

Question 1

The Risk Premium is defined as the difference between the Stock Market Return and The T-Bill Return

So, we get these results

Year	Risk Premium
1999	18.9%
2000	-16.8%
2001	-14.8%
2002	-22.6%
2003	30.6%

The Average Risk Premium is the arithmetic average of these numbers. It is -0.94%

To calculate the Standard Deviation of the Risk Premium, we first need to determine the square deviations from the average risk premium, every year

Year	Deviation from Mean	Squared Deviation
1999	19.84%	393.6256
2000	-15.86%	251.5396
2001	-13.86%	192.0996
2002	-21.66%	469.1556
2003	31.54%	994.7716
Sum		2301.192

Then, we pick the sum of the squared deviations and divide by FOUR (not five, because we are using historical data, we need to divide by the number of observation minus one) to get the variance. The square root of the variance is the standard deviation. The number is 23.99%

Question 2

In this question all you are required to do is to make portfolios combining the portfolio Mr. Edwards already has with the Indexes you can choose from. You will make portfolios where 50% is the old portfolio and 50% will be the index. Notice that, the portfolio is worth \$2 million and the money he has to invest in the indexes is \$2 million also.

In the question, the requirement is that the new portfolio has a higher expected return and a lower standard deviation of returns.

The results are the following

Using Index	Expected Return	Standard Deviation
A	14.4%	21.18%
B	12.4%	20.17%
C	14.9%	23.44%
D	13.9%	21.39%

Using Index B is not good, because expected return is reduced. Using Index C is not good because Standard Deviation is increased. You can suggest using either Indexes A or D.

You will use Index A, however. Compared with what you get by using Index D, you have a higher expected return and a lower standard deviation. So, it is clearly better to use A than to use D.

Question 3

The advice to “Buy” or “Sell” depends on the relation between the realized returns and the expected returns according to the CAPM. If the realized return is higher, this means the stock is underpriced, so you should buy it. If the realized return is lower, this means the stock is overpriced, so you should sell it.

The expected return of stock A is $6\% + 0.8 * 6\% = 10.8\%$. The realized return is 11%, so it's higher. The advice is “BUY”. The expected return of stock B is $6\% + 1.5 * 6\% = 15\%$. The realized return is 14%, so it's lower. The advice is “SELL”.

The second part is the most complicated part of the practice test.

The formula for the price is

$$P = \frac{Div}{r - g}$$

You are asked to calculate the expected price of the stocks one year from now. Because it is the expected price of the stock, you should use as the discount rate, the expected rate of return of each stock. That is, the one given to you by the CAPM.

Because it is the price one year from now, you need to use the next dividend. For that, you need to discover the current dividend and the rate of growth of dividends.

The growth rate of dividends is found by knowing that the rate of return of a stock is divided by dividend yield and capital gains yield. So, if the rate of return of stock A is 11% and in stock B is 14%, and the dividend yield is 5% for both, the capital gains yield is 6% for A and 9% for B.

The capital gains yield, as you know, is the growth rate of dividends. So, the dividends in stock A grow at 6% and 9% for stock B.

The last step is to find the dividend. The dividend yield being 5% tells you the dividend is 5% of the price. So the dividend of stock A is $\$75 * 0.05 = \3.75 and for stock B is $\$60 * 0.05 = \3 .

So, the price one year from now for both stocks is

$$P_A = \frac{3.75 * 1.06}{0.108 - 0.06} = 82.81 \text{ and } P_B = \frac{3 * 1.09}{0.15 - 0.09} = 54.5$$

Question 4

The average returns for Stock A is 4.4% and for stock B is 5.4%

To get the correlation coefficient you need to know the standard deviation of both returns and the covariance of the two returns. So, build the following table. The last line is the sum.

Deviation from mean for A	Deviation from mean for B	Squared deviation for A	Squared deviation for B	Deviation for A times Deviation for B
7.6%	12.6%	57.76	158.76	95.76
-0.4%	-6.4%	0.16	40.96	2.56
-13.4%	-15.4%	179.56	237.16	206.36
3.6%	9.6%	12.96	92.16	34.56
2.6%	-0.4%	6.76	0.16	-1.04
		257.2	529.2	338.2

Because we use historical data, to get the variances and covariance we need to divide by 4. So, the standard deviation of return for A is 8.02% and B is 11.5%. The covariance is 84.55

The correlation coefficient is

$$\frac{84.55}{8.02 * 11.5} = 0.9167$$

By acceptable combinations it is meant the EFFICIENT FRONTIER. Combinations outside the efficient frontier are combinations that no one will choose.

We don't ask you to calculate the efficient frontier, but only to describe the combinations that are in the efficient frontier. For that we use the Minimum Variance Portfolio. As you saw in lecture, the efficient frontier starts in the Minimum Variance Portfolio. It will include that Portfolio and all portfolios with a smaller amount of the asset with less risk.

So, the minimum variance portfolio when we combine A and B is the one where the weight of A is

$$\frac{\sigma_B^2 - \sigma_{AB}}{\sigma_A^2 + \sigma_B^2 - 2\sigma_{AB}} = \frac{132.3 - 84.55}{64.3 + 132.3 - 2 * 84.55} = 1.73$$

So, the efficient frontier is all the portfolios with a weight in A of at most 173% of all the money.

So, holding only A is acceptable, because you have 100% of money in A and 0% in B. Holding B is acceptable because you have 0% of your money in A and 100% in B. In the efficient frontier a combination that gives you higher expected return also has higher risk. So, no combination is superior to any other.

Question 5

The fact the prices were not affected by the verdict is not an indication the market isn't semi strong form efficient. What probably happened is that the price before the verdict already incorporated a prediction of what the sentence was going to be. If that prediction was correct, the price will not be affected. If they predicted a higher punishment, you could even see the prices going up. If the prediction was a smaller punishment, you could see a drop in price.

In part b), because the prices already incorporate the full effects of the sentence, the rates of return will not be affected in the future. The ones affected were the ones holding the stock when the company went to court, but that already happened.