares of C. She believes that their prospects are as follows:

Company:	A	B	C
Expected Return, %:	10	15	20

The matrix of their variances and covariances is given by:

	A	B	C
A	.0025	.0015	.0010
B	.0015	.0050	.0020
C	.0010	.0020	.0100

- a. What are the expected return and standard deviation of returns on her portfolio?
- b. Using the portfolio of part a, is Ms. Boesky's portfolio better or worse than one invested entirely in shares of C, or is it impossible to say? Explain.

4. (16) In an efficient capital market, investors can borrow or lend at the risk-free interest rate of 5.0 percent, and the expected return on the market portfolio is 13.4 percent and its standard deviation is 22 percent. An investor is willing to bear more than the average market risk. If he or she is willing to have a portfolio whose standard deviation is 30 percent, what would be its expected return? How would the investor create such a portfolio?

5. (24) Your company is considering a project which requires the building of a warehouse. Warehouse A costs \$120,000 to build and lasts five years. An alternative, Warehouse B costs \$180,000 to build and lasts 8 years. Both warehouses would provide the same stream of services in the context of the project. Neither has a scrap value at the end of its life. Whichever is built, it will need to be replaced when it wears out, indefinitely.

The project has risk that is comparable to that of the company's current assets. The company's capital structure involves 25 percent debt. The debt can be regarded as risk free. The company's stock has a beta of 0.8. Based on the monthly returns for five recent years, the standard deviation of the rate of return on the company's stock is 0.25 while that for the market portfolio is 0.22. The current risk-free interest rate is 0.052, and the expected market risk premium is 0.08.

- a. What interest rate would you use in the analysis of this project? Explain.
- b. Assuming that the project itself is worth doing, which warehouse would you choose? Explain and show your work.
- c. How would your analysis be affected if it was anticipated that the cost of construction would increase at 3 percent per year? Show your work.

ECONOMICS 422
FINAL EXAMINATION

R. W. Parks

Spring 1992

Two hours. Answer all questions. Question weights (total=120) are given in parentheses. In general you should try to show your work for the problems i.e. the non-multiple-choice questions. 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. (28) Provide brief definitions of the following:

- a. The Fisher equation.
- b. The term structure of interest rates.
- c. The distribution of a random variable.
- d. The expected utility hypothesis.
- e. Leverage and the effect of leverage on portfolio risk.
- f. Yield to maturity of a coupon bearing bond.
- g. The efficient market hypothesis

2.(12) BPS is considering a project whose risk is regarded as similar to that of the company's assets. The market value of BPS stock is \$8 million and the market value of its risky debt is \$8 million. The yield to maturity on its risky debt is 12.2 percent. The beta of the company's common stock is 1.5, the expected risk premium on the market is 8 percent, and the return on Treasury Bills is 5 percent.

The project involves an initial outlay of \$1 million and will then generate revenue and additional operating costs in each of the following three years. The revenues from the project are forecast at \$850,000 per year in real terms, but are expected to grow at 4 percent per year. The operating costs are forecast at \$425,000 per year in real terms and are expected to grow at 4.5 percent per year.

- a. What is the appropriate discount rate?
- b. Should BPS undertake this project? Why?

3.(10) After conducting an analysis of past stock prices, you come up with the following observations. Which would appear to contradict the weak form of the efficient market hypothesis? For any cases that contradict, provide a brief explanation of why there is a contradiction.

- a. The average return on all of the stocks is greater than zero.

- b. For five of the stocks the correlation between the return in week t and the return in week $t+1$ is -0.3 .
- c. One 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.
- d. One could have made higher than average capital gains by holding shares with low dividend yields.

- 4.(12) Which of the following is or are call options, and which is or are put options?
- Warrants.
 - Executive stock options.
 - The abandonment option on an investment project.
 - Stand-by underwriting.
 - A a company's option to redeem its bonds at a premium before maturity.
- 5.(10) The stock of Phoenix Corp is \$110. Over the next six months, its price will either fall to \$86 or rise to \$165. What is the value of a six-month call option with an exercise price of \$140. The interest rate is 10.25 percent or 5 percent over six months.
- \$5.52
 - \$7.78
 - \$8.89
 - \$10.32
- 6.(16) Superski Corp's stock sells for \$83.125. It has a beta of 1.35, the standard deviation of the rate of return is 0.4, and it has not paid dividends. The risk free interest rate is 6.1 percent. Find the value of a one year European put option on Superski with an exercise price of \$90. Would an American put option be worth more or less? Why?
- 7.(6) Using a diagram showing the value at expiration as a function of the asset price, explain the difference between being short a put option with an exercise price of X and being long a forward contract at a price of X.
- 8.(10) Suppose that you can buy or sell futures contracts on soybeans. The current (spot) price of soybeans is \$5.45 per bushel, and the risk free interest rate is 4.5 percent per year. It costs \$0.25 per bushel, paid in advance, to store a bushel of soybeans for one year. The 12 month futures contract for soybeans currently sells for \$6.01.
- There is no arbitrage opportunity.
 - The safest strategy is to buy soybeans today and hold them for one year.
 - There is an arbitrage opportunity. Buy soybeans and also buy a 12 month soybean futures contract.
 - There is an arbitrage opportunity. Sell soybeans short today and buy a 12 month soybean futures contract.
 - There is an arbitrage opportunity. Borrow money, buy soybeans, and sell a 12 month soybean futures contract.

9.(10) The current level of the Standard and Poor's Index is 378. The prospective dividend yield is 3.2 percent, and the interest rate on one year Treasury issues is 4.5 percent. What is the value of a one-year future on the index? (Assume that all dividend payments occur at the end of the year.)

- a. 370.23
- b. 382.91
- c. 407.11
- d. Can't say without knowing the outlook for the market.

10.(6) Explain the advantages of holding a diversified portfolio as opposed to holding one or only a very few assets. Suppose that your portfolio is a small one. Does the diversification principle still hold? How can you diversify without incurring prohibitive transactions costs?

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