NORTHWESTERN UNIVERSITY
KELLOGG GRADUATE SCHOOL OF MANAGEMENT

Kathleen Hagerty
Investments
EMP 39

Final Exam

I. Answer the following true or false and explain why.

a. The only risk in efficient portfolios is market risk.

b. If a risky security has an expected return below the T-bill rate, it must have a negative beta.

c. Suppose your want to buy 100 ounces of gold in six months. Call options could be used to protect you against an adverse movement in the price of gold over the next six months.

II. Consider the following information on stocks A and B.

	Stock A	Stock B	T-bill
Expected Return	.20	.30	.05
Standard Deviation	.25	.30	
Price	$40	$50	

The correlation between the two stocks is 0.

a. What is the expected return and standard deviation for a portfolio which contains 25 shares of A and 20 shares of B?

b. Draw all the expected return-standard deviation combinations of A and the T-bill.

c. If you didn't want a standard deviation bigger than 15%, how would you split your money between A and a T-bill?

d. Draw all the expected return- standard deviation combinations of A and B. (I don't want the exact numbers, just the general shape).

II. Consider the following information:

	Market Portfolio	Treasury Bills
Expected Return	12%	7%
Standard Deviation	20%	0

a. If you needed to earn an expected return of 10%, what is the best portfolio to hold? What is the standard deviation of that portfolio?

b. A stock has beta of .9 and a security analyst who specializes in studying this stock expects this stock's return to be 13%. If the Security Market Line captures the market's expectations about this stock, is the analyst pessimistic or optimistic about this stock relative to the market's expectations?

IV. Suppose an automobile manufacturer wants to hedge the cost of aluminum and there are puts and calls on aluminum. Assume the breakeven cost of aluminum is $1600 per ton.

a. (10 points) If the firm wants to put a $1800 cap on its aluminum costs, what option position should it take? (I.e. Should it buy a call, sell a call, buy a put or sell a put?). Draw a graph of the firm's unhedged and hedged position.

b. (10 points) Suppose the firm wanted a collar with a $1800 cap and $1500 floor instead of the $1800 cap. What option position should the firm take to accomplish this? How does the cost of the collar compare to the cost of the cap? Why?

c. (5 points) If the firm wants to lower the cost of the collar what should it do?

d. If the firm wanted to hedge the cost of aluminum with a future, what futures position should it take (i.e., buy a future or sell a future)?

V. a. Draw the payoff diagram for a short position in a gold forward with a forward price equal to $450/ounce.

b. Draw a payoff diagram for the following position: sell one call with a strike price equal to 40 and buy one put with a strike price equal to 40.

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I. Answer the following true or false and explain why.

b. The only risk in efficient portfolios is market risk.

True, all the firm specific risk has been diversified away.

b. If a risky security has an expected return below the T-bill rate, it must have a negative beta.

True.
The expected return is given by :

$$ER = r_f + \beta(ER_{market} - r_f).$$

Since $(ER_{market} - r_f) > 0$, if $ER < r_f$, then β must be negative.

c. Suppose your want to buy 100 ounces of gold in six months. Call options could be used to protect you against an adverse movement in the price of gold over the next six months.

True, a call provides protection against price increases.

II. Consider the following information on stocks A and B.

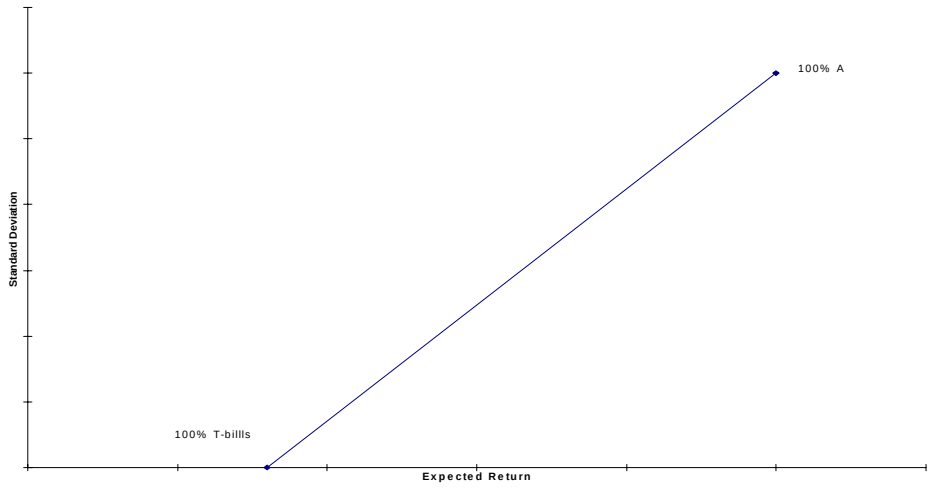
	Stock A	Stock B	T-bill
Expected Return	.20	.30	.05
Standard Deviation	.25	.30	
Price	$40	$50	

The correlation between the two stocks is 0.

a. What is the expected return and standard deviation for a portfolio which contains 25 shares of A and 20 shares of B?

Investment in A = $40/share * 25 shares = $1000
Investment in B = $50/share * 20 shares = $1000
Total Investment $2000
Portfolio weight for A $1000/$2000 = 1/2
Portfolio weight for B $1000/$2000 = 1/2
Expected Return = (1/2)*.20 + (1/2)*.30 = .25
Standard Deviation = SQRT[$(1/2)^2(.25)^2 + (1/2)^2(.3)^2$] = .1953

b. Draw all the expected return-standard deviation combinations of A and the T-bill.

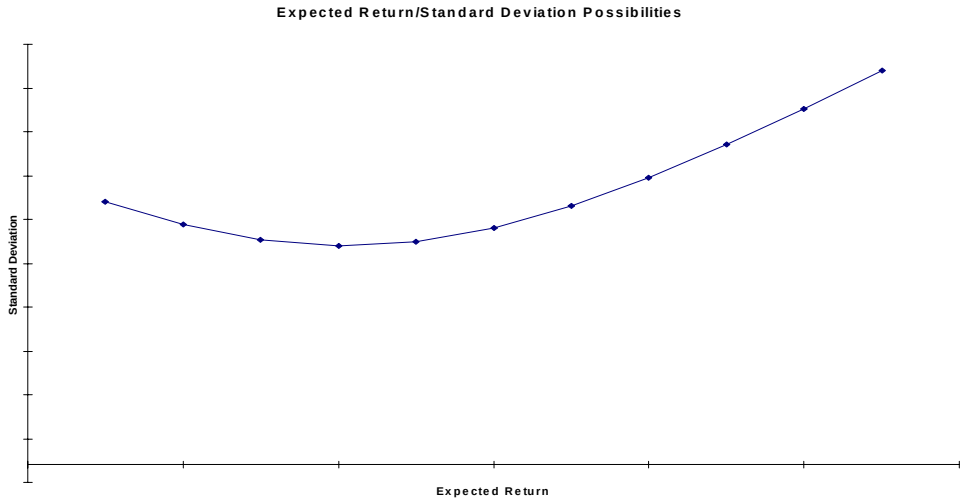


c. If you didn't want a standard deviation bigger than 15%, how would you split your money between A and a T-bill?

The standard deviation of a portfolio with portfolio weight w in A and (1-w) in a T-bill is $w*\sigma_A$.
Therefore if you want a standard deviation of 15%, you would solve:

$.15 = w*.25 \Longrightarrow w = .6$

d. Draw all the expected return- standard deviation combinations of A and B. (I don't want the exact numbers, just the general shape).



II. Consider the following information:

	Market Portfolio	Treasury Bills
Expected Return	12%	7%
Standard Deviation	20%	0

a. If you needed to earn an expected return of 10%, what is the best portfolio to hold? What is the standard deviation of that portfolio?

b.

ER = 10% = w_{market}*.15 + (1-w_{market})*.07 ====> w_{market} = .375

σ = (.375)*.20 = .075

c. A stock has beta of .9 and a security analyst who specializes in studying this stock expects this stock's return to be 13%. If the Security Market Line captures the market's expectations about this stock, is the analyst pessimistic or optimistic about this stock relative to the market's expectations?

ER = .07 + (.9)*(.12 - .07) = .115
The analyst is optimistic

IV. Suppose an automobile manufacturer wants to hedge the cost of aluminum and there are puts and calls on aluminum. Assume the breakeven cost of aluminum is $1600 per ton.

a. (10 points) If the firm wants to put a $1800 cap on its aluminum costs, what option position should it take? (I.e. Should it buy a call, sell a call, buy a put or sell a put?). Draw a graph of the firm's unhedged and hedged position.

Buy a call with a strike price of $1800
See other exam for EMP 34 and 37 for examples of graph

b. (10 points) Suppose the firm wanted a collar with a $1800 cap and $1500 floor instead of the $1800 cap. What option position should the firm take to accomplish this? How does the cost of the collar compare to the cost of the cap? Why?

Buy a call with a strike price of $1800 and sell a put with a strike price of $1500. The collar is cheaper than the cap because some of the gain associated with a price decline have been sold off.

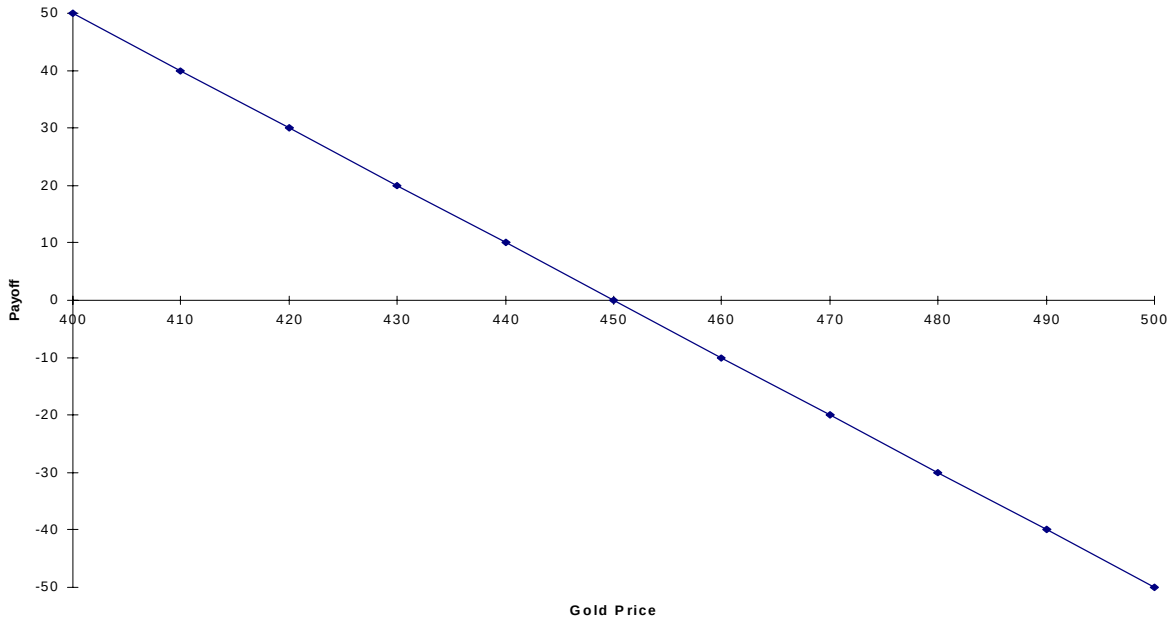
c. (5 points) If the firm wants to lower the cost of the collar what should it do?

Raise the strike on the call or raise the strike on the put.

d. If the firm wanted to hedge the cost of aluminum with a future, what futures position should it take (i.e., buy a future or sell a future)?

Buy a future

V. a. Draw the payoff diagram for a short position in a gold forward with a forward price equal to $450/ounce.



b. Draw a payoff diagram for the following position: sell one call with a strike price equal to 40 and buy one put with a strike price equal to 40.