

LEARNING OBJECTIVES

1. Define attribution analysis.
2. Contrast security selection with asset allocation decisions.
3. Describe the importance of a benchmark portfolio.*
4. Identify the characteristics of an appropriate benchmark portfolio.*
5. Recommend specific indexes as components of a benchmark portfolio.*
6. Determine whether a portfolio manager has outperformed his or her benchmark.*
7. Compare the Treynor ratio, the Sharpe ratio, and Jensen's alpha as measures of portfolio performance.*
8. Compute Treynor, Sharpe, and Jensen's alpha for a mutual fund.*
9. Demonstrate the asset allocation decision.*
10. Define the rebalancing strategies, including buy and hold, constant weighting, and dynamic allocation.*
11. Summarize how changes to asset allocation and selection affect portfolio returns.
12. Define asset selection methods, including discounted cash flow, relative value, technical analysis, and passive investing.
13. Compute the intrinsic value of a security using a simple discounted cash flow method.*
14. Compare relative value multiples when comparing securities.*
15. Define multiples, including price to earnings, price to book value, price to sales, price to cash flow, and enterprise value to EBITDA.*
16. Discuss the Fama decomposition.
17. Compute the return to diversification and net selectivity in the Fama decomposition.
18. Discuss attribution analysis as described by BHB.*
19. Compute return attribution on a security by dividing performance into selection and attribution.*
20. Contrast the components of a bond attribution analysis, including trading, policy, rate anticipation, and analysis effects.
21. Draw the bond market line.

**Ties to CFP Board Student-Centered Learning Objectives.*

INTRODUCTION

Financial analysts typically begin the process of evaluating the performance of a portfolio by computing the various types of returns shown in Chapter 3. Popular measures of performance include time and dollar weighted returns as well as holding period returns, which provide an important first step in determining the historical quality of a financial asset. Returns, however, do not provide the complete story about an asset's performance.

Subsequent steps include adjusting the performance measures for risk in the manner also described in Chapter 3. To measure the variability in returns, financial analysts compute standard deviations and betas. Both the return and risk measures are used as inputs to compute the Sharpe ratio and Jensen's alpha. Even still, the story on performance remains incomplete.

To finalize the discussion on portfolio performance, an attribution analysis must be executed. The first two steps answer the relevant question of how a portfolio has performed. **Attribution analysis** provides the reasons behind that performance. Eugene Fama was the first academic researcher to develop a

formal attribution analysis model. Fama is best known for his work on the efficient markets hypothesis, and he was awarded the Nobel Prize in economic science for his lifetime contributions to the understanding of asset pricing. Some of his lesser known work includes a 1972 paper on the decomposition of investment performance into its basic component parts. It was Fama who developed the notion that managed portfolios should be compared against naively selected portfolios that are composed of similar securities with similar risk levels. It is interesting to note that Fama's work in the early 70s did not receive the attention it deserved and has typically taken a backseat to other types of attribution analysis. Those other types, however, have their roots in what is known as the Fama decomposition.

In 1986, three professional investment advisers, Gary Brinson, Randolph Hood, and Gilbert Beebower (BHB) developed a formal and more easily applied attribution model. They authored a paper on the determinants of portfolio performance for equity securities. Other researchers have added to their work and improved the understanding of performance.

Any discussion of attribution analysis, whether authored by Fama or BHB, begins with a discussion of the creation and the importance of a **benchmark portfolio**.

BENCHMARK PORTFOLIO

Evaluating the performance of a portfolio without comparing that performance to similarly constructed portfolios ignores the systematic risk influence that affect all portfolios. It is necessary, therefore, to compare each portfolio against a relevant benchmark.

Example 5.1

Consider a client with a 10% return objective. A financial adviser creates a policy statement for that client, identifies relevant financial securities that fit the risk return profile for this client, and drafts an optimal asset allocation using specialized optimization techniques. After one year, the financial adviser's recommendations produce a return of 10%.

Question: Is this client satisfied with the performance of the portfolio?

Answer: It might initially appear that the client should be satisfied because the return objective is met. A more in-depth review of performance, however, indicates the actual return ought to be compared against a relevant benchmark or index. Suppose that a benchmark portfolio, which contains securities that have identical risk characteristics as the client's portfolio, produces a 15% return during the period. The relative performance of the client's portfolio is inferior. Few, if any, clients, would be satisfied with a portfolio that underperformed the benchmark by 5%.

Historically, most investors have settled on popular indexes as benchmarks against which to compare the performance of their portfolios. Indexes, such as the Standard and Poor's 500 Index or the Wilshire 5000 Index, are commonly-used benchmarks for client portfolios. These and other indexes, however, are only appropriate if the client's portfolio contains virtually the same stocks held with similar weights as those in the index.

Key Concepts

1. Define a benchmark portfolio.
2. Describe conditions under which a benchmark portfolio is appropriate for a specific equity portfolio.

These are important indexes and are appropriate for many clients, including passive investors. Popular indexes have been important to investors for over a century. For example, the Dow Averages were first published in 1885, and the S&P Index was created in 1923, with 233 companies. A wave of passive investing began in the mid 1970s with the introduction of the Vanguard 500 Index Fund. Other investment firms joined the process and created their own index funds. Currently, there are tens of trillions of dollars invested in index funds, and for those investors, the related index serves as the appropriate benchmark to evaluate performance.

Example 5.2

Consider an investor who owns the Atlantic 500 Index Fund. The Atlantic fund generates a 9% return during the previous year. The related Standard & Poor's 500 index generates a 9.1% return over that same time period. One might be initially tempted to conclude that Atlantic underperformed by 10 basis points, and that is probably true, but those 10 basis points can most likely be attributed to the expense ratio for the Atlantic fund. Passive investors will typically generate a return equal to the performance of the related index minus expenses.

For other investors, comparing performance to a popular index is inappropriate. Those investors or financial advisers who inappropriately use an index as a benchmark are really just taking shortcuts as described in the Behavioral Finance chapter.

Forming an appropriate benchmark is critical for effective portfolio management. Sometimes referred to as a **normal portfolio**, a benchmark is a customized portfolio that contains the securities in the universe the manager typically holds, and is weighted as the manager would typically weight the portfolio.

A normal portfolio is like a companion portfolio but has identical risk levels to the actual portfolio. Any deviation from the normal portfolio by an investment adviser will result in different returns generated by the actual portfolio and by the normal one.

The basic notion is to determine if performance can reasonably be expected to be replicated.

Consider a hypothetical example in which a comparison between two money managers is being made.

Example 5.3

Hank Waddle spends significant time and resources performing macro-economic analyses, industry analyses, and security analyses. Waddle forms his portfolio only after careful consideration of all relevant factors, including using a proprietary software allocation model tailored to fit the risk and return objectives outlined in the portfolio's prospectus. Waddle's portfolio generally consists of large cap firms. Waddle generated a return of 10% over the previous period.

Alvin Pete spends significant time and resources watching Hollywood movies. Whenever he sees a product placement in one of the scenes, he buys shares in that company. If he sees an identical product in two movies within a month's time, he doubles the allocation to

that company. Pete's portfolio consists almost entirely of large cap firms. Pete generated a return of 11% over the previous period.

Assume both money managers outperformed their respective benchmarks by exactly 50 basis points. Which one is the better manager?

It seems reasonable to think that using fundamental analysis would make Waddle more likely to repeat his outperformance than Pete. In the absence of perfect knowledge about the two manager's decision making tools, an attribution analysis can begin to shed insight on which manager has superior skills.

Forming a Benchmark Portfolio

The process of forming a benchmark or normal portfolio can be fairly straightforward or extremely complicated. Under certain circumstances, it is appropriate to use an index or combination of indexes as the benchmark, as long as many of the securities held in the portfolio are contained in the index. A more complex way is to locate securities that have high correlations with the securities in the portfolio. Either way, the formation of the benchmark portfolio is critical in determining relative performance.

Example 5.4

Zack Pickler owns a well-diversified portfolio consisting of twenty-five large cap stocks and twenty-five small cap stocks.

Ellen Woods owns a well-diversified portfolio consisting of ten large cap stocks, twenty international mid cap stocks (Germany, Spain, and UK), ten emerging market stocks, and ten micro U.S. stocks. Identify an appropriate benchmark for each.

Pickler: One-half of the S&P 500 Index and one-half of the S&P Small Cap 600. This is an easy one. Investors should structure the benchmark weights to be similar to those in the portfolio.

Woods: Some combination of the S&P 500 Index (20%), the MSCI Emerging Market Index (40%), Dow Jones Micro Cap Index (20%), and the Stoxx Europe 500 (20%). This one is slightly more challenging, as the investor must search for indexes that have high correlations with the underlying stocks. Once again, the weights should be similar to the invested portfolio weights.

A more challenging but still appropriate benchmark selection for both Woods and Pickler would include 40 stocks that operate in the same industry as the companies in the portfolio. The allocations in the benchmark should be similar to those in the portfolio. The benchmark should be monitored for changes in variances and covariances.

Quick Quiz 5.1

1. A portfolio with 100 equity securities and 100 fixed-income securities will most likely have a benchmark that contains identical stocks and bonds.
 - a. True
 - b. False
2. A portfolio manager who generates a return in excess of the benchmark portfolio has outperformed.
 - a. True
 - b. False
3. An appropriate benchmark is one that contains securities with high positive correlations to those securities in the portfolio.
 - a. True
 - b. False

False, True, True.

PERFORMANCE MEASURES

Before the development of modern portfolio theory in the 1960s, investors generally measured performance by using one yardstick, the return on an investment. Investors at that time were aware of risk but had no formal way of measuring it. Consequently, investors made decisions based on incomplete information.

For example, during the 1920s, the stock market generated substantial positive returns almost every year until it topped by a 45 percent return in 1928. The subsequent 1929 crash and depression produced substantial negative returns for several years and hit the bottom in 1932 with a loss of about 50 percent. Investors had few risk management tools at their disposal to help them manage the volatility from 1920 through the beginning of World War II. Of course, the Great Depression significantly eliminated much of the wealth that was generated during the roaring 20s, and most investors were concerned about survival rather than risk management.

At about this time in history, using inflation adjusted returns as a measure of performance became popular.

For example, the Dow Jones Industrial Average surged about 50 percent after the Battle of Midway to the end of WW II but inflation was almost 10 percent during 1941 and 1942. Clearly, investor returns were being affected by the rate of price changes in the economy.

Using inflation adjusted returns was not a satisfactory way to handle volatility, but the concept led to the idea that portfolio returns should be compared to some other performance measure.

When Harry Markowitz applied standard deviation to the development of the efficient frontier in 1952, other researchers were able to create relative and absolute measures of performance.

A three-year period in the mid 1960s saw the development of three performance measures that are still used by financial advisers today.

The first was introduced by Jack Treynor, a mathematician who is credited as one of the four original authors of the capital asset pricing model. Treynor worked at the famed management consulting firm Arthur D. Little but studied for one year at MIT where he met Franco Modigliani and Merton Miller and shared research with William Sharpe and Fisher Black. After returning to the consulting world, he developed a practical application of his work, which is known as the **Treynor Ratio**. This ratio is the first performance ratio and uses systematic risk to measure risk adjusted returns.

Key Concepts

1. Define the three types of ratios of portfolio performance evaluation.
2. Discuss systematic and total risk in the context of portfolio performance evaluation.

A year later, William Sharpe published a similar ratio, called the **Sharpe ratio**. He used standard deviation as the measure of total risk instead of the beta used by Treynor.

The following year, Michael Jensen developed what has become known as **Jensen's alpha**. Jensen was interested in evaluating fund managers to determine if they could regularly outperform. He used similar metrics as Sharpe and Treynor, but he added market data to the model. As such, Jensen's alpha is an absolute measure of performance and is widely interpreted as a measure of excess return. Financial advisers often speak of positive or negative alphas as barometers of managerial value added. **Alpha** is the difference between the actual return on a portfolio and its expected return as outlined by the capital asset pricing model.

Exhibit 5.1 | Performance Measures summarizes the formulas and important concepts of the three measures of performance.

 **Quick Quiz 5.2**

1. A financial adviser compares two funds and computes a Sharpe ratio of 0.62 and 0.69. The adviser would identify the fund with the higher ratio as the one that outperformed.
 - a. True
 - b. False
2. A Jensen's alpha of 0.03 indicates the mutual fund outperformed the relevant equity index on a risk-adjusted basis.
 - a. True
 - b. False

True, True

Exhibit 5.1 | Performance Measures

	Treynor Ratio	Sharpe Ratio	Jensen's Alpha
Equation	$T_p = \frac{r_p - r_f}{\beta_p}$	$S_p = \frac{r_p - r_f}{\sigma_p}$	$\alpha_p = r_p - [r_f + \beta_p(r_m - r_f)]$
Risk Statistic	Beta	Standard Deviation	Beta
Risk Type	Systematic	Total	Systematic
Performance Measure	Relative	Relative	Absolute

Example 5.5

Sean Grayson is a financial adviser comparing two mutual funds. Grayson collects the following information:

	Polar Bear Fund	Grizzly Bear Fund
Return on Fund	16.1%	14.8%
Beta	1.11	1.05
Standard Deviation	18.6%	16.4%
Risk-Free Rate	3.1%	3.1%
Return on Market Index	12.9%	12.9%