NORTHWESTERN UNIVERSITY
KELLOGG GRADUATE SCHOOL OF MANAGEMENT

Kathleen Hagerty
Investments
EMP 37

Final Exam

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

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

b. If I want to know the relationship between risk and return for a single security, I should use the Capital Market Line.

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

d. 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	.25	.33	.08
Standard Deviation	.30	.40	
Price	$50	$80	

The correlation between the two stocks is 0.

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

b. Draw all the combinations of A and the T-bill. (I don't want the exact numbers, just the general shape).

c. If you didn't want a standard deviation bigger than 25%, how would you split your money between A and a T-bill?

d. Draw all the 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	20%	5%
Standard Deviation	15%	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. What is the expected return for a stock with a standard deviation equal to 20% and a beta equal to 1.3?

IV. Suppose an airline wants to hedge the cost of fuel and there are puts and calls on gasoline available.

a. (10 points) If the airline wants to put a cap on its fuel 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 airline's unhedged and hedged position.

b. (10 points) Suppose the airline wanted a collar instead of a cap. What option position should the firm take to accomplish this? Assuming the level of the cap on the collar stays the same, 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 fuel 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 long position in a gold forward with a forward price equal to $450/ounce.

b. Draw a payoff diagram for the following option position: Buy 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 I want to know the relationship between risk and return for a single security, I should use the Capital Market Line.

False, you should use the Security Market Line.

c. 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.

d. 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.

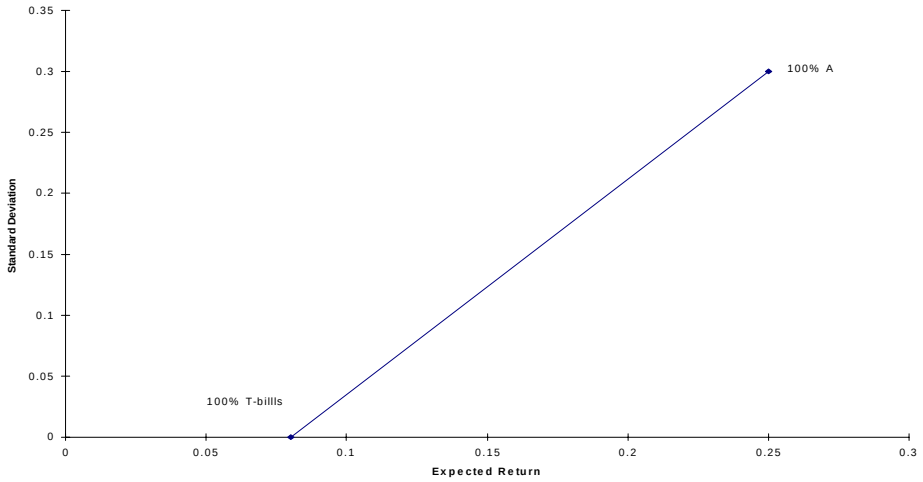
	Stock A	Stock B	T-bill
Expected Return	.25	.33	.08
Standard Deviation	.30	.40	
Price	$50	$80	

The correlation between the two stocks is 0.

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

Investment in A = $50/share * 20 shares = $1000
Investment in B = $80/share * 25 shares = $2000
Total Investment $3000
Portfolio weight for A $1000/$3000 = 1/3
Portfolio weight for B $2000/$3000 = 2/3
Expected Return = (1/3)*.25 + (2/3)*.33 = .3033
Standard Deviation = SQRT[$(1/3)^2(.3)^2 + (2/3)^2(.4)^2$] = .2848

b. Draw all the combinations of A and the T-bill. (I don't want the exact numbers, just the general shape).

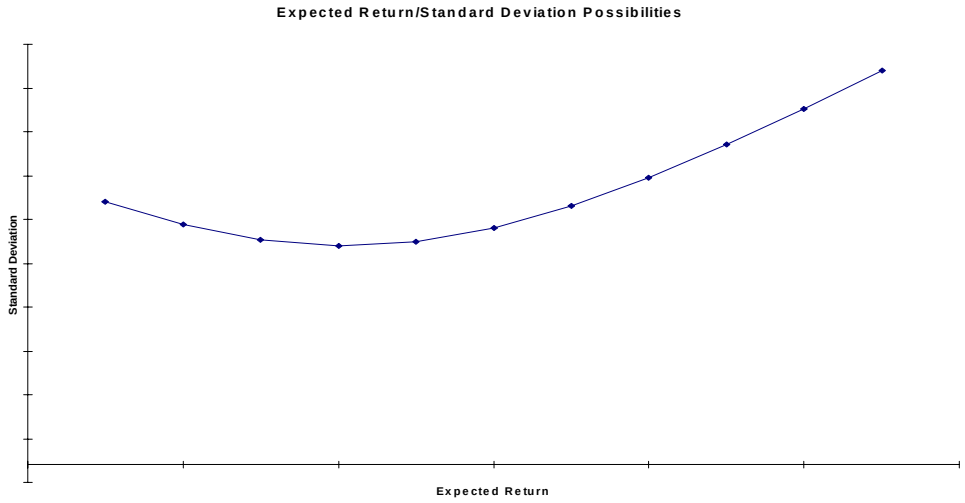


c. If you didn't want a standard deviation bigger than 25%, how would you split your money between A and a T-bill?

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 25%, you would solve:

$$.25 = w*.3 \Longrightarrow w = .8333$$

. Draw all the 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	20%	5%
Standard Deviation	15%	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?

ER = 10% = w_{market}*.20 + (1-w_{market})*.05 ====> w_{market} = 1/3

σ = (1/3)*.15 = .05

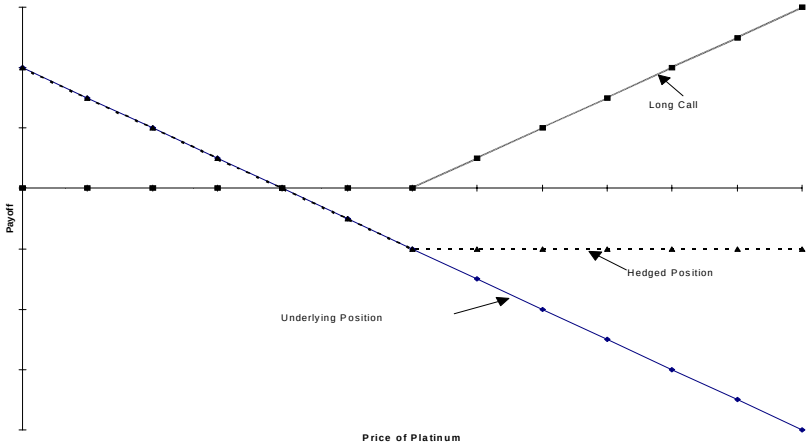
b. What is the expected return for a stock with a standard deviation equal to 20% and a beta equal to 1.3?

ER = .05 + (1.3)*(.20 - .05) = .245

IV. Suppose an airline wants to hedge the cost of fuel and there are puts and calls on gasoline available.

a. (10 points) If the airline wants to put a cap on its fuel 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 airline's unhedged and hedged position.

Buy a call



b. (10 points) Suppose the airline wanted a collar instead of a cap. What option position should the firm take to accomplish this? Assuming the level of the cap on the collar stays the same, how does the cost of the collar compare to the cost of the cap? Why?

Sell a put and buy a call. The collar is cheaper than the cap since the some of the gains associated with price declines have been sold off.

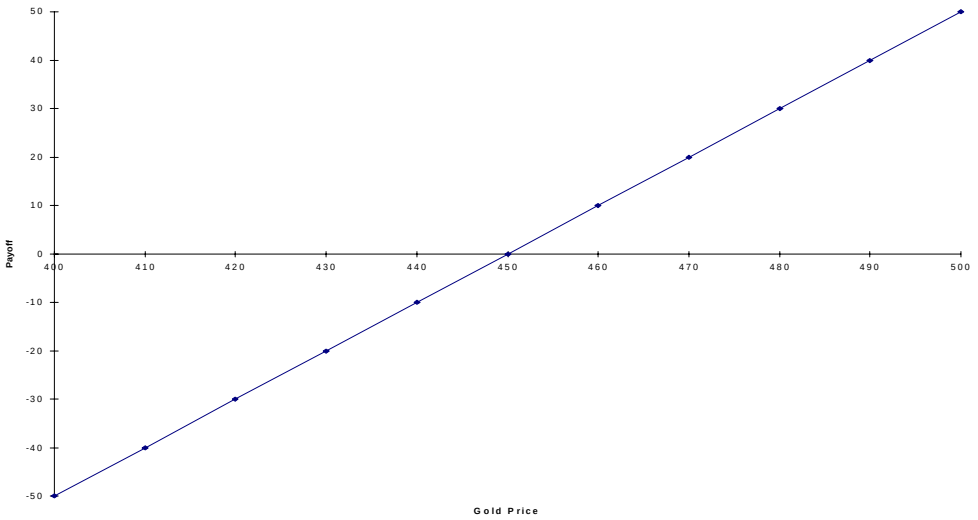
c. (5 points) If the firm wants to lower the cost of the collar what should it do?

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

d. If the firm wanted to hedge the cost of fuel 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 long position in a gold forward with a forward price equal to $450/ounce.



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