THE MODERN PORTFOLIO THEORY AS AN INVESTMENT DECISION TOOL

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ABSTRACT

This research paper is academic exposition into the modern portfolio theory (MPT) written with a primary objective of showing how it aids an investor to classify, estimate, and control both the kind and the amount of expected risk and return in an attempt to maximize portfolio expected return for a given amount of portfolio risk, or equivalently minimize risk for a given level of expected return. A methodology section is included which examined applicability of the theory to real time investment decisions relative to assumptions of the MPT. A fair critique of the MPT is carried out to determine inherent flaws of the theory while attempting to proffer areas of further improvement (for example, the post-modern portfolio theory [PMPT]). The paper is summarized to give a compressed view of the discourse upon which conclusions were drawn while referencing cited literature as employed in the course of the presentation.

INTRODUCTION

This paper presentation is an assessment of the modern portfolio theory as an investment decision tool. In the investment world, there exist different motives for investment. The most prominent among all is to earn a return on investment. However, selecting investments on the basis of returns alone is not sufficient. The fact that most investors invest their funds in more than one security suggests that there are other factors, besides return, and they must be considered. The investors not only like return but also dislike risk.

The financial market, despite the benefits and rewards, is a complexly volatile industry which requires critical analysis to adequately evaluate risks relative to returns to aid decisions as regards participation in the industry. Upon such premise, this research work is an academic insight into some analytics of the financial market. The presentation is an attempt to create foundation knowledge to understanding the workings of the financial market. Despite the span of the research, specific attention would be accorded to the Modern Portfolio Theory.

In the course of this discourse, some historical background to financial market analysis would be examined, related literature (to Modern Portfolio Theory) reviewed, its applications, pros and cons of the theory would equally be examined. It is intended that this write-up would add to the existing pool of knowledge on the concept being investigated.

LITERATURE REVIEW

Investment portfolio theories guide the way an individual investor or financial planner allocates money and other capital assets within an investing portfolio. An investing portfolio has long-term goals independent of a market's day-to-day fluctuations; because of these
goals, investment portfolio theories aim to aid investors or financial planners with tools to estimate the expected risk and return associated with investments.

Passive portfolio theories, on one hand, combine an investor's goals and temperament with financial actions. Passive theories propose minimal input from the investor; instead, passive strategies rely on diversification, buying many stocks in the same industry or market, to match the performance of a market index. Passive theories use market data and other available information to forecast investment performance.

Active Portfolio Theories come in three varieties. Active portfolios can either be patient, aggressive or conservative. Patient portfolios invest in established, stable companies that pay dividends and earn revenue despite economic conditions. Aggressive portfolios buy riskier stocks, those that are growing, in an attempt to maximize returns; because of the volatility to which this type of portfolio is exposed, it has a high turnover rate. As the name implies, conservative portfolios invest with an eye on yield and long-term stability.

In any financial market analysis, if the objective of the analysis involves determination of stocks to buy and at what price, there are two basic methodologies: Fundamental analysis, which maintains that markets may misprice a security in the short run but that the "correct" price will eventually be reached. Profits can be made by trading the mispriced security and then waiting for the market to recognize its "mistake" and re-price the security. Technical analysis, maintains that all information is reflected already in the stock price. Trends 'are your friend' and sentiment changes predate and predict trend changes. Investors' emotional responses to price movements lead to recognizable price chart patterns. Technical analysis does not care what the 'value' of a stock is. Their price predictions are only extrapolations from historical price patterns.

**OBJECTIVE**

Fundamental analysis of a business involves analyzing its financial statements and fore health, its management and competitive advantages, and its competitors and markets. When applied to futures and, it focuses on the overall state of the economy, interest rates, production, earnings, and management. Fundamental analysis is performed on historical and present data, but with the goal of making financial forecasts. There are several possible objectives:

- To conduct a company stock valuation and predict its probable price evolution
- To make a projection on its business performance
- To evaluate its management and make internal business decisions
- To calculate its credit risk

While fundamental analysts examine earnings, dividends, new products, research and the like, technical analysts examine what investors fear or thought of these developments and whether or not investors have the Where withal to back up their opinions; these two concepts are called psych (psychology) and supply/demand.
THE MODERN PORTFOLIO THEORY (MPT)

Harry Markowitz 1991, an American economist in the 1950s developed a theory of "portfolio choice," which allows investors to analyses risk relative to their expected return. For this work Markowitz, a professor at Baruch College at the City University of New York, shared the 1990 Nobel Memorial Prize in Economic Sciences with William Sharpe and Merton Miller.

Markowitz’s theory is today known as the Modern Portfolio Theory, (MPT). The MPT is a theory of investment which attempts to maximize portfolio expected return for a given amount of portfolio risk, or equivalently minimize risk for a given level of expected return, by carefully choosing the proportions of various assets. Although the MPT is widely used in practice in the financial industry, in recent years, the basic assumptions of the MPT have been widely challenged. The Modern Portfolio Theory, an improvement upon traditional investment models, is an important advance in the mathematical modelling of finance. The theory encourages asset diversification to hedge against market risk as well as risk that is unique to a specific company.

The theory (MPT) is a sophisticated investment decision approach that aids an investor to classify, estimate, and control both the kind and the amount of expected risk and return; also called Portfolio Management Theory. Essential to the portfolio theory are its quantification of the relationship between risk and return and the assumption that investors must be compensated for assuming risk. Portfolio theory departs from traditional security analysis in shifting emphasis from analysing the characteristics of individual investments to determining the statistical relationships among the individual securities that comprise the overall portfolio (Edwin and Martins 1997).
The MPT mathematically formulates the concept of diversification in investing, with the aim of selecting a collection of investment assets that has collectively lower risk than any individual asset. The possibility of this can be seen intuitively because different types of assets often change in value in opposite ways. But diversification lowers risk even if assets' returns are not negatively correlated—indeed, even if they are positively correlated.

The fundamental concept behind the MPT is that assets in an investment portfolio should not be selected individually, each on their own merits. Rather, it is important to consider how each asset changes in price relative to how every other asset in the portfolio changes in price. Investing is a trade-off between risk and expected return as shown in Figure 1.

Concept of Risk And Expected Return

Return

Return is the basic motivating force and the principal reward in any investment process. Returns may be defined in terms of realized return (that is, the return which has been earned) and expected return (that is, the return which the investor anticipates to earn over some future investment period). The expected return is a predicted or estimated return and may or may not occur. The realized returns in the past allow an investor to estimate cash inflows in terms of dividends, interest, bonus, capital gains, etc., available to the holder of the investment.

Risk

Risk in investment analysis, is the unpredictability of future returns from an investment. The concept of risk may be defined as the possibility that the actual return may not be same as expected. In other words, risk refers to the chance that the actual outcome (return) from an investment will differ from an expected outcome. With reference to a firm, risk may be defined as the possibility that the actual outcome of a financial decision may not be same as estimated. The risk may be considered as a chance of variation in return. Investments having greater chances of variations are considered more risky than those with lesser chances of variations.

Measurement of risk and the beta coefficient

No investor can predict with certainty whether the income from an investment will increase or decrease and by how much. Statistical measures can be used to make precise measurement of risk about the estimated returns, to gauge the extent to which the expected return and actual return are likely to differ. The expected return, standard deviation and variance of outcomes can be used to measure risk.

Beta coefficient

There is another measure of risk known as β which measures the risk of one security/ portfolio relative to market risk. The market risk is represented by fluctuation in the market benchmark, that is, market index. Shares whose β factor is more than 1 are considered less risky. It may be noted that β is a measure of systematic risk which cannot be diversified away.
The total risk of an investment consists of two components: diversifiable (unsystematic) risk and non-diversifiable (systematic) risk. The relationship between total risk, diversifiable risk, and non-diversifiable risk can be expressed by the following equation:

Total risk = Diversifiable risk + Non diversifiable risk

**Assumptions of the modern portfolio theory**

The framework of the MPT makes many assumptions about investors and markets. Some are explicit in MPT equations; such as the use of Normal distributions to model returns. Others are implicit, such as the neglect of taxes and transaction fees. None of these assumptions are entirely true, and each of them compromises the MPT to some degree. Predominant among the MPT assumptions is the efficient market theory.

**The efficient market theory**

The efficient market theory is widely referred to as a hypothesis, and thus efficient market hypothesis (EMH) asserts that financial markets are "informationally efficient". That is, one cannot consistently achieve returns in excess of average market returns on a risk-adjusted basis, given the information available at the time the investment is made. There are three major versions of the MPT hypothesis: "weak", "semi-strong", and "strong". The weak EMH asserts that prices of traded assets (for example, stocks, bonds, or property) already reflect all past publicly available information. The semi-strong EMH opines that prices reflect all publicly available information and that prices change to reflect new public information. Extensive researches have revealed signs of inefficiency in financial markets.

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**Figure 2.** Efficient frontier. The hyperbola is sometimes referred to as the 'Markowitz Bullet', and is the efficient frontier if no risk-free asset is available. With a risk-free asset, the straight line is the efficient frontier.

**Asset returns are (jointly) normally distributed random variables**

Despite this assumption, evidence from frequent observations shows that returns in equity and other markets are not normally distributed. Large swings (3 to 6 standard deviations from
the mean) occur in the market far more frequently than the normal distribution assumption would predict. While the model can also be justified by assuming any return distribution which is jointly elliptical, all the joint elliptical distributions are symmetrical whereas asset returns empirically are not.

**Correlations between assets are fixed and constant forever**

Correlations depend on systemic relationships between the underlying assets, and change when these relationships change. During times of financial crisis, all assets tend to become positively correlated, because they all move (down) together. In other words, the MPT fails to function when investors are most in need of protection from risk.

**All investors aim to maximize economic utility**

Investors aim to maximize economic utility in order to make as much money as possible, regardless of any other considerations. This is a key assumption of the efficient market hypothesis, upon which the MPT relies.

**All investors are rational and risk-averse**

This is another assumption of the efficient market hypothesis, but we now know from behavioral economics that market participants are not rational. It does not allow for "herd behavior" or investors who will accept lower returns for higher risk. Even gamblers clearly pay for risk, and it is possible that some stock traders will pay for risk as well.

**All investors have access to the same information at the same time**

This also comes from the efficient market hypothesis. In fact, real markets contain information asymmetry, insider trading, and those who are simply better informed than others.

**Investors have an accurate conception of possible returns**

The probability beliefs of investors match the true distribution of returns. A different possibility is investors' expectations being biased, causing market prices to be informationally inefficient.

**There are no taxes or transaction costs**

Real financial products are subject both to taxes and transaction costs (such as broker fees), and taking these into account will alter the composition of the optimum portfolio. These assumptions can be relaxed with more complicated versions of the model.

**All investors are price takers**

Their actions do not influence prices. In reality, sufficiently large sales or purchases of individual assets can shift market prices for that asset and others (via cross-elasticity of demand). An investor may not even be able to assemble the theoretically optimal portfolio if the market moves too much while they are buying the required securities.

**All securities can be divided into parcels of any size**

In reality, fractional shares usually cannot be bought or sold, and some assets have minimum order sizes. More complex versions of the MPT take into account a more sophisticated model
of the world (such as one with non-normal distributions and taxes) but all mathematical models of finance still rely on many unrealistic premises as stated previously.

APPLICATION OF THE MODERN PORTFOLIO THEORY

The MPT assumes that investors are risk adverse, meaning that given two portfolios that offer the same expected return, investors will prefer the less risky one. Thus, an investor will take on increased risk only if compensated by higher expected returns. Conversely, an investor who wants higher expected returns must accept more risk. The exact trade-off will be the same for all investors, but different investors will evaluate the trade-off differently based on individual risk aversion characteristics. The implication is that a rational investor will not invest in a portfolio if a second portfolio exists with a more favorable risk-expected return profile – that is, if for that level of risk an alternative portfolio exists which has better expected returns. The MPT is therefore a form of diversification. Under certain assumptions and for specific quantitative definitions of risk and return, MPT explains how to find the best possible diversification strategy.

Applying the theory

The Portfolio theory (MPT) approach has four basic procedures: Security valuation-describing a universe of assets in terms of expected return and expected risk; asset allocation decision- determining how assets are to be distributed among classes of investment, such as stocks or bonds; portfolio optimization-reconciling risk and return in selecting the securities to be included, such as determining which portfolio of stocks offers the best return for a given level of expected risk; and performance measurement-dividing each stock’s performance (risk) into market-related (systematic) and industry/security-related (residual) classifications (Brodie, 2009).

The MPT does not take cognizance of its own effect on asset prices

Diversification eliminates non-systematic risk, but, at the cost of increasing the systematic risk. Diversification forces the portfolio manager to invest in assets without analysing their fundamentals; solely for the benefit of eliminating the portfolio’s non-systematic risk (the capital asset pricing investment in all available assets) (Chandra, 2003). This artificially increased demand pushes up the price of assets that, when analysed individually, would be of little fundamental value. The result is that the whole portfolio becomes more expensive and, as a result, the probability of a positive return decreases (that is, the risk of the portfolio increases).

The legitimacy of the modern portfolio theory has been challenged by financial analysts who often cite Warren Buffett as a rule breaker. Warren Buffett, a major financial market referral with successful financial takeovers in his resume, is not a typical investor. Unlike the average mutual fund manager, Buffett often buys companies and then manages them. He provides them with economies of scale, lower cost of capital and the benefits of his managerial wisdom. And when he takes large portions in companies, he often gets a board seat. So perhaps his great returns are more a result of his managerial skills than his investment skills,
or some combination of both. This, obviously, is not congruent with the line of thought of MPT proponents (Sabbadini, 2010).

CONCLUSION

This paper presentation sought to review the relevance of the modern portfolio theory as an investment portfolio tool in portfolio decision making. In the course of the research, the relevance and applicability of the MPT was reviewed, however, it was also established that many inherent flaws of the theory have marred the efficacy of the theory. Among other things, its simplistic assumptions and direct correlation of risks and returns were identified as significant flaws.

Despite the limitations of the theory, it is still widely accepted and further research is being carried out on its principles. The post modern portfolio theory is a significant advancement of the theory. Post-modern portfolio theory encourages far greater diversification in an investment portfolio than does the MPT. By utilizing the alpha coefficient and the beta coefficient, each of which gauge an investment's performance, investors can engineer a portfolio's risk and returns to coincide with investment objectives. The alpha coefficient measures an investment's performance relative to its risk; the beta coefficient measures an investment's return relative to the market as a whole. The post-modern portfolio theory (PMPT) separates alpha- and beta-generated revenue, and then considers each individually to maximize their performance. The PMPT is more adaptable to the individual investor and can gauge risk relative to the investor's minimum acceptable return (MAR) for an asset.

REFERENCES


