PROBLEM SETS

Quiz

1. The Fisher equation tells us that the real interest rate approximately equals the nominal rate minus the inflation rate. Suppose the inflation rate increases from 3% to 5%. Does the Fisher equation imply that this increase will result in a fall in the real rate of interest? Explain.
2. You've just stumbled on a new dataset that enables you to compute historical rates of return on U.S. stocks all the way back to 1880. What are the advantages and disadvantages in using these data to help estimate the expected rate of return on U.S. stocks over the coming year?
3. You are considering two alternative 2-year investments: You can invest in a risky asset with a positive risk premium and returns in each of the 2 years that will be identically distributed and uncorrelated, or you can invest in the risky asset for only 1 year and then invest the proceeds in a risk-free asset. Which of the following statements about the first investment alternative (compared with the second) are true?
   a. Its 2-year risk premium is the same as the second alternative.
   b. The standard deviation of its 2-year return is the same.
   c. Its annualized standard deviation is lower.
   d. Its Sharpe ratio is higher.
   e. It is relatively more attractive to investors who have lower degrees of risk aversion.

Problems

4. You have $5,000 to invest for the next year and are considering three alternatives:
   a. A money market fund with an average maturity of 30 days offering a current yield of 6% per year.
   b. A 1-year savings deposit at a bank offering an interest rate of 7.5%.
   c. A 20-year U.S. Treasury bond offering a yield to maturity of 9% per year.

   What role does your forecast of future interest rates play in your decisions?
5. Use Figure 5.1 in the text to analyze the effect of the following on the level of real interest rates:
   a. Businesses become more pessimistic about future demand for their products and decide to reduce their capital spending.
   b. Households are induced to save more because of increased uncertainty about their future Social Security benefits.
   c. The Federal Reserve Board undertakes open-market purchases of U.S. Treasury securities in order to increase the supply of money.
6. You are considering the choice between investing $50,000 in a conventional 1-year bank CD offering an interest rate of 5% and a 1-year "Inflation-Plus" CD offering 1.5% per year plus the rate of inflation.
   a. Which is the safer investment?
   b. Which offers the higher expected return?
   c. If you expect the rate of inflation to be 3% over the next year, which is the better investment? Why?
   d. If we observe a risk-free nominal interest rate of 5% per year and a risk-free real rate of 1.5% on inflation-indexed bonds, can we infer that the market's expected rate of inflation is 3.5% per year?
7. Look at Spreadsheet 5.1 in the text. Suppose you now revise your expectations regarding the stock price as follows:

State of the Economy	Probability	Ending Price	HPR (including dividends)
Boom	.35	$140	44.5%
Normal growth	.30	110	14.0
Recession	.35	80	−16.5

Use Equations 5.11 and 5.12 to compute the mean and standard deviation of the HPR on stocks. Compare your revised parameters with the ones in the spreadsheet.

8. Derive the probability distribution of the 1-year HPR on a 30-year U.S. Treasury bond with an 8% coupon if it is currently selling at par and the probability distribution of its yield to maturity a year from now is as follows:

State of the Economy	Probability	YTM
Boom	.20	11.0%
Normal growth	.50	8.0
Recession	.30	7.0

For simplicity, assume the entire 8% coupon is paid at the end of the year rather than every 6 months.

9. What is the standard deviation of a random variable q with the following probability distribution:

Value of q	Probability
0	.25
1	.25
2	.50

10. The continuously compounded annual return on a stock is normally distributed with a mean of 20% and standard deviation of 30%. With 95.44% confidence, we should expect its actual return in any particular year to be between which pair of values? *Hint:* look again at Figure 5.4.
    a. −40.0% and 80.0%
    b. −30.0% and 80.0%
    c. −20.6% and 60.6%
    d. −10.4% and 50.4%
11. Using historical risk premiums over the 1926–1995 period as your guide, what would be your estimate of the expected annual HPR on the S&P 500 stock portfolio if the current risk-free interest rate is 6%?

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12. You can find annual holding-period returns for several asset classes at our Web site (**www.mhhe.com/bkm**); look for links to Chapter 5. Compute the means, standard deviations, skewness, and kurtosis of the annual HPR of large stocks and long-term Treasury bonds using only the 30 years of data between 1976 and 2005. How do these statistics compare with those computed from the data for the period 1926–1941? Which do you think are the most relevant statistics to use for projecting into the future?
13. During a period of severe inflation, a bond offered a nominal HPR of 80% per year. The inflation rate was 70% per year.
    a. What was the real HPR on the bond over the year?
    b. Compare this real HPR to the approximation $r \approx R - i$.
14. Suppose that the inflation rate is expected to be 3% in the near future. Using the historical data provided in this chapter, what would be your predictions for:
    a. The T-bill rate?
    b. The expected rate of return on large stocks?
    c. The risk premium on the stock market?
15. An economy is making a rapid recovery from steep recession, and businesses foresee a need for large amounts of capital investment. Why would this development affect real interest rates?

Challenge Problems

Challenge Problems 16 and 17 are more difficult. You may need to review the definitions of call and put options in Chapter 2.

16. You are faced with the probability distribution of the HPR on the stock market index fund given in Spreadsheet 5.1 of the text. Suppose the price of a put option on a share of the index fund with exercise price of $110 and time to expiration of 1 year is $12.
    a. What is the probability distribution of the HPR on the put option?
    b. What is the probability distribution of the HPR on a portfolio consisting of one share of the index fund and a put option?

c. In what sense does buying the put option constitute a purchase of insurance in this case?

17. Take as given the conditions described in the previous problem, and suppose the risk-free interest rate is 6% per year. You are contemplating investing $107.55 in a 1-year CD and simultaneously buying a call option on the stock market index fund with an exercise price of $110 and expiration of 1 year. What is the probability distribution of your dollar return at the end of the year?

CFA® PROBLEMS

1. Given $100,000 to invest, what is the expected risk premium in dollars of investing in equities versus risk-free T-bills (U.S. Treasury bills) based on the following table?

Action	Probability	Expected Return
Invest in equities	.6	$ 50,000
	.4	–$ 30,000
Invest in risk-free T-bill	1.0	$ 5,000

2. Based on the scenarios below, what is the expected return for a portfolio with the following return profile?

	Market Condition		
	Bear	Normal	Bull
Probability	.2	.3	.5
Rate of return	–25%	10%	24%

Use the following scenario analysis for Stocks X and Y to answer CFA Problems 3 through 6 (round to the nearest percent).

	Bear Market	Normal Market	Bull Market
Probability	0.2	0.5	0.3
Stock X	–20%	18%	50%
Stock Y	–15%	20%	10%

3. What are the expected rates of return for Stocks X and Y?
4. What are the standard deviations of returns on Stocks X and Y?
5. Assume that of your $10,000 portfolio, you invest $9,000 in Stock X and $1,000 in Stock Y. What is the expected return on your portfolio?
6. Probabilities for three states of the economy and probabilities for the returns on a particular stock in each state are shown in the table below.

State of Economy	Probability of Economic State	Stock Performance	Probability of Stock Performance in Given Economic State
Good	.3	Good	.6
		Neutral	.3
		Poor	.1
Neutral	.5	Good	.4
		Neutral	.3
		Poor	.3
Poor	.2	Good	.2
		Neutral	.3
		Poor	.5

What is the probability that the economy will be neutral *and* the stock will experience poor performance?

7. An analyst estimates that a stock has the following probabilities of return depending on the state of the economy:

State of Economy	Probability	Return
Good	.1	15%
Normal	.6	13
Poor	.3	7

What is the expected return of the stock?

STANDARD &POOR'S

Go to **www.mhhe.com/edumarketinsight** (bookmark this page!) and link to *Company*. Choose a few companies of interest and record their ticker symbols. Under Excel Analytics, go to *Market Data* and find Monthly Adjusted Prices for each firm, which you should download into a spreadsheet. Calculate the standard deviation, skew, and kurtosis of the recent history of returns for each firm. How do they compare to the values for the S&P 500? Try repeating the exercise for other firms. Can you reach any conclusions about the pattern of these statistics for individual firms versus the diversified market index? Do returns for the index appear to be better described by the normal distribution than the returns of the individual firms?

E-Investments

Inflation and Rates

The Federal Reserve Bank of St. Louis has information available on interest rates and economic conditions. A publication called *Monetary Trends* contains graphs and tables with information about current conditions in the capital markets. Go to the Web site **www.stls.frb.org** and click on *Economic Research* on the menu at the top of the page. Find the most recent issue of *Monetary Trends* in the *Recent Data Publications* section and answer these questions.

1. What is the professionals' consensus forecast for inflation for the next 2 years? (Use the *Federal Reserve Bank of Philadelphia* line on the graph to answer this.)
2. What do consumers expect to happen to inflation over the next 2 years? (Use the *University of Michigan* line on the graph to answer this.)
3. Have real interest rates increased, decreased, or remained the same over the last 2 years?
4. What has happened to short-term nominal interest rates over the last 2 years? What about long-term nominal interest rates?
5. How do recent U.S. inflation and long-term interest rates compare with those of the other countries listed?
6. What are the most recently available levels of 3-month and 10-year yields on Treasury securities?