Department of Economics
University of California, Berkeley

Fall 2009

ECONOMICS 136
SAMPLE FINAL EXAM A

THIS EXAM HAS THREE SECTIONS:

I.	**True/False**	**18 Points**
II.	**Problems**	**67 Points**
III.	**Essay**	**15 Points**

INSTRUCTIONS:

You have 3 hours to answer all questions. Number your blue books, and be sure to put your name and your TA's name on all of them. Use one blue book to answer parts I and III; use a second blue book to answer part II.

You are allowed to use three two-sided sheets of notes and a calculator.

GOOD LUCK!

PART I

Are the following statements true of false? Explain your answer in no more than two sentences. You will be graded on your explanation. (18 points, 3 each)

1) In a CAPM equilibrium, no portfolio has a higher Sharpe-ratio than the market portfolio.

2) If the yield curve is upward sloping and constant over time, then the price of a Treasury bond with a given date of maturity is rising as time passes.

3) An American call option on ABC has a strike price of \$12 and expires in June 2007, while another American call on ABC has a strike price of \$10 and expires in August 2007. If the first option costs \$1.20 and the second costs \$1.10 today, there is an arbitrage opportunity.

4) Lakonishok, Shleifer, and Vishny (LSV) argue that because growth stocks are glamorous, investors rush to buy them, pushing up their price and resulting in high subsequent returns, as confirmed in the data.

5) Suppose that Congyan's portfolio consists of 20% in 90-day Treasuries (riskfree), 20% in growth stocks and 60% in value stocks, while Dan's portfolio consists of 50% in 90-day Treasuries, 10% in growth stocks and 40% in value stocks. The mutual fund theorem is violated in this example.

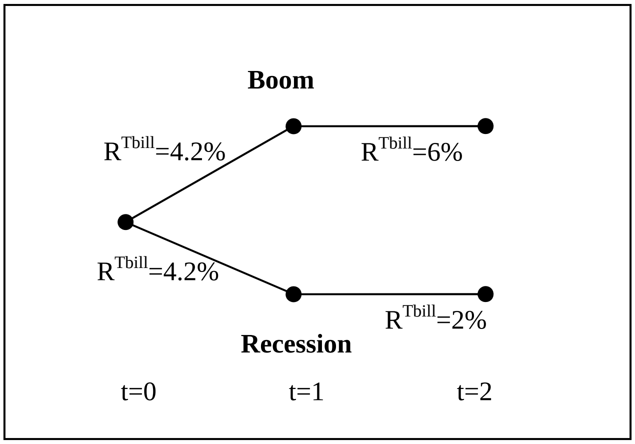
6) The value effect contradicts the weak form of the efficient markets hypothesis.

PART II

Note: Please use natural units in solving all problems (e.g., a standard deviation of 20% means σ=0.2 and σ^2=0.04.).

1. Bond portfolios (24 points, 4 each)

Consider an economy over three dates, t=0, t=1 and t=2. At t=1, the economy is either in a boom or in a recession; both of these events have 50% probability. The event tree of this economy is given below.



There are two financial assets, a Treasury *bill* and a Treasury *bond*. T-bills sold at t=0 mature at t=1, and T-bills sold at t=1 mature at t=2. The rate of return on a T-bill between t=0 and t=1 is 4.2% (this is independent of the state of the economy: the T-bill is a riskfree investment between t=0 and t=1). If the economy is in a boom, the Fed raises interest rates, and as a result, the T-bill return between t=1 and t=2 is 6%. If the economy is in a recession, the Fed lowers interest rates, and hence the T-bill return between t=1 and t=2 is only 2%. These numbers are also shown in the figure. The Treasury *bond* is a zero-coupon bond with maturity date t=2 and face value $100 (i.e., this bond pays $100 to its owner at t=2). The price of this bond at t=0 is P_0=$92.

(a) Consider a money-market fund that invests $1 in T-bills at t=0, and then re-invests the proceeds in T-bills at t=1. What is the overall net simple rate of return on this money-market fund between t=0 and t=2 if the economy enters a boom? If the economy enters a recession?
(b) Suppose that at t=1, the economy is in a boom. What is P_1^{boom}, the price of the T-bond in this event? To compute it, note that at t=1, both the T-bill and the T-bond are riskfree assets, and hence must earn the same return between t=1 and t=2. Now suppose the economy is in a recession at t=1. What is $P_1^{recession}$, the price of the T-bond then?
(c) Suppose you buy the T-bond at t=0 and sell it at t=1. What is the net simple return you would earn from this investment between t=0 and t=1 if the economy enters a boom? If the economy enters a recession?
(d) Now consider a short term bond investor, who would like to invest in t=0 for *one period* in a portfolio of the T-bill and the T-bond. Assume that these are the only assets available to the investor. What is the mean and standard deviation of the return for these two assets between t=0 and t=1? If this investor has risk aversion A=10, what is his optimal portfolio?
(e) Now consider a long term bond investor, who would like to invest for two periods at t=0. This investor is choosing between two strategies: (1) invest 100% of her wealth in the T-bond; (2) invest 100% of her wealth in the money market fund defined in part (a). The investor has to choose one of these two strategies (i.e., she is not allowed to combine the strategies in a portfolio, or to rebalance at t=1). What is the expected return and standard deviation of the return for the two strategies between t=0 and t=2? Which of the two strategies is better for a mean-variance investor who is risk averse (A>0)?
(f) Financial advisors sometimes warn that T-bills are not safe in the long term due to refinancing risk. Evaluate this advice using the above example. What do you think might constitute a safe asset for a long-term investor?

2. Capital budgeting (18 points, 3 each)

Consider an economy where the riskfree rate is R_f = 4%, the expected return on the market portfolio is ER_m = 12%, and the standard deviation of the return on the market portfolio is 20%. The covariance between the return on ABC stock and the return on the market portfolio is 0.06. All of this data refers to annual returns. Suppose that ABC stock pays a dividend of $10 per share next year, and dividends are expected to grow at a rate of 2% per year.

(a) ABC's manager argues that according to the Gordon Growth Model his shares should sell for a price of $10/(.04-.02)=$500. Explain why this valuation is inappropriate.

(b) Assuming that CAPM holds, compute ABC's beta with respect to the market portfolio, and the expected rate of return of ABC stock.

(c) Given your answer to (b), what price does the Gordon growth model imply for ABC?

(d) It turns out that the market price of ABC is $50, which is different from what you computed in (c) [if not, you made a mistake!]. However, you realize that ABC has only narrowly avoided bankruptcy last year, and has a very high book-to-market ratio. Is the fact that ABC has a lower price than what's predicted by part (c) consistent with what you know about the expected return of stocks with high book-to-market ratios? Why?

(e) Now you want to apply a more sophisticated asset pricing model than CAPM to price ABC. Let HML=R_H- R_L denote the excess return of value stocks over growth stocks, and SMB= R_S- R_B the excess return of small stocks over big stocks. Suppose that ABC has a beta of 1.5 with respect to HML, and a beta of zero with respect to SMB. The beta of ABC with respect to the market portfolio is still what you computed in part (b). If the expected excess return of value stocks over growth stocks is E[HML]=4%, what should be the expected return of ABC according to the Fama-French model? Is it higher or lower than the expected return you computed in (b)? Why?

(f) Using the expected return you computed in part e), what should be the price of ABC according to the Gordon model? Does your answer justify the market price of P=$50?

3. Derivatives (25 points)

Consider an economy in three periods, t=0, t=1 and t=2. At t=0, the market index is trading at a value of 100. At t=1, the index either rises to 115 with 50% probability, or falls to 95 with 50% probability. Following either of these outcomes, the index either rises by 15 or falls by 5, with equal probabilities, at t=2. Thus the highest possible index value at t=2 is 130, and the lowest is 90. The index pays no dividends during this time, and the riskfree rate is R_f=0.

(a) [4 points] Our first goal is to compute the price of a European put option on the index, with exercise price X=120 and expiration date t=2. Draw the event tree for the economy. For each node at t=1 and t=2, write the index value. For each node at t=2, write the payoff of the put.

(b) [3 points] Consider the node at t=1 where the index has gone up to 115. We begin by focusing on events subsequent to this node only. Our goal is to compute the price of the option, P_1, in this event. To do so, construct a portfolio at this node that replicates the payoff of the option in both possible subsequent states at t = 2. Specifically, assume that you purchase x shares of the market index and invest y dollars in the riskfree asset. Solve

for x and y from the assumption that this is a replicating portfolio. What is the price of this portfolio at t = 1 (in the event when the index is at 115)? What is the put price P_1 in this event?
(c) [3 points] Following a similar procedure as in (b), now solve for the price of the option at t = 1 in the event when the market index has gone down to 95.
(d) [3 points] Now go back to period t = 0. To compute P_0, construct a portfolio of the market index and the riskfree asset that pays P_1 in period t = 1 (that is, the number you obtained in (b) if the price goes up in period 1, and the number you obtained in (c) otherwise). What is the price of this portfolio? What is the price of the put option?
(e) [4 points] Suppose that you buy one put option at t=0 and sell it at t=1. What is the expected return between t=0 and t=1 of this investment? Is it higher or lower than the riskfree rate? Does that contradict the efficient markets hypothesis? If CAPM holds, what must be the sign of the beta of the put between t=0 and t=1?
(f) [4 points] Consider the market index. What is its expected return between t=0 and t=1? What is the variance of the return? What is the covariance of the return on the market index and the return on investing in the put between t=0 and t=1?
(g) [4 points] Compute the beta of the put with respect to the market index using your results in (f). Does it have the sign you predicted in (e)? If CAPM holds, what must be the expected return of the put implied by the CAPM equation between t=0 and t=1? Is this the same expected return you got in (e)? Does CAPM hold in this example?

PART III – ESSAY (15 points)

Write a **short** essay on the topic below. Use formulas and graphs to back up your argument where necessary. Be brief: your essay will be graded on the quality of your arguments and not on length.

Mutual funds

A friend of yours suggests that the best way to invest is to pick a mutual fund that has a smart manager, who will carefully choose and invest in underpriced stocks.
a) What is the evidence about the investment performance of actively and passively managed funds? Are the fees of actively managed funds higher or lower? Why? Based on these facts, how should you respond to your friend?
b) Your friend says: “But look at Warren Buffett and other famous investors who earned very high returns. All we need to do is to find a manager who has earned persistently high returns in previous years, and invest in her fund.” Respond to this argument by referring to the role of luck and the evidence on the persistence in mutual fund returns.
c) Now your friend comes up with a chart that shows the performance during 1995-2005 of all actively managed funds that existed in 2005. The chart shows that these funds performed substantially better than the index during 1995-2005. What sort of bias does this chart suffer from? How does that bias affect the evaluation of fund returns? What chart should your friend look at?