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THE THEORY AND PRACTICE OF INVESTMENT MANAGEMENT

SECOND EDITION

Asset Allocation, Valuation, Portfolio Construction, and Strategies

FRANK J. FABOZZI, HARRY M. MARKOWITZ, EDITORS

The Theory and Practice of Investment Management

Second Edition

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Frank J. Fabozzi is Professor in the Practice of Finance in the Yale School of Management. Prior to joining the Yale faculty, he was a Visiting Professor of Finance in the Sloan School at MIT. He is a Fellow of the International Center for Finance at Yale University and on the Advisory Council for the Department of Operations Research and Financial Engineering at Princeton University. Professor Fabozzi is the editor of the *Journal of Portfolio Management* and an associate editor of the *Journal of Fixed Income*, *Journal of Asset Management*, *Review of Futures Markets*, and *Quantitative Finance*. He is a trustee for the BlackRock family of closed-end funds. In 2002, he was inducted into the Fixed Income Analysts Society's Hall of Fame and is the 2007 recipient of the C. Stewart Sheppard Award given by the CFA Institute. He has authored numerous books in investment management. Professor Fabozzi earned a doctorate in economics from the City University of New York in 1972 and earned the designation of Chartered Financial Analyst and Certified Public Accountant.

Harry M. Markowitz has applied computer and mathematical techniques to various practical decision making areas. In finance, in an article in 1952 and a book in 1959, he presented what is now referred to as MPT, "modern portfolio theory." This has become a standard topic in college courses and texts on investments and is widely used by institutional investors for tactical asset allocation, risk control, and attribution analysis. In other areas, Dr. Markowitz developed "sparse matrix" techniques for solving very large mathematical optimization problems. These techniques are now standard in production software for optimization programs. He also designed and supervised the development of the SIMSCRIPT programming language. SIMSCRIPT has been widely used for programming computer simulations of systems like factories, transportation systems, and communication networks. In 1989, Dr. Markowitz received the John von Neumann Award from the Operations Research Society of America for his work in portfolio theory, sparse matrix techniques, and SIMSCRIPT. In 1990, he shared the Nobel Prize in Economics for his work on portfolio theory.

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Foreword

Then and Now in Investing, and Why Now Is So Much Better

Peter L. Bernstein

This Foreword originally appeared in the first edition of *The Theory and Practice of Investment Management*. Peter Bernstein passed away in June 2009. References to the updated chapters mentioned in the Foreword are provided by the editors.

As I read this book for the first time, I was constantly reminded of the contrast between the investment world of today and what professional investing was like at the beginning of my career 50 years ago. The revolution in investing over the past half century has been far more remarkable than most people with a shorter memory bank can realize.

While sophisticated investors back then understood a few of the basic ideas and principles that drive today's investment practices, their methods were crude, undisciplined, purely intuitive, and wildly inaccurate in terms of achieving what they hoped to accomplish. Entire areas and techniques of investment management had yet to be discovered, many destined to appear only 20 or 30 years later. The momentous Nobel-prize-winning theoretical innovations that did develop during the 1950s—Markowitz's principles of portfolio selection, Modigliani-Miller's contribution to corporate finance and the uses of arbitrage, and Tobin's insights into the risk–reward trade-off—trickled at a snail's pace even into the academic world and were unknown to nearly all practitioners until many years later.

We did understand the importance of diversification, in both individual positions and in asset allocation. The diversification we provided, however, was determined by seat-of-the-pants deliberations, with no systematic evaluation beyond hunch. Although risk was an ever-present consideration, in

our shop at least, the idea of attaching a number to investment risk was inconceivable. Performance measurement was a simple comparison to the Dow Jones Industrials. Institutional and tax-free investors were few and far between. Many of the individual clients who comprised our constituency kept their securities in safe deposit boxes instead of with brokers (risky) or custodian banks (costly), which was a major obstacle to making changes in portfolios, especially with bearer bonds.

We bought and sold stocks on the basis of their being "cheap" or "expensive," but we worked without any explicit methodology for quantifying what those words meant. The notion of growth as an investment consideration simply did not exist in the early 1950s, when stocks still yielded more than bonds. Although I attracted some attention with an article on the subject in the *Harvard Business Review* in 1956, growth as a central element of equity investing did not gain any traction until well into the 1960s.

We expected bond yields to rise and fall with business activity and stocks to do the opposite, which meant any suggestion of the two asset classes moving in tandem was unthinkable. Credit risk and interest rate risk were the only kinds of fixed income risk we thought about; inflation played no part in decisions concerning asset allocation, market timing, or managing the bond portions of our portfolios. Everybody knew long bonds were riskier than short-term obligations, but precisely how much riskier and the structure of risk and return in the bond market were never part of our deliberations. The uses of the complex and fascinating mathematics of fixed income securities were still largely undeveloped.

In any case, the fixed income universe available to us consisted only of Treasuries, corporates, and municipals; many of the corporates traded on the Big Board instead of in the dealer markets that are so familiar today. But that did not matter much because we acquired most of our clients' bonds on a buy-and-hold basis, as was the custom with all fixed income securities purchased by sober investors like insurance companies, college endowments, trustees for widows and orphans, and the small number of fee-only investment counsel firms like ours.

With the invention of the money market fund still some 20 years in the future, and Treasuries difficult to trade in small or odd amounts, cash management consisted of advising clients to deposit or withdraw money from savings accounts. Once in the savings account, the money became "their" money rather than "our" money. And that meant we had to call even clients with discretionary accounts and engage in a debate whenever we wanted to make a purchase without an offsetting sale.

The volume of information of interest to investors was infinitesimal from today's vantage point. At 10 minutes past every hour, a friendly broker would call on the phone to give us the latest hourly price of the Dow Jones

Industrials and a rundown on the stocks we followed most closely. That was all we knew during the day about what was happening in the market. The Standard & Poor's averages were published only monthly because calculating values for market-weighted indexes took too long for the result to be timely; searching the ticker tape for the 30 Dow stocks, jotting down their prices, adding them up, and then dividing by the divisor was a dreary task, but it could be accomplished in just a few minutes.

Research consisted primarily of the Value Line, which was way ahead of its time in working off a disciplined valuation procedure (although the saying went that if the stock's price did not move toward the Line after a while, the Line would manage to move toward the price). Wall Street research was spotty and superficial. As we and other leading investment advisors insisted that our clients choose their own brokers in order to avoid any odor of conflicts of interest, soft dollar research in such a world was nonexistent.

I need not elaborate on the difference the computer has made in preparing timely and elaborate client valuations, in organizing data for research purposes, and in speedy communication. But that was only the beginning: The computer has been the messenger of the investment revolution. If the world's stock of office equipment still consisted only of the slide-rules and hand-turned or electric (not electronic) desk-top calculators we used in the 1950s, the theories comprising the subject matter of this book, and that support today's investment practices, would never have moved beyond their pages in scholarly journals into the real world of investing.

■ ■ ■

To give you a flavor of the profound nature of the changes that have occurred, I suggest you peek ahead to a few chapters in this book. For example, skim through Chapter 3 on applying Markowitz's mean-variance analysis, Chapters 5 and 6 on asset pricing models, Chapter 19 on fixed income portfolio strategies, and Chapter 7 on asset allocation. Even a superficial view will reveal the radical difference between the way we managed portfolios in the 1950s and common practice today.

Markowitz won the Nobel Prize for his emphasis on two ancient homilies—nothing ventured, nothing gained, but do not put all your eggs into one basket. Markowitz's memorable achievement was to transform these two basic investment guidelines into a rigorous analytical procedure for composing investment portfolios. His primary innovation, in fact, was to distinguish between risk in a portfolio setting and the risk an investor faces in selecting individual security positions.

Markowitz uses his quantitative definition of risk to provide a means of calculating—in hard numbers—the price of risk, or the amount of additional risk an investor must face in order to increase the portfolio's expected

return by a given amount. Investors can now employ diversification (distributing the eggs in many baskets) to minimize the amount of "venture," or risk, relative to a given amount of expected "gain," or return. Or, with the same process, the investor can choose to maximize the gain to be expected from a given amount of venture. Markowitz characterizes such portfolios as "efficient," because they optimize the combination of input (risk) per unit of output (return). This pioneering analysis was only a starting point, but it is still the inspiration for an extensive set of novel approaches for arriving at the most critical decisions in the portfolio-building process.

Despite his contribution to the measurement and understanding of investment risk, Markowitz skipped over a full-dress definition of the other side of the equation—expected return. Chapters 5 and 6 on asset pricing models detail striking advances in both defining and quantifying expected return. Nevertheless, the methodology in these chapters is still a variation on Markowitz's theme, for risk continues to play a central role in the prices investors set on individual assets as they go about building their portfolios.

This approach is a quantum leap from the way I used to guess whether a security was "cheap" or "expensive." We limited ourselves to trying to figure out what P/E or dividend yield was appropriate for each stock we considered, a judgment that ignored the correlations between that security and all the other securities in the portfolio or between that security and the market as a whole. But Markowitz made it clear that the selection of issues for a portfolio is not the same thing as valuing individual securities. Those choices must be set in terms of the interaction between each individual security and the rest of the portfolio; later variations by William Sharpe and others, also described in Chapters 4 and 5, emphasized the importance of the interaction between individual securities and the market as a whole. Consequently, the models in Chapters 4 and 5 have an entirely different goal from the traditional valuation parameters covered in Chapter 10.

This entire structure of portfolio formation is by no means limited to selecting stocks: It is equally important in the management of fixed-income portfolios. Here, as you will see in Chapter 19, the many aspects of fixed-income strategies are even further removed from traditional investment practices than the modern approach to equity selections. The proliferation of new forms of fixed income instruments has joined with the conversion of buy-and-hold into a broad set of active bond management strategies, creating a world of fixed-income investing unrecognizable to a Rip Van Winkle who went to sleep in the early 1950s and awoke in the early 2000s. Indeed, today's debt instruments are explicitly designed for agile and dynamic trading; the sanctified practice of holding bonds to maturity that I once knew would be dangerously inappropriate in today's world. Fixed income instruments may still be less risky than equities, but they nevertheless offer an

immense and widening span of risk and return trade-offs. The result is a significant increase in total portfolio expected returns relative to the risks incurred. Here, too, portfolio efficiency can be enhanced.

■ ■ ■

Despite my enthusiasm for the whole long story within the covers of this book, I warn the reader against expecting magic potions showering instant riches on anyone who masters these lessons. The future faced by investors is just as unpredictable as it ever was. Do not believe any boasts to the contrary. Risk is an inescapable companion in the investment process.

But that is just the point. By making risk an integral part of the decisionmaking process, and by incorporating the rigor and discipline of quantification, modern theories and applications clarify as never before the multifarious paths linking the risk of loss to opportunities for gain. One of the most exciting features to me is how a few dominant principles can spawn an apparently unlimited supply of variations on the basic themes, opening investment possibilities we never dreamed of 50 years ago. While this book does a great job of describing the cat, it also provides a broad menu of effective methods to skin the cat.

The transformation in investing over the past 50 years is comparable to stepping from Charles Lindbergh's *Spirit of St. Louis* into a modern commercial aircraft. Lindbergh's flight from New York to Paris made him a hero before the whole world. A flight from New York to Paris now takes place without notice every hour of the day and into the night. But it is not only distance and time that modern technology has conquered. A glance into the cockpit of a contemporary aircraft reveals a fantastic array of controls and instruments whose entire purpose is to prevent the kinds of crashes that were as routine in Lindbergh's day as they are headline news in our own time—and to do so without any loss of speed. The secret of success is in control of an airliner at altitudes and velocity Lindbergh never dreamed of.

The metaphor is apt. As this book makes abundantly clear, the striking difference between today's investment world and the world to which I was introduced is in control over the consequences of decision making, under conditions of uncertainty, without any loss of opportunity. Indeed, the opportunity set has been greatly expanded. We will never know enough of what lies ahead to make greater wealth a certainty, but we can learn how to increase the odds and—equally important, I assure you—we can avoid losing our shirts because of foolish decisions.

The ideas in this book comprise a rich treasure. How I wish I had had it in my hands when I first entered the challenging world of investing back in 1951!

PART

One

Instruments, Asset Allocation, Portfolio Selection, and Asset Pricing

CHAPTER 1

Overview of Investment Management

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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.