VANDERBILT Ave.
ASSET MANAGEMENT

Emad A. Zikry, President and Chief Executive Officer

Modern Portfolio Theory (MPT) Statistics & Definitions

MPT assumes that investors are risk averse, 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.

Alpha (higher is better)

The premium earned by a portfolio, or segment of a portfolio, beyond that which would be earned through a policy of investing exclusively in Treasury Bills and another market index. This measure generally is interpreted as representing the value added (or subtracted) by a money manager as a result of market timing and selection.

Sharpe Ratio (higher is better)

The Sharpe Ratio is based on the capital asset pricing model. The Sharpe Ratio is a measure of return above the risk-free rate per unit of total risk or systematic plus unsystematic risk. It measures relative value added by the manager and is frequently compared to the benchmark and/or other managers. A manager has added value compared to the index, if his Sharpe Ratio is higher than the index's. A Sharpe Ratio of 1.00 means that for each unit of incremental risk (over the risk-free rate), the investor is rewarded with a similar unit of return. Sharpe Ratios will be negative when the manager's returns are less than the T-Bill return.

Upside Capture Ratio (higher is better)

The Upside Capture Ratio measures the percentage to which the manager has participated in the return of the benchmark over the up periods. It is calculated by dividing the manager's returns for the benchmark's up periods by the benchmark's returns for that same period.

Treynor Ratio (higher is better)

The Treynor Ratio (sometimes called the reward-to-volatility ratio) is a measurement of the returns earned in excess of that which could have been earned on an investment that has no diversifiable risk (e.g. Treasury Bill), per each unit of market risk assumed. The Treynor Ratio relates excess return over the risk-free rate to the additional risk taken; however, systematic risk is used instead of total risk.

Information Ratio (higher is better)

The Information ratio is a measure of the risk-adjusted return of a security (or portfolio). It is defined as the expected active return divided by the tracking error, where active return is the difference between the return of the security and the return of a selected benchmark index, and tracking error is the standard deviation of the active return. The

information ratio is measures the active return of the manager's portfolio divided by the amount of risk that the manager takes relative to the benchmark.

Simple Dietz Method*

The Simple Dietz method overcomes the need to know the valuation of the portfolio on the date of each cash flow by assuming a constant rate of return on the portfolio during the period. The method assumes that all cash flows occur at the mid-point of the period. The formula for estimating the rate of return using the Simple Dietz method is:

$$R = \frac{MVE - MVB - F}{MVB + \dfrac{F}{2}}$$

Where:

MVB is the market value at the beginning of the period, including accrued income from the previous period;

MVE is the market value at the end of the period, including accrued income for the period;

F is the sum of the cash flows within the period (contributions to the portfolio are positive flows, and withdrawals or distributions are negative flows);

The chief advantage of the Simple Dietz method is that portfolio valuation is not required for the date of each cash flow. Its chief disadvantage is that it provides a less accurate estimate of the true time-weighted rate of return. Specifically, the estimate suffers most when a combination of the following conditions exists: (1) one or more large cash flows occur (2) cash flows occur during periods of high market volatility, i.e., the portfolio's returns have been significantly nonlinear, and (3) returns are biased in times of high rates.

*An excerpt from the book titled "*Pension Funds: Measuring Investment Performance*" by Peter O. Dietz.

Modified Dietz Method*

The Modified Dietz method overcomes the problem of the Simple Dietz method by time weighting the flows. The formula for estimating the time-weighted rate of return using the Modified Dietz method, R_{DIETZ}, is:

$$R_{DIETZ} = \frac{MVE - MVB - F}{MVB + FW}$$

Where: MVB is the market value at the beginning of the period, including accrued income from the previous period;

MVE is the market value at the end of the period, including accrued income for the period;

F is the sum of the cash flows within the period (contributions to the portfolio are positive flows, and withdrawals or distributions are negative flows); and

FW is the sum of each cash flow, F_1, multiplied by its weight, W_1.

W_1 is the proportion of the total number of days in the period that the cash flow F_1 has been in (or out of) the portfolio. The formula for W_1 is:

$$W_1 = \frac{CD - D_1}{CD}$$

Where: CD is the total number of days in the period, and

D_1 is the number of days since the beginning of the period in which cash flow F_1 occurred.

The numerator is based on the assumption that the cash flows occur at the end of the day. If cash flows are assumed to occur at the beginning of the day, the numerator would be $CD + 1 - D_1$. It is important to be consistent, whichever method is chosen.

The chief advantage of the Modified Dietz methodology is that it weighs each cash flow by the amount of time it was held in the portfolio, whereas, the Simple Dietz methodology assumes that all cash flows occur at the mid-point of a period.

*An excerpt from the booklet titled the Association for Investment Management Research under the chapter

INDATA

PORTFOLIO/BOND/EQUITY RATE OF RETURN FORMULA:

$$\frac{\text{(Current Market Value + Income) - (Prior Market Value + Cash Flow)}}{\text{(Prior Market Value + Cash Flow)}}$$

DEFINITIONS:

FOR TOTAL PORTFOLIO

INCOME: 1/12 of the portfolio's annual income for all assets held during each processing period.

CASH FLOW: the net of contributions, distributions and/or re-invested income.

FOR BOND/EQUITY

INCOME: 1/12 of the bond/equity portion's annual income for all assets held during each processing period.

CASH FLOW: the net of purchase costs and/or sale proceeds.

The following is the formula for computing the time-weighted rate of return for 1 quarter by linking 3 monthly dollar-weighted rates:

$$R_Q = (1+R_{M1})(1+R_{M2})(1+R_{M3}) - 1$$

where R_Q = Quarterly time-weighted rate of return.

              R_{M1-3} = Dollar-weighted rates of return for months 1, 2, 3.

CUMULATIVE TIME-WEIGHTED RATES OF RETURN

The cumulative time-weighted rate of return is calculated by linking the annual time-weighted rates and taking the nth root of the linkage. When 1 is subtracted from the nth root of the linkage, the resulting rate is cumulative.

$$r_c = \sqrt[n]{(1+r_1)(1+r_2).....(1+r_3)} - 1$$

Where r_c = The annualized rate of return earned during the n year period.

              r_n = The rate of return earned in year n.

Note: The above formula takes into account prepayments; income received; and accrued income from sales and purchases. In addition, estimated annual income is utilized for month end as opposed to accrued interest. For Fixed Income with prepayments, this enhanced approach provides a more smoother and non-volatile result. The formula also assumes that all cash flows occur at the beginning of the period. This assumption would result in a conservative (understated) rate of return when the bias is toward cash in-flow, a neutral rate of return when there is no cash flow bias, or an aggressive (overstated) rate of return when the bias is toward cash out-flows.

Vanderbilt Research Team

Emad A. Zikry

Chief Executive Officer

Vanderbilt Avenue Asset Management

Emad is the Managing Partner and Chief Executive Officer of Vanderbilt Avenue Asset Management LLC. Vanderbilt's client base includes Multi-national Corporations, Public Funds, Foundations/Endowments, and Taft Hartley accounts.

Previously, Emad was Chairman of Institutional Business at Pioneer Investments. Pioneer investments has more than $300 Billion in assets under management. The parent of Pioneer, UniCredit S.p.A., is the largest bank in Italy and the second largest bank in Europe. Pioneer had purchased Vanderbilt Capital Advisors, of which Emad was the founder and Chief Executive Officer.

Emad has had numerous articles published in professional and academic journals such as The Journal of Forecasting, The American Economist and The Journal of Fixed Income. He is a Board member of The National Investment Company. Emad was a member of the Board of Advisors of the Pacific Institute, The Advisory Committee of Fulcrum Global Partners, The Chief Executive Officers Club and formerly a board member of The Foreign Policy Association. He also served on the Board of Directors of the University of Albany Foundation, NextGen Healthcare Inc., The Park Avenue Bank, AA Bank and The New Providence Fund and Associates LP.

Emad is an FINRA Arbitrator. He is also a member of the National Association for Business Economists and The Economic Club of New York. Emad served as an adjunct professor at the University of Kansas and St. John's University.

Emad holds a Bachelor of Science from the University of Albany, and a M.A. and Ph.D. in Economics from the University of Kansas.