CHAPTER 1

Overview of Investment Management

Frank J. Fabozzi, Ph.D., CFA, CPA
Professor in the Practice of Finance
Yale School of Management

Harry M. Markowitz, Ph.D.
Consultant

The purpose of this book is to describe the activities and investment vehicles associated with *investment management*. Investment management—also referred to as *portfolio management* and *money management*—requires an understanding of:

- How investment objectives are determined.
- The investment vehicles in which an investor can allocate funds.
- The way investment products are valued so that an investor can assess whether or not a particular investment is fairly priced, underpriced, or overpriced.
- The investment strategies that can be employed by an investor to realize a specified investment objective.
- The best way to construct a portfolio, given an investment strategy.
- The techniques for evaluating performance.

In this book, the contributors explain each of these activities. In this introductory chapter, we set forth in general terms the *investment management process*. This process involves the following five tasks:

1. Setting investment objectives.
2. Establishing an investment policy.
3. Selecting an investment strategy.

4. Constructing the portfolio.
5. Measuring and evaluating investment performance.

SETTING INVESTMENT OBJECTIVES

Setting investment objectives, begins with a thorough analysis of the investment objectives of the entity whose funds are being managed. These entities can be classified as *individual investors* and *institutional investors*. Within each of these broad classifications is a wide range of investment objectives.

Institutional investors include:

- Pension funds.
- Depository institutions (commercial banks, savings and loan associations, and credit unions).
- Insurance companies (life companies, property and casualty companies, and health companies).
- Regulated investment companies (mutual funds and closed-end funds).
- Endowments and foundations.
- Treasury department of corporations, municipal governments, and government agencies.

In general, we can classify institutional investors into two broad categories: those that must meet contractually specified liabilities and those that do not. We can classify those in the first category as institutions with "liability-driven objectives" and those in the second category as institutions with "nonliability driven objectives." A *liability* is a cash outlay that must be made at a specific time to satisfy the contractual terms of an issued obligation. An institutional investor is concerned with both the *amount* and *timing* of liabilities because its assets must produce the cash flow to meet any payments it has promised to make in a timely way.

Some institutions have a wide range of investment products that they offer investors, some of which are liability driven and others that are nonliability driven. Once the investment objective is clearly defined, it will then be possible to (1) establish a "benchmark" by which to evaluate the performance of the investment manager and (2) evaluate alternative investment strategies to assess the potential for realizing the specified investment objective.

ESTABLISHING AN INVESTMENT POLICY

Establishing an investment policy starts with the asset allocation decision. That is, a decision must be made as to how the funds to be invested should be distributed among the major classes of assets.

Asset Classes

Throughout this book, we refer to certain categories of investment products as an "asset class." In the next chapter, we take a closer look at what is meant by an asset class. From the perspective of a U.S. investor, the convention is to refer to the following as *traditional asset classes*: U.S. common stocks, non-U.S. (or foreign) common stocks, U.S. bonds, non-U.S. (or foreign) bonds, cash equivalents, and real estate. Common stock and bonds are further divided into different asset classes. Cash equivalents are defined as short-term debt obligations that have little price volatility. In addition to the traditional asset classes, there are asset classes commonly referred to as *alternative assets* or *alternative investments*. Two of the more popular ones are hedge funds and private equity. In the next chapter, we review three popular alternative assets.

Constraints

There are some institutional investors that make the asset allocation decision based purely on their understanding of the risk-return characteristics of the various asset classes and expected returns. The asset allocation will take into consideration any investment constraints or restrictions. Asset allocation models are commercially available for assisting those individuals responsible for making this decision.

In the development of an investment policy, the following factors must be considered: client constraints, regulatory constraints, and tax and accounting issues.

Examples of client-imposed constraints would be restrictions that specify the types of securities in which a manager may invest and concentration limits on how much or little may be invested in a particular asset class or in a particular issuer. When a benchmark is established, there may be a restriction as to the degree to which the manager may deviate from some key characteristics of that benchmark.

There are many types of regulatory constraints. These involve constraints on the asset classes that are permissible and concentration limits on investments. Moreover, in making the asset allocation decision, consideration must be given to any risk-based capital requirements. For depository institutions and insurance companies, the amount of statutory capital required is related to the quality of the assets in which the institution has invested.

Tax considerations are important for several reasons. First, certain institutional investors such as pension funds, endowments, and foundations are exempt from federal income taxation. Consequently, the assets in which they invest will not be those that are tax-advantaged investments. Second, there are tax factors that must be incorporated into the investment policy. For example, although a pension fund might be tax-exempt, there may be certain assets or the use of some investment vehicles in which it invests whose earnings may be taxed.

Generally accepted accounting principles (GAAP) and regulatory accounting principles (RAP) are important considerations in developing investment policies.

SELECTING A PORTFOLIO STRATEGY

The next task in the investment management process is selecting a portfolio strategy that is consistent with the investment objectives and investment policy guidelines. The selection can be made from a wide range of portfolio strategies. In general, portfolio strategies can be classified as either active or passive.

An *active portfolio strategy* uses available information and forecasting techniques to seek a better performance than a portfolio that is simply diversified broadly. Essential to all active strategies are expectations about the factors that have been found to influence the performance of an asset class. A *passive portfolio strategy* involves minimal expectational input, and instead relies on diversification to match the performance of some market index. In effect, a passive strategy assumes that market prices impound all available information. Between these extremes of active and passive strategies, several strategies have sprung up that have elements of both.

Given the choice among active and passive strategies, which should be selected? The answer depends on (1) the client's or money manager's view of how "price-efficient" the market is; (2) the client's risk tolerance; and (3) the nature of the client's liabilities. By "marketplace price efficiency," we mean how difficult it would be to earn a greater return than passive management after adjusting for the risk associated with a strategy and the transaction costs associated with implementing that strategy.

CONSTRUCTING THE PORTFOLIO

Once a portfolio strategy is selected, the next task is to construct the portfolio (i.e., select the specific assets to be included in the portfolio). It is in this phase of the investment management process that the investor attempts to construct an *efficient portfolio*. An efficient portfolio is one that provides the greatest expected return for a given level of risk, or equivalently, the lowest risk for a given expected return.

To construct an efficient portfolio, the investor must be able to quantify risk and provide the necessary inputs. As explained in Chapter 3, there are three key inputs that are needed: future expected return (or simply expected return), variance of asset returns, and correlation (or covariance) of asset returns. All of the investment tools described in the chapters that follow in this book are intended to provide the investor with information with which to estimate these three inputs.

MEASURING AND EVALUATING PERFORMANCE

Finally, there is the task of measuring and evaluating investment performance. *Performance measurement* involves the calculation of the return realized by a portfolio manager over some time interval, which we refer to as the *evaluation period*. There are several important issues that must be addressed in developing a methodology for calculating a portfolio's return and we discuss them below.

Performance evaluation is concerned with three issues: (1) determining whether the portfolio manager added value by outperforming the established benchmark; (2) identifying how the portfolio manager achieved the calculated return; and (3) assessing whether the portfolio manager achieved superior performance (i.e., added value) by skill or by luck. There are two approaches that have been employed in evaluating the performance of portfolio managers: single-index performance measures and performance attribution models.

Despite their popularity, single-index performance measures do not specify how or why a portfolio manager may have outperformed or underperformed a benchmark. Two popular measures are the Sharpe ratio[1] and information ratio. These two ratios are return/risk ratios. At this junction, an explanation of the information ratio is not easy to understand but it will be described in Chapter 9. The Sharpe ratio is equal to

$$\text{Sharpe ratio} = \frac{\text{Portfolio return} - \text{Risk-free rate}}{\text{Standard deviation of the portfolio return}}$$

The numerator of the Sharpe ratio is a measure of return. It is not the raw return but the return in excess of what could have been earned by investing in a risk-free security. The denominator is a measure of the risk associated with generating the portfolio return. As explained in Chapter 3, the standard deviation is a commonly used measure of risk. Thus, the

[1]William F. Sharpe, "Mutual Fund Performance," *Journal of Business* 39, S1 (1966): 119–138.

Sharpe ratio is a measure of the excess return relative to the variability of the portfolio return.

Performance attribution models (also called *return attribution models*) decompose the portfolio return so that a client can determine how the portfolio manager earned the return. As we explain in later chapters, a portfolio manager seeking to outperform a designated benchmark can do so by constructing a portfolio so that it differs from the risks embedded in the benchmark. Consequently, understanding the risk embedded in a benchmark are essential to understanding not only how to construct a portfolio, but also for employing return attribution models.

Measuring Performance

The starting point for evaluating the performance of a portfolio manager is measuring return. This might seem quite simple, but several practical issues make the task complex because one must take into account any cash distributions made from a portfolio during the evaluation period.

The dollar return realized on a portfolio for any evaluation period (i.e., a year, month, or week) is equal to the sum of:

1. The difference between the market value of the portfolio at the end of the evaluation period and the market value at the beginning of the evaluation period.
2. Any distributions made from the portfolio.

It is important that any capital or income distributions from the portfolio to a client or beneficiary of the portfolio be taken into account.

The rate of return, or simply return, expresses the dollar return in terms of the amount of the market value at the beginning of the evaluation period. Thus, the return can be viewed as the amount (expressed as a fraction of the initial portfolio value) that can be withdrawn at the end of the evaluation period while maintaining the initial market value of the portfolio intact.

In equation form, the portfolio's *return* can be expressed as follows:

$$R_P = \frac{MV_1 - MV_0 + D}{MV_0}$$

where

R_P = the portfolio's return

MV_1 = the portfolio's market value at the end of the evaluation period

MV_0 = the portfolio's market value at the beginning of the evaluation period

D = the cash distributions from the portfolio to the client during the evaluation period

To illustrate the calculation of a return, assume the following information for the portfolio manager of a common stock portfolio: The portfolio's market value at the beginning and end of the evaluation period is $250 million and $280 million, respectively, and, during the evaluation period, $10 million is distributed to the client from investment income. Therefore,

$$MV_1 = \$280{,}000{,}000 \quad MV_0 = \$250{,}000{,}000 \quad D = \$10{,}000{,}000$$

Then

$$R_P = \frac{\$280{,}000{,}000 - \$250{,}000{,}000 + \$10{,}000{,}000}{\$250{,}000{,}000} = 0.16 = 16\%$$

There are three assumptions in measuring return. The first assumption is that cash inflows (i.e., dividends and interest) into the portfolio during the evaluation period but are not distributed are reinvested in the portfolio. For example, suppose that during the evaluation period, $20 million is received from dividends. This amount is reflected in the market value of the portfolio at the end of the period.

The second assumption is that if there are distributions from the portfolio, they either occur at the end of the evaluation period or are held in the form of cash until the end of the evaluation period. In our example, $10 million is distributed to the client. But when did that distribution actually occur? To understand why the timing of the distribution is important, consider two extreme cases: (1) the distribution is made at the end of the evaluation period, as is assumed in the return calculation; and (2) the distribution is made at the beginning of the evaluation period. In the first case, the portfolio manager had the use of the $10 million to invest for the entire evaluation period. By contrast, in the second case, the portfolio manager loses the opportunity to invest the funds until the end of the evaluation period. Consequently, the timing of the distribution will affect the return, but this is not considered in the return calculation above.

The third assumption is that there is no cash contributed to the portfolio by the client. For example, suppose that sometime during the evaluation period, the client contributes $15 million to the portfolio manager to invest. Consequently, the market value of the portfolio at the end of the evaluation period, $280 million in our example, would reflect the contribution of

$15 million. The return calculation does not reflect that the portfolio's ending market value is affected by the cash contributed by the client. Moreover, the timing of this contribution will affect the calculated return.

Thus, while the return calculation for a portfolio can be evaluated for any length of time—such as one day, one month, five years—from a practical point of view, the assumptions of this approach limit its application. The longer the evaluation period, the more likely the assumptions will be violated. For example, it is highly likely that there may be more than one distribution to the client and more than one contribution from the client if the evaluation period is five years. Therefore, a return calculation made over a long period of time, if longer than a few months, would not be very reliable because of the assumption underlying the calculations that all cash payments and inflows are made and received at the end of the period.

Not only does the violation of the assumptions make it difficult to compare the returns of two portfolio managers over some evaluation period, but it is also not useful for evaluating performance over different periods. For example, the return calculation above will not give reliable information to compare the performance of a 1-month evaluation period and a 3-year evaluation period. To make such a comparison, the return must be expressed per unit of time, for example, per year.

The way to handle these practical issues is to calculate the return for a short unit of time such as a month or a quarter. We call the return so calculated the *subperiod return*. To get the return for the evaluation period, the subperiod returns are then averaged. So, for example, if the evaluation period is one year, and 12 monthly returns are calculated, the monthly returns are the subperiod returns, and they are averaged to get the 1-year return. If a 3-year return is sought, and 12 quarterly returns can be calculated, quarterly returns are the subperiod returns, and they are averaged to get the 3-year return. The 3-year return can then be converted into an annual return by the straightforward procedure described later.

Three methodologies have been used in practice to calculate the average of the subperiod returns: arithmetic average rate of return, time-weighted rate of return (also called the *geometric rate of return*), and dollar-weighted return.

Arithmetic Average (Mean) Rate of Return

The *arithmetic average (mean) rate of return* is an unweighted average of the subperiod returns. The general formula is

$$R_A = \frac{R_{P1} + R_{P2} + \cdots + R_{PN}}{N}$$

where

R_A = the arithmetic average rate of return
R_{Pk} = the portfolio return for subperiod k, where k =1, ... , N
N = the number of subperiods in the evaluation period

For example, if the portfolio returns were –10%, 20%, and 5% in months July, August, and September, respectively, the arithmetic average monthly return is 5%, as shown:

$$R_A = \frac{-0.10 + 0.20 + 0.05}{3} = 0.05 = 5\%$$

There is a major problem with using the arithmetic average rate of return. To see this problem, suppose a portfolio's initial market value is $280 million, and the market values at the end of the next two months are $560 million and $280 million, respectively. Furthermore, assume that there are no client distributions or contributions for either month. Then the subperiod return for the first month (R_{P1}) is 100%, and the subperiod return for the second month (R_{P2}) is –50%. The arithmetic average rate of return is then 25%. Not a bad return! But think about this number. The portfolio's initial market value was $280 million. Its market value at the end of two months is $280 million. The return over this 2-month evaluation period is zero. Yet the arithmetic average rate of return says it is a whopping 25%.

Thus it is improper to interpret the arithmetic average rate of return as a measure of the average return over an evaluation period. The proper interpretation is as follows: It is the average value of the withdrawals (expressed as a fraction of the portfolio's initial market value) that can be made at the end of each subperiod while keeping the portfolio's initial market value intact. In our first example, in which the average monthly return is 5%, the investor must add 10% of the initial portfolio market value at the end of the first month, can withdraw 20% of the initial portfolio market value at the end of the second month, and can withdraw 5% of the initial portfolio market value at the end of the third month. In our second example, the average monthly return of 25% means that 100% of the portfolio's initial market value ($280 million) can be withdrawn at the end of the first month, and 50% must be added at the end of the second month.

Time-Weighted Rate of Return

The *time-weighted rate of return* measures the compounded rate of growth of the portfolio's initial market value during the evaluation period, assuming that all cash distributions are reinvested in the portfolio. This return is also commonly referred to as the *geometric mean return* because it is computed by taking the geometric average of the portfolio subperiod returns. The general formula is

$$R_T = [(1 + R_{P1})(1 + R_{P2}) \ldots (1 + R_{PN})]^{1/N} - 1$$

where R_T is the time-weighted rate of return, and R_{Pk} and N are as defined earlier.

For example, let us assume the portfolio returns were –10%, 20%, and 5% in July, August, and September, as in the first example above. Then the time-weighted rate of return is

$$R_T = \{[1 + (-0.10)]\,(1 + 0.20)\,(1 + 0.05)\}^{1/3} - 1$$
$$= [(0.90)\,(1.20)\,(1.05)]^{1/3} - 1 = 0.043$$

Because the time-weighted rate of return is 4.3% per month, $1 invested in the portfolio at the beginning of July would have grown at a rate of 4.3% per month during the 3-month evaluation period.

The time-weighted rate of return in the second example is 0%, as expected, as shown here:

$$R_T = \{(1 + 1.00)[1 + (-0.50)]\}^{1/2} - 1 = [(2.00)(0.50)]^{1/2} - 1 = 0\%$$

In general, the arithmetic and time-weighted average returns will give different values for the portfolio return over some evaluation period. This is because, in computing the arithmetic average rate of return, the amount invested is assumed to be maintained (through additions or withdrawals) at the portfolio's initial market value. The time-weighted return, in contrast, is the return on a portfolio that varies in size because of the assumption that all proceeds are reinvested.

In general, the arithmetic average rate of return will exceed the time-weighted average rate of return. The exception is in the special situation where all the subperiod returns are the same, in which case the averages are identical. The magnitude of the difference between the two averages is smaller the less the variation in the subperiod returns over the evaluation period. For example, suppose that the evaluation period is four months, and that the four monthly returns are as follows: $R_{P1} = 0.04$, $R_{P2} = 0.06$, $R_{P3} = 0.02$, and $R_{P4} = -0.02$. The arithmetic average rate of return is 2.5%, and the time-weighted average rate of return is 2.46%. Not much of a difference. In our earlier example, in which we calculated an average rate of return of 25% but a time-weighted average rate of return of 0%, the large discrepancy is due to the substantial variation in the two monthly returns.

Dollar-Weighted Rate of Return

The *dollar-weighted rate of return* is computed by finding the interest rate that will make the present value of the cash flows from all the subperiods in the evaluation period plus the portfolio's terminal market value equal to the portfolio's initial market value. The cash flow for each subperiod reflects the difference between the cash inflows due to investment income (i.e., dividends and interest) and to contributions made by the client to the portfolio and the cash outflows reflecting distributions to the client. Notice that it is not necessary to know the portfolio's market value for each subperiod to determine the dollar-weighted rate of return.

The dollar-weighted rate of return is simply an internal rate of return calculation, and, hence, it is also called the *internal rate of return*. The general formula for the dollar-weighted return is

$$V_0 = \frac{C_1}{(1+R_D)} + \frac{C_2}{(1+R_D)^2} + \cdots + \frac{C_N + V_N}{(1+R_D)^n}$$

where

R_D = the dollar-weighted rate of return
V_0 = the portfolio's initial market value
V_N = the portfolio's terminal market value
C_k = the portfolio's cash flow (cash inflows minus cash outflows) for subperiod k, where k = 1, 2, ..., N

The dollar-weighted rate of return and the time-weighted rate of return will produce the same result if no withdrawals or contributions occur over the evaluation period and if all investment income is reinvested. The problem with the dollar-weighted rate of return is that it is affected by factors that are beyond the control of the money manager. Specifically, any contributions made by the client or withdrawals that the client requires will affect the calculated return. This may make it difficult to compare the performance of two portfolio managers. Despite this limitation, the dollar-weighted rate of return does provide information about the growth of the fund. This growth, however, may not be solely attributable to the performance of the portfolio manager when there are contributions and withdrawals.

Annualizing Returns

The evaluation period may be less than or greater than one year. Typically, return measures are reported as an average annual return. This requires the annualization of the subperiod returns. The subperiod returns are usually calculated for a period of less than one year for the reasons described earlier. The subperiod returns are then annualized using the following formula:

$$\text{Annual return} = (1 + \text{Average period return})^{\text{Number of periods in year}} - 1$$

For example, suppose the evaluation period is three years, and a monthly period return is calculated. Suppose further that the average monthly return is 2%. Then the annual return would be

$$\text{Annual return} = (1.02)^{12} - 1 = 26.8\%$$

KEY POINTS

- The investment management process involves setting investment objectives, establishing an investment policy, selecting an investment strategy, constructing the portfolio, and measuring and evaluating investment performance.
- Investment objectives can be either based on some benchmark or liabilities.
- Investment policy begins with the decision as to how to allocate funds across the major asset classes taking into consideration client-imposed and regulatory constraints.
- In selecting a portfolio strategy that is consistent with its investment objectives, a client can select an active strategy or a passive strategy. The selection of a strategy depends on the client's view of the pricing efficiency of the market, as well as the client's risk tolerance.
- The portfolio construction task involves assembling assets so as to create an efficient portfolio: a portfolio that provides the greatest expected return for the target level of risk.
- In evaluating performance, return attribution analysis should be used. This tool allows a client to understand why a portfolio manager may have underperformed or outperformed a benchmark.
- Performance measurement involves computing the return over some time period.
- The three methods for computing a return over some evaluation period based on averaging subperiod returns are the arithmetic average rate of return, time-weighted rate of return, and dollar-weighted return. The last two measures will produce the same result if no withdrawals or contributions occur over the evaluation period and if all investment income is reinvested.