

## Introduction and Overview

Modern Portfolio Theory suggests that you can maximize your investment returns, given the amount of risk (or volatility) you are willing to take on. This is the idea to be developed and evaluated during this 10-part series. Part One provides an introduction to the issues.

by **Donald R. Chambers**

**W**e are inundated with advice regarding investment decisions from numerous sources (brokers, columnists, economists) and through a variety of media (television, magazines, seminars). But the suggested answers regarding investment decisions not only vary tremendously but often directly conflict with each other—leaving the typical investor in a quandary.

On top of this complexity, conditions change. Markets crash and firms once viewed as providing solutions, such as Merrill Lynch, are themselves in trouble.

But some investment philosophies claim or appear to be “timeless.” A popular AIER publication entitled “How to Invest Wisely” by Lawrence Pratt provides a concise summary of solid investment principles—as does literature by John C. Bogle, founder of the Vanguard Group. While these solid principles appear stable through time, even these sources differ in their prescriptions.

In the last 50 years extensive discoveries have been made in academia regarding how investment decisions should be made. Together, these advances are generally referred to as “Modern Portfolio The-

ory” or MPT. The most important point of MPT is that *diversification reduces risk without reducing expected return*. MPT uses mathematics and statistics to demonstrate diversification clearly and carefully.

This series focuses on relatively simple and easy-to-implement

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investment concepts. These concepts have changed little in the past and are unlikely to change dramatically in the future.

This is the first in a series of ten articles on implications offered by MPT with regard to the decisions of an individual investor. The goal of this series is to make the implications of MPT accessible to non-professional investors.

**A Brief History of MPT.** In the 1950s Harry Markowitz pioneered the use of math and statistics to describe diversification and the process of forming diversified portfolios. Previous analyses were qualitative and lacked precision and clarity.

In the mid-1960s two more major

advances emerged: efficient market theory and equilibrium pricing theory.

Led by Professor Eugene Fama, MPT pioneers established a framework for discussing the idea that security markets are informationally efficient. This means that secu-

rity prices already reflect available information and that it is therefore not possible to use available information to identify under-priced or over-priced securities.

In the wake of difficult times such as the financial crisis that began in 2007, the concept of market efficiency is sometimes criticized. However, while no market is perfectly efficient, the evidence suggests that behaving *as if* markets were highly efficient provides investors with a solid approach.

Led by Professors James Tobin, William F. Sharpe and others, MPT pioneers also constructed an equilibrium framework for theoretically linking expected return with a new measure of risk entitled “beta.” This work, highlighted by the Capital Asset Pricing Model (CAPM), provided an insight that investors should simply hold two assets: a “riskless” asset and a highly diversified “market portfolio.”

In the 1970s, MPT pioneers Fisher Black, Myron Scholes and others led advances in derivative

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models (options, futures, and so forth) that enabled understanding of derivative pricing and risk management techniques that revolutionized financial markets.

MPT does not describe or prescribe investing perfectly. Improvements or even corrections will be made. But even if it is not perfect, MPT has major implications that should be considered by every investor.

The purpose of this series is to clarify the major ideas of MPT that can and should be used by typical investors to manage their portfolios. We can begin with the two-asset model.

**A Good Starting Point: The Asset Allocation Decision.** How much of your portfolio should you place into various categories of investments? In a nutshell, this is the asset allocation decision. It concerns how much money to place into risky investments such as the stock market, and therefore how much remains to be placed in safe investments such as money market mutual funds and certificates of deposit.

In practice, many people view the asset allocation decision as determining investment levels in several categories of risky assets such as stocks, real estate and hedge funds. Some people may further subdivide a category such as stocks into sub-categories such as international vs. domestic, small cap vs. large cap, growth vs. value and so forth.

But for our purposes here, the asset allocation decision concerns just two major asset classes: risky investments and safe investments.

As a simplified example, consider Jaclyn, a 40-year-old professional with considerable wealth accumulated in retirement programs. She decides to allocate 60 percent of her money towards broadly diversified stock funds and the remaining 40 percent in a combination of short term investment-grade bond funds,

CDs, and money market funds. This 60/40 split is often considered to be the typical split for the pension money of a financially comfortable investor well prior to retirement. If the stock market quickly rises or falls 10 percent, her total portfolio will tend to move only 6 percent. Why? Her stock positions comprising 60 percent of her portfolio will rise or fall the same amount as the market, but her low-risk bond funds will barely move.

Granted, sometimes it is difficult to classify a total portfolio solely in terms of the percentage stocks and percentage bonds. But for our purposes it is helpful to assume for simplicity that each investor's portfolio can be approximated by a simple mix of stocks and low-risk bonds. This assumption is not as restrictive as it may initially seem. Almost every asset allocation can be viewed

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as having an *exposure to the stock market* that is similar to the exposure of a particular combination of stocks and bonds.

In other words, an investor might hold multiple asset classes (e.g., corporate bonds, real estate), but the portfolio can still be viewed as having the same *market risk* as a pure stock and low-risk bond portfolio by answering the following question: "If the stock market were to fluctuate quickly either up 10 percent or down 10 percent, how much would the portfolio typically rise or fall?" A reply of "6 percent" is comparable in market risk to the previous asset mix of 60 percent stocks and 40 percent bonds.

For example, Rob, a newly retired, wealthy and somewhat aggressive investor may hold an extensive combination of assets including real estate investment trusts,

hedge funds, and some unusual stock and bond funds that specialize in particular asset classes such as low cap growth stocks and convertible bonds. Nevertheless, Rob has watched his portfolio and knows that on days when the stock market moves considerably, his portfolio tends to move about 60 percent as much as the overall stock market and in the same direction.

It can be useful to think of Rob's portfolio as having a level of *market risk* equivalent to a combination of a 60 percent stocks and 40 percent low-risk bonds even if his portfolio contains other types of assets and other types of risks. Thus, in this simplest representation, every portfolio can be viewed as having an asset allocation that has the same responsiveness to market fluctuations as a portfolio comprised of  $x$  percent stocks and  $(100-x)$  percent low-risk bonds.

The analysis up to this point has focused on one type of risk: *market risk*. But responsiveness to stock market fluctuations is only one of the two types of risk. The following section contrasts this market risk with the other type of risk: *idiosyncratic risk*. For reasons you are about to see, this latter risk is also known as "diversifiable risk."

**Market (Systematic) and Idiosyncratic (Diversifiable) Risks.** Market or systematic risk is the tendency of the value of a portfolio to move in response to rapid movements in the overall market portfolio (i.e., an aggregation of all available risky investments). Idiosyncratic or diversifiable risks are all risks other than market risk.

There is an important difference between Jaclyn's holdings of 60 percent stocks and 40 percent money funds and Rob's holdings of a complex set of funds which would tend to rise and fall about 60 percent as much as the market. That difference involves all risks other than

systematic risk.

Idiosyncratic or diversifiable risks are all fluctuations in value due to anything other than overall market movements. Examples include a labor strike at a particular firm, an adverse legal ruling, a poor earnings announcement, or a failed pharmaceutical study. Jaclyn's portfolio of stocks and bonds contains little or no idiosyncratic risk—it is well diversified. But Rob's portfolio probably contains substantial idiosyncratic risk.

When the market suddenly drops 5 percent, Jaclyn has observed that her portfolio tends to drop almost exactly 3 percent (60 percent of 5 percent) because Jaclyn has a well diversified portfolio that is not subject to substantial idiosyncratic risks. Rob notices that when the market drops 5 percent his portfolio tends on average to drop 3 percent, but sometimes moves substantially lower, sometimes drops less and sometimes might even rise.

This deviation in Rob's returns is due to the idiosyncratic risks contained in his positions. The higher or lower returns are caused by events unrelated to the market's level that are causing profits or losses in some of his holdings. Perhaps one of his hedge fund investments collapsed, for example.

In summary, some portfolios adhere reasonably closely to the idea of being invested in two assets: low-risk bonds and a well diversified portfolio of risky assets. Other portfolios contain poorly diversified holdings. But considerable insight can be derived from viewing all portfolios as having a level of systematic risk that is equivalent to being some percentage, say  $x$  percent, in the overall stock market and therefore  $(100-x)$  percent in short term, low default risk bonds (i.e., the so-called riskless asset).

This variable, " $x$ " (expressed as a decimal such as 0.60 or 1.20), is

called the "beta" of the portfolio and is the measure of market risk. So a portfolio that has 60 percent stocks and 40 percent risk-free bonds, and any portfolio with a similar level of market risk, is said to have a beta equal to 0.60. A portfolio entirely invested in a broad stock market portfolio would be said to have a beta of 1.0. Money market funds have a beta of 0.0. The concept of beta can be applied to individual stocks, mutual funds and overall portfolios.

**The "Market Portfolio" and the "Riskless Asset Portfolio."** In MPT, the idea that investors should hold simply two assets, a diversified stock portfolio and a riskless bond portfolio, is known as the "two fund separation theorem." The diversified stock portfolio that is

**Any portfolio has a level of systematic risk equal to " $x$ ," the percentage of the portfolio held in stocks. This " $x$ " is called the "beta" of the portfolio, and is a measure of the portfolio's market risk.**

recommended is usually entitled the "market portfolio."

Strictly speaking, MPT specifies that the market portfolio is the portfolio of *all* risky assets found everywhere in the world. It is not limited to stocks and is not limited to the investor's home country. The market portfolio includes all investments that contain risk.

Further, the portfolio contains weights for each asset in direct proportion to that asset's *size*, as measured by its valuation. Thus, if IBM is 100 times larger than XYZ Corporation, then the market portfolio should contain a position in IBM that has 100 times the value as the portfolio's position in XYZ Corporation.

In practice the market portfolio is limited to *investable* assets, and few investors diversify into every

asset class. Similarly, few investors, especially outside the U.S., hold a proportion of domestic and foreign assets directly proportional to their aggregate values. Most investors have relatively large portfolio weights in the assets of their own country. (These issues are discussed in Parts 2 and 9 of this series.)

The prescription of MPT is clear: Investors should seek to diversify as much risk as possible by holding as many assets as possible and by holding those assets in proportion to their total market value.

The so-called riskless asset can not of course be truly riskless. Currencies contain risk of purchasing power fluctuations, and no asset has value if some event such as a comet destroys the earth. In research studies of U.S. markets, the riskless asset is often identified as very

short term (e.g., 3 month U.S. Treasury Bills. In practice it would include short term fixed income securities with little or no credit risk such as FDIC-insured CDs, money market mutual funds and money market accounts. Part 6 of this

series discusses the "riskless" part of the portfolio.

In sum, MPT provides a remarkably clear prescription for investing in risky assets. *MPT tells investors exactly which securities should be purchased (all of them) and in exactly what proportions (in proportion to their size)!*

But MPT does not answer the other key question—the asset allocation decision—what percentage of one's wealth should be placed in the market portfolio rather than the riskless return.

### **Risk and Returns: The U.S. Record**

Nobody knows what the future holds. We usually look to the past for some indications of the possibilities. U.S. investors who chose to bear the risks of stocks generally fared extraordinarily well in the 20<sup>th</sup>

century. From the summer lows of 1982 to the highs of 2007, the U.S. stock market rose over fifteen-fold even excluding dividends! But investors received a taste of devastating performance in 2008. What will the next 10, 25, or 50 years be like for U.S. investors?

Not all nations experienced the generally great stock markets that the U.S. experienced during the latter half of the 20<sup>th</sup> century. In some nations stock market investors lost everything when their country or government collapsed.

More recently, since late 1989, investors in Japanese stocks have seen their wealth decline by over 80 percent in the course of a generation. If the U.S. were to experience a similar decline from the highs of the Dow Jones Industrial Average (approximately 14,000 points) in the year 2007, it would mean that 20 years later the Dow Jones average would be trading at only 2,500. Ouch.

No one can predict the future returns of stocks with a high degree of accuracy. But MPT predicts that higher expected returns are available if and only if one bears higher levels of systematic (market) risk. The biggest question that all of us face as investors is this: “To what extent do we want to bear that risk in hopes of receiving added return?”

**Act Your Age?** Most investment performance is attributable to the asset allocation decision. A few decades ago a 50 percent stock and 50 percent bond allocation was considered standard for the retirement assets of a relatively young and affluent investor. Today, one of the simplest and most effective starting points for asset allocation decisions is that each person should “*invest their age as a percentage in bonds—and the rest in stocks.*” Thus, a 60 year old should consider holding 60 percent on bonds and 40 percent in stocks as a starting point for analysis.

Of course, this prescription needs to be adjusted to align with a person’s preferences and circumstances.

The allocation decision is not a “set it and forget it” decision. All of the circumstances that led to a particular asset allocation can change: wealth, income, estimated lifespan, risk tolerances, and so forth.

It is not too much to say that clarifying this decision-making process is the central objective of this series.

**Where Do We Go from Here?** We conclude this introduction by noting the difference in investment strategy as between MPT and security analysis. Security analysis investigates the valuation of individual securities. Judging by the quantity of advice offered on security selection, one might think that investment success is mostly driven by one’s ability to pick the right securities.

But as already noted, studies show that investment results are primarily determined by the asset allocation decision (i.e., which asset classes to emphasize). MPT provides the framework for making that decision.

As the table shows, the next two parts of the series focus on diversification and risk measurement. They explore what it really means to be fully diversified, what happens if one is not fully diversified, and how we can benefit from expressing

the amount of risk as the standard deviation of returns.

The fourth part lays out MPT’s “baseline” model that links risk and return. The baseline model describes how much additional expected return investors might expect from taking additional risk. The fifth part summarizes some of the challenges with applying the “baseline” model to one’s personal financial circumstances such as illiquid holdings and taxes.

Part six provides detailed and practical information regarding fixed income investing. The seventh and eighth parts of this series explore issues involved with changing one’s overall asset allocation through time, either in an attempt to time the market or in response to changes in the investor’s financial circumstances or goals.

Finally, the ninth and tenth parts explore some “outside the box” ideas such as alternative investments, behavioral or psychological issues, and multi-factor models.

Taken together, these ten parts are designed to help investors glean practical investment guidelines from MPT. MPT is not without its limitations and its critics. But many of the most common large investment mistakes are caused by failure to follow MPT’s most basic prescriptions.

## MPT’s Lessons for Investment Management

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Part 10. Holistic Asset Allocation, Multi-Factor Models, and Behavioral Issues