

5. A simple way to measure timing and selection success simultaneously is to estimate an expanded security characteristic line, with a quadratic term added to the usual index model. Another way to evaluate timers is based on the implicit call option embedded in their performance.
6. Style analysis uses a multiple regression model where the factors are category (style) portfolios such as bills, bonds, and stocks. A regression of fund returns on the style portfolio returns generates residuals that represent the value added of stock selection in each period. These residuals can be used to gauge fund performance relative to similar-style funds.
7. The Morningstar Star Rating method compares each fund to a peer group represented by a style portfolio within four asset classes. Risk-adjusted ratings (RAR) are based on fund returns relative to the peer group and used to award each fund one to five stars based on the rank of its RAR.
8. Common attribution procedures partition performance improvements to asset allocation, sector selection, and security selection. Performance is assessed by calculating departures of portfolio composition from a benchmark or neutral portfolio.

Related Web sites for this chapter are available at www.mhhe.com/bkm

time-weighted average
dollar-weighted rate of return
comparison universe

Sharpe's measure
Treyner's measure
Jensen's measure

information ratio
bogey

KEY TERMS

1. Is it possible that a positive alpha will be associated with inferior performance? Explain.
2. We know that the geometric average (time-weighted return) on a risky investment is always lower than the corresponding arithmetic average. Can the IRR (the dollar-weighted return) similarly be ranked relative to these other two averages?
3. We have seen that market timing has tremendous potential value. Would it therefore be wise to shift resources to timing at the expense of security selection?
4. Consider the rate of return of stocks ABC and XYZ.

Year	r_{ABC}	r_{XYZ}
1	20%	30%
2	12	12
3	14	18
4	3	0
5	1	-10

- a. Calculate the arithmetic average return on these stocks over the sample period.
 - b. Which stock has greater dispersion around the mean?
 - c. Calculate the geometric average returns of each stock. What do you conclude?
 - d. If you were equally likely to earn a return of 20%, 12%, 14%, 3%, or 1%, in each year (these are the five annual returns for stock ABC), what would be your expected rate of return? What if the five possible outcomes were those of stock XYZ?
5. XYZ stock price and dividend history are as follows:

Year	Beginning-of-Year Price	Dividend Paid at Year-End
2005	\$100	\$4
2006	120	4
2007	90	4
2008	100	4

An investor buys three shares of XYZ at the beginning of 2005, buys another two shares at the beginning of 2006, sells one share at the beginning of 2007, and sells all four remaining shares at the beginning of 2008.

PROBLEM SETS

Quiz

Problems

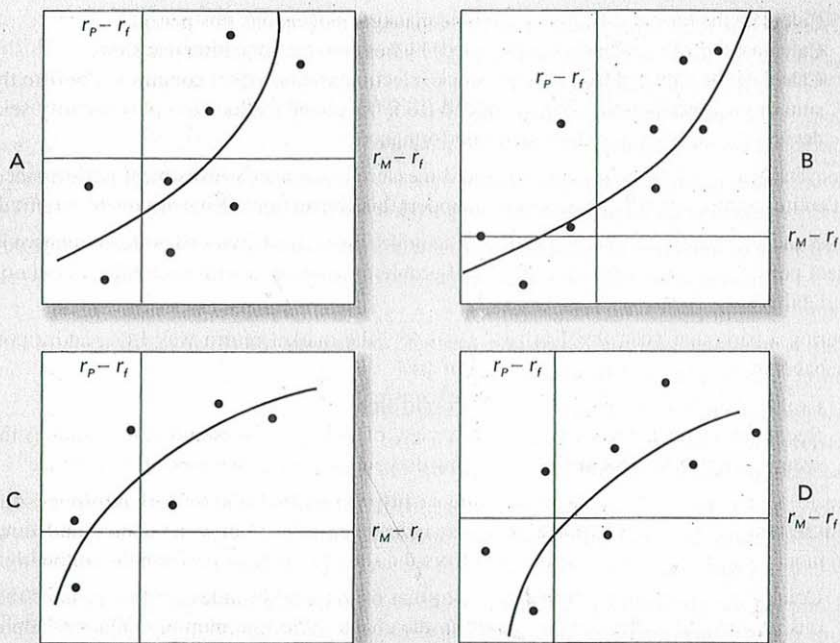
- a. What are the arithmetic and geometric average time-weighted rates of return for the investor?
- b. What is the dollar-weighted rate of return? (*Hint:* Carefully prepare a chart of cash flows for the *four* dates corresponding to the turns of the year for January 1, 2005, to January 1, 2008. If your calculator cannot calculate internal rate of return, you will have to use trial and error.)
6. A manager buys three shares of stock today, and then sells one of those shares each year for the next 3 years. His actions and the price history of the stock are summarized below. The stock pays no dividends.

Time	Price	Action
0	\$90	Buy 3 shares
1	100	Sell 1 share
2	100	Sell 1 share
3	100	Sell 1 share

- a. Calculate the time-weighted geometric average return on this "portfolio."
- b. Calculate the time-weighted arithmetic average return on this portfolio.
- c. Calculate the dollar-weighted average return on this portfolio.
7. Based on current dividend yields and expected capital gains, the expected rates of return on portfolios A and B are 12% and 16%, respectively. The beta of A is .7, while that of B is 1.4. The T-bill rate is currently 5%, whereas the expected rate of return of the S&P 500 index is 13%. The standard deviation of portfolio A is 12% annually, that of B is 31%, and that of the S&P 500 index is 18%.
- a. If you currently hold a market-index portfolio, would you choose to add either of these portfolios to your holdings? Explain.
- b. If instead you could invest *only* in T-bills and *one* of these portfolios, which would you choose?
8. Consider the two (excess return) index-model regression results for stocks A and B. The risk-free rate over the period was 6%, and the market's average return was 14%. Performance is measured using an index model regression on excess returns.

	Stock A	Stock B
Index model regression estimates	$1\% + 1.2(r_M - r_f)$	$2\% + .8(r_M - r_f)$
R-square	.576	.436
Residual standard deviation, $\sigma(e)$	10.3%	19.1%
Standard deviation of excess returns	21.6%	24.9%

- a. Calculate the following statistics for each stock:
- Alpha
 - Information ratio
 - Sharpe measure
 - Treynor measure
- b. Which stock is the best choice under the following circumstances?
- This is the only risky asset to be held by the investor.
 - This stock will be mixed with the rest of the investor's portfolio, currently composed solely of holdings in the market index fund.
 - This is one of many stocks that the investor is analyzing to form an actively managed stock portfolio.
9. Evaluate the market timing and security selection abilities of four managers whose performances are plotted in the accompanying diagrams.



10. Consider the following information regarding the performance of a money manager in a recent month. The table represents the actual return of each sector of the manager's portfolio in column 1, the fraction of the portfolio allocated to each sector in column 2, the benchmark or neutral sector allocations in column 3, and the returns of sector indices in column 4.

	Actual Return	Actual Weight	Benchmark Weight	Index Return
Equity	2%	.70	.60	2.5% (S&P 500)
Bonds	1	.20	.30	1.2 (Salomon Index)
Cash	0.5	.10	.10	0.5

- What was the manager's return in the month? What was her overperformance or underperformance?
 - What was the contribution of security selection to relative performance?
 - What was the contribution of asset allocation to relative performance? Confirm that the sum of selection and allocation contributions equals her total "excess" return relative to the bogey.
11. A global equity manager is assigned to select stocks from a universe of large stocks throughout the world. The manager will be evaluated by comparing her returns to the return on the MSCI World Market Portfolio, but she is free to hold stocks from various countries in whatever proportions she finds desirable. Results for a given month are contained in the following table:

Country	Weight In MSCI Index	Manager's Weight	Manager's Return in Country	Return of Stock Index for That Country
U.K.	.15	.30	20%	12%
Japan	.30	.10	15	15
U.S.	.45	.40	10	14
Germany	.10	.20	5	12

- a. Calculate the total value added of all the manager's decisions this period.
 - b. Calculate the value added (or subtracted) by her *country* allocation decisions.
 - c. Calculate the value added from her stock selection ability within countries. Confirm that the sum of the contributions to value added from her country allocation plus security selection decisions equals total over- or underperformance.
12. Conventional wisdom says that one should measure a manager's investment performance over an entire market cycle. What arguments support this convention? What arguments contradict it?
13. Does the use of universes of managers with similar investment styles to evaluate relative investment performance overcome the statistical problems associated with instability of beta or total variability?
14. During a particular year, the T-bill rate was 6%, the market return was 14%, and a portfolio manager with beta of .5 realized a return of 10%.
 - a. Evaluate the manager based on the portfolio alpha.
 - b. Reconsider your answer to part (a) in view of the Black-Jensen-Scholes finding that the security market line is too flat. Now how do you assess the manager's performance?
15. Go to Kenneth French's data library site at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html. Select two industry portfolios of your choice and download 36 months of data. Download other data from the site as needed to perform the following tasks.
 - a. Compare the portfolio's performance to that of the market index on the basis of the various performance measures discussed in the chapter. Plot the monthly values of alpha plus residual return.
 - b. Now use the Fama-French three-factor model as the return benchmark. Compute plots of alpha plus residual return using the FF model. How does performance change using this benchmark instead of the market index?

Challenge Problem



1. You and a prospective client are considering the measurement of investment performance, particularly with respect to international portfolios for the past 5 years. The data you discussed are presented in the following table:

International Manager or Index	Total Return	Country and Security Return	Currency Return
Manager A	-6.0%	2.0%	-8.0%
Manager B	-2.0	-1.0	-1.0
International Index	-5.0	0.2	-5.2

- a. Assume that the data for manager A and manager B accurately reflect their investment skills and that both managers actively manage currency exposure. Briefly describe one strength and one weakness for each manager.
 - b. Recommend and justify a strategy that would enable your fund to take advantage of the strengths of each of the two managers while minimizing their weaknesses.
2. Carl Karl, a portfolio manager for the Alpine Trust Company, has been responsible since 2010 for the City of Alpine's Employee Retirement Plan, a municipal pension fund. Alpine is a growing community, and city services and employee payrolls have expanded in each of the past 10 years. Contributions to the plan in fiscal 2015 exceeded benefit payments by a three-to-one ratio.

The plan board of trustees directed Karl 5 years ago to invest for total return over the long term. However, as trustees of this highly visible public fund, they cautioned him that volatile or erratic results could cause them embarrassment. They also noted a state statute that mandated that not more than 25% of the plan's assets (at cost) be invested in common stocks.

At the annual meeting of the trustees in November 2015, Karl presented the following portfolio and performance report to the board:

Alpine Employee Retirement Plan

Asset Mix as of 9/30/15	At Cost (millions)		At Market (millions)	
Fixed-income assets:				
Short-term securities	\$ 4.5	11.0%	\$ 4.5	11.4%
Long-term bonds and mortgages	26.5	64.7	23.5	59.5
Common stocks	10.0	24.3	11.5	29.1
	\$41.0	100.0%	\$39.5	100.0%

Investment Performance

	Annual Rates of Return for Periods Ending 9/30/15	
	5 Years	1 Year
Total Alpine Fund:		
Time-weighted	8.2%	5.2%
Dollar-weighted (internal)	7.7%	4.8%
Assumed actuarial return	6.0%	6.0%
U.S. Treasury bills	7.5%	11.3%
Large sample of pension funds (average 60% equities, 40% fixed income)	10.1%	14.3%
Common stocks—Alpine Fund	13.3%	14.3%
Alpine portfolio beta coefficient	0.90	0.89
Standard & Poor's 500 stock index	13.8%	21.1%
Fixed-income securities—Alpine Fund	6.7%	1.0%
Salomon Brothers' bond index	4.0%	-11.4%

Karl was proud of his performance and was chagrined when a trustee made the following critical observations:

- "Our 1-year results were terrible, and it's what you've done for us lately that counts most."
- "Our total fund performance was clearly inferior compared to the large sample of other pension funds for the last 5 years. What else could this reflect except poor management judgment?"
- "Our common stock performance was especially poor for the 5-year period."
- "Why bother to compare your returns to the return from Treasury bills and the actuarial assumption rate? What your competition could have earned for us or how we would have fared if invested in a passive index (which doesn't charge a fee) are the only relevant measures of performance."
- "Who cares about time-weighted return? If it can't pay pensions, what good is it!"

Appraise the merits of each of these statements and give counterarguments that Mr. Karl can use.

- The Retired Fund is an open-ended mutual fund composed of \$500 million in U.S. bonds and U.S. Treasury bills. This fund has had a portfolio duration (including T-bills) of between 3 and 9 years. Retired has shown first-quartile performance over the past 5 years, as measured by an independent fixed-income measurement service. However, the directors of the fund would like to measure the market timing skill of the fund's sole bond investor manager. An external consulting firm has suggested the following three methods:
 - Method I examines the value of the bond portfolio at the beginning of every year, then calculates the return that would have been achieved had that same portfolio been held throughout the year. This return would then be compared with the return actually obtained by the fund.

- b. Method II calculates the average weighting of the portfolio in bonds and T-bills for each year. Instead of using the actual bond portfolio, the return on a long-bond market index and T-bill index would be used. For example, if the portfolio on average was 65% in bonds and 35% in T-bills, the annual return on a portfolio invested 65% in a long-bond index and 35% in T-bills would be calculated. This return is compared with the annual return that would have been generated using the indexes and the manager's actual bond/T-bill weighting for each quarter of the year.
- c. Method III examines the net bond purchase activity (market value of purchases less sales) for each quarter of the year. If net purchases were positive (negative) in any quarter, the performance of the bonds would be evaluated until the net purchase activity became negative (positive). Positive (negative) net purchases would be viewed as a bullish (bearish) view taken by the manager. The correctness of this view would be measured.

Critique *each* method with regard to market timing measurement problems.

Use the following data to solve CFA Problems 4–6: The administrator of a large pension fund wants to evaluate the performance of four portfolio managers. Each portfolio manager invests only in U.S. common stocks. Assume that during the most recent 5-year period, the average annual total rate of return including dividends on the S&P 500 was 14%, and the average nominal rate of return on government Treasury bills was 8%. The following table shows risk and return measures for each portfolio.

Portfolio	Average Annual Rate of Return	Standard Deviation	Beta
P	17%	20%	1.1
Q	24	18	2.1
R	11	10	0.5
S	16	14	1.5
S&P 500	14	12	1.0

- What is the Treynor performance measure for portfolio P?
- What is the Sharpe performance measure for portfolio Q?
- An analyst wants to evaluate portfolio X, consisting entirely of U.S. common stocks, using both the Treynor and Sharpe measures of portfolio performance. The following table provides the average annual rate of return for portfolio X, the market portfolio (as measured by the S&P 500), and U.S. Treasury bills during the past 8 years:

	Average Annual Rate of Return	Standard Deviation of Return	Beta
Portfolio X	10%	18%	0.60
S&P 500	12	13	1.00
T-bills	6	N/A	N/A

- Calculate the Treynor and Sharpe measures for both portfolio X and the S&P 500. Briefly explain whether portfolio X underperformed, equaled, or outperformed the S&P 500 on a risk-adjusted basis using both the Treynor measure and the Sharpe measure.
 - Based on the performance of portfolio X relative to the S&P 500 calculated in part (a), briefly explain the reason for the conflicting results when using the Treynor measure versus the Sharpe measure.
- Assume you invested in an asset for 2 years. The first year you earned a 15% return, and the second year you earned a negative 10% return. What was your annual geometric return?
 - A portfolio of stocks generates a -9% return in 2006, a 23% return in 2007, and a 17% return in 2008. What is the annualized return (geometric mean) for the entire period?
 - A 2-year investment of \$2,000 results in a cash flow of \$150 at the end of the first year and another cash flow of \$150 at the end of the second year, in addition to the return of the original investment. What is the internal rate of return on the investment?

10. In measuring the performance of a portfolio, the time-weighted rate of return is superior to the dollar-weighted rate of return because:
- When the rate of return varies, the time-weighted return is higher.
 - The dollar-weighted return assumes all portfolio deposits are made on day 1.
 - The dollar-weighted return can only be estimated.
 - The time-weighted return is unaffected by the timing of portfolio contributions and withdrawals.
11. A pension fund portfolio begins with \$500,000 and earns 15% the first year and 10% the second year. At the beginning of the second year, the sponsor contributes another \$500,000. What were the time-weighted and dollar-weighted rates of return?
12. Pure market timers attempt to maintain a _____ portfolio beta and a _____ portfolio alpha.
- Constant; shifting.
 - Shifting; zero.
 - Shifting; shifting.
 - Zero; zero.
13. The difference between an arithmetic average and a geometric average of returns
- Increases as the variability of the returns increases.
 - Increases as the variability of the returns decreases.
 - Is always negative.
 - Depends on the specific returns being averaged, but is not necessarily sensitive to their variability.
14. During the annual review of Acme's pension plan, several trustees questioned their investment consultant about various aspects of performance measurement and risk assessment.
- Comment on the appropriateness of using each of the following benchmarks for performance evaluation:
 - Market index.
 - Benchmark normal portfolio.
 - Median of the manager universe.
 - Distinguish among the following performance measures:
 - The Sharpe ratio.
 - The Treynor measure.
 - Jensen's alpha.
 - Describe how each of the three performance measures is calculated.
 - State whether each measure assumes that the relevant risk is systematic, unsystematic, or total. Explain how each measure relates excess return and the relevant risk.
15. Trustees of the Pallor Corp. pension plan ask consultant Donald Millip to comment on the following statements. What should his response be?
- Median manager benchmarks are statistically unbiased measures of performance over long periods of time.
 - Median manager benchmarks are unambiguous and are therefore easily replicated by managers wishing to adopt a passive/indexed approach.
 - Median manager benchmarks are not appropriate in all circumstances because the median manager universe encompasses many investment styles.
16. James Chan is reviewing the performance of the global equity managers of the Jarvis University endowment fund. Williamson Capital is currently the endowment fund's only large-capitalization global equity manager. Performance data for Williamson Capital are shown in Table 24A.

Chan also presents the endowment fund's investment committee with performance information for Joyner Asset Management, which is another large-capitalization global equity manager. Performance data for Joyner Asset Management are shown in Table 24B. Performance data for the relevant risk-free asset and market index are shown in Table 24C.

Average annual rate of return	22.1%
Beta	1.2
Standard deviation of returns	16.8%

TABLE 24A

Williamson capital performance data,
1997–2008

Average annual rate of return	24.2%
Beta	0.8
Standard deviation of returns	20.2%

TABLE 24B

Joyner asset management performance
data 1997–2008

Risk-free Asset	
Average annual rate of return	5.0%
Market Index	
Average annual rate of return	18.9%
Standard deviation of returns	13.8%

TABLE 24C

Relevant risk-free asset and market
index performance data, 1997–2008

- Calculate the Sharpe ratio and Treynor measure for both Williamson Capital and Joyner Asset Management.
- The Investment Committee notices that using the Sharpe ratio versus the Treynor measure produces different performance rankings of Williamson and Joyner. Explain why these criteria may result in different rankings.

Go to the *Market Insight* entry page (www.mhhe.com/edumarketinsight) and click on the *Commentary* tab. Follow the current Investment Policy Committee Notes (*USA IPC Notes*) link to open the notes. Answer the following questions based on information provided in the report:

- What recent and upcoming reports are listed in the *Economic Outlook* and the *Upcoming Reports* sections?
- What factors are important for the longer-term outlook?
- What fundamental and technical factors are discussed in the *Market Outlook* section?
- What is the current recommended allocation for each asset class?
- What are the year-end target levels for the S&P 500 index, the Federal Funds rate, real Gross Domestic Product growth, and West Texas Intermediate crude oil prices?
- Which sectors are recommended for overweighting in current portfolios? Which are recommended for underweighting?

How would you evaluate the usefulness of these asset allocation recommendations?