Answer Key Homework #1

CHAPTER 5: INTRODUCTION TO RISK, RETURN, AND THE HISTORICAL RECORD

1. The Fisher equation predicts that the nominal rate will equal the equilibrium real rate plus the expected inflation rate. Hence, if the inflation rate increases from 3% to 5% while there is no change in the real rate, then the nominal rate will increase by 2%. On the other hand, it is possible that an increase in the expected inflation rate would be accompanied by a change in the real rate of interest. While it is conceivable that the nominal interest rate could remain constant as the inflation rate increased, implying that the real rate decreased as inflation increased, this is not a likely scenario.

3. From Fish equation: $i = r + \pi^e$ or $(1 + i) = (r' + 1)(\pi^e + 1)$
$i = 45\%, \pi^e = 30\%$
$r = 15\%\ or\ r' = 11.54\%$

6. a. The "Inflation-Plus" CD is the safer investment because it guarantees the purchasing power of the investment. Using the approximation that the real rate equals the nominal rate minus the inflation rate, the CD provides a real rate of 1.5% regardless of the inflation rate.

b. The expected return depends on the expected rate of inflation over the next year. If the expected rate of inflation is less than 3.5% then the conventional CD offers a higher real return than the Inflation-Plus CD; if the expected rate of inflation is greater than 3.5%, then the opposite is true.

c. If you expect the rate of inflation to be 3% over the next year, then the conventional CD offers you an expected real rate of return of 2%, which is 0.5% higher than the real rate on the inflation-protected CD. But unless you know that inflation will be 3% with certainty, the conventional CD is also riskier. The question of which is the better investment than depends on your attitude towards risk versus return. You might choose to diversify and invest part of your funds in each.

d. No. We cannot assume that the entire difference between the risk-free nominal rate (on conventional CDs) of 5% and the real risk-free rate (on inflation-protected CDs) of 1.5% is the expected rate of inflation. Part of the difference is probably a risk premium associated with the uncertainty surrounding the real rate of return on the conventional CDs. This implies that the expected rate of inflation is less than 3.5% per year.

10. a. With probability 0.9544, the value of a normally distributed variable will fall within two standard deviations of the mean; that is, between –40% and 80%.

CHAPTER 6: RISK AVERSION AND CAPITAL ALLOCATION TO RISKY ASSETS

2. b. A higher borrowing rate is a consequence of the risk of the borrowers' default. In perfect markets with no additional cost of default, this increment would equal the value of the borrower's option to default, and the Sharpe measure, with appropriate treatment of the default option, would be the same. However, in reality there are costs to default so that this part of the increment lowers the Sharpe ratio. Also, notice that answer (c) is not correct because doubling the expected return with a fixed risk-free rate will more than double the risk premium and the Sharpe ratio.

6. Points on the curve are derived by solving for E(r) in the following equation:

$U = 0.05 = E(r) - 0.5A\sigma^2 = E(r) - 1.5\sigma^2$

The values of E(r), given the values of σ^2, are therefore:

σ	σ^2	E(r)
0.00	0.0000	0.05000
0.05	0.0025	0.05375
0.10	0.0100	0.06500
0.15	0.0225	0.08375
0.20	0.0400	0.11000
0.25	0.0625	0.14375

The bold line in the graph on the next page (labeled Q6, for Question 6) depicts the indifference curve.

7. Repeating the analysis in Problem 6, utility is now:
$U = E(r) - 0.5A\sigma^2 = E(r) - 2.0\sigma^2 = 0.05$
The equal-utility combinations of expected return and standard deviation are presented in the table below. The indifference curve is the upward sloping line in the graph on the next page, labeled Q7 (for Question 7).

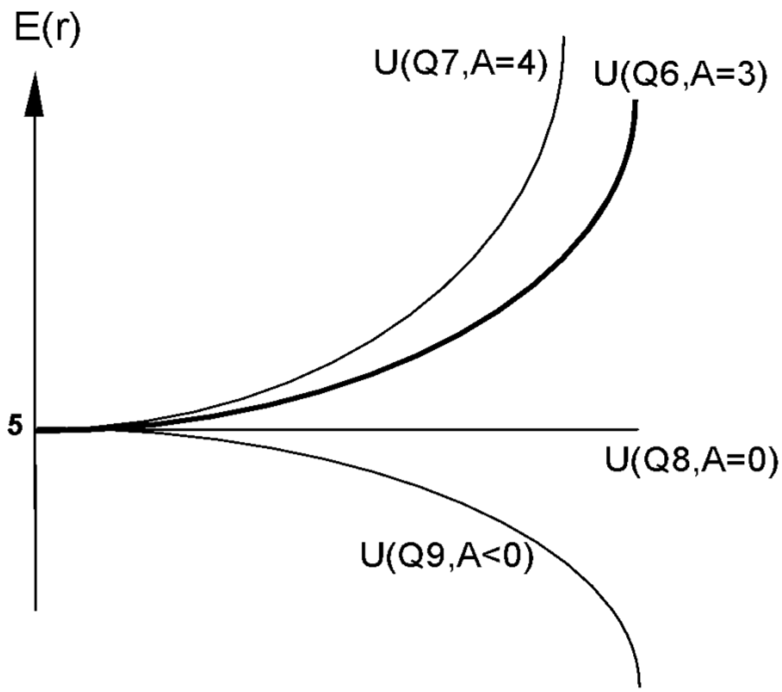
σ	σ^2	E(r)
0.00	0.0000	0.0500
0.05	0.0025	0.0550
0.10	0.0100	0.0700
0.15	0.0225	0.0950
0.20	0.0400	0.1300
0.25	0.0625	0.1750

The indifference curve in Problem 7 differs from that in Problem 6 in slope. When A increases from 3 to 4, the increased risk aversion results in a greater slope for the indifference curve since more expected return is needed in order to compensate for additional σ.

8. The coefficient of risk aversion for a risk neutral investor is zero. Therefore, the corresponding utility is equal to the portfolio's expected return. The corresponding indifference curve in the expected return-standard deviation plane is a horizontal line, labeled Q8 in the graph below (see Problem 6).

9. A risk lover, rather than penalizing portfolio utility to account for risk, derives greater utility as variance increases. This amounts to a negative coefficient of risk aversion. The corresponding indifference curve is downward sloping in the graph below (see Problem 6) and is labeled Q9.

Graph for question 6-9



13. Expected return = (0.7 × 18%) + (0.3 × 8%) = 15%

Standard deviation = 0.7 × 28% = 19.6%

14. Investment proportions: 30% in T-bills

0.7 × 25% = 17.5% in Stock A

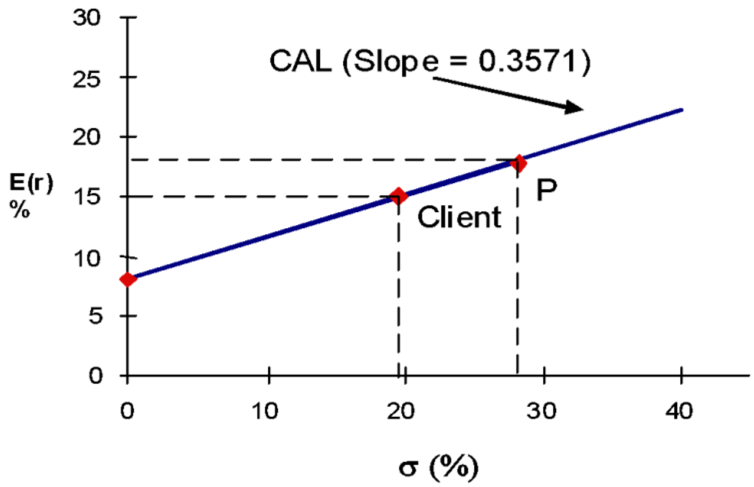
0.7 × 32% = 22.4% in Stock B

0.7 × 43% = 30.1% in Stock C

15. Your reward-to-volatility ratio: $S = \frac{.18 - .08}{.28} = 0.3571$

Client's reward-to-volatility ratio: $S = \frac{.15 - .08}{.196} = 0.3571$

16.



17. a. $E(r_C) = r_f + y \times [E(r_P) - r_f] = 8 + y \times (18 - 8)$

If the expected return for the portfolio is 16%, then:

16% = 8% + 10% × y ⇒ $y = \frac{.16 - .08}{.10} = 0.8$

Therefore, in order to have a portfolio with expected rate of return equal to 16%, the client must Invest 80% of total funds in the risky portfolio and 20% in T-bills.

b. Client's investment proportions: 20.0% in T-bills

$0.8 \times 25\% =$ 20.0% in Stock A

$0.8 \times 32\% =$ 25.6% in Stock B

$0.8 \times 43\% =$ 34.4% in Stock C

c. $\sigma_C = 0.8 \times \sigma_P = 0.8 \times 28\% = 22.4\%$

18. a. $\sigma_C = y \times 28\%$

If your client prefers a standard deviation of at most 18%, then:

y = 18/28 = 0.6429 = 64.29% invested in the risky portfolio

b. $E(r_C) = .08 + .1 \times y = .08 + (0.6429 \times .1) = 14.429\%$

19. a. $y^* = \dfrac{E(r_P) - r_f}{A\sigma_P^2} = \dfrac{0.18 - 0.08}{3.5 \times 0.28^2} = \dfrac{0.10}{0.2744} = 0.3644$

Therefore, the client's optimal proportions are: 36.44% invested in the risky portfolio and 63.56% invested in T-bills.

b. $E(r_C) = 8 + 10 \times y^* = 8 + (0.3644 \times 10) = 11.644\%$

$\sigma_C = 0.3644 \times 28 = 10.203\%$