Managing Market Exposure

Robert B. Litterman and Kurt D. Winkelmann
Journal of Portfolio Management
vol. 22, no. 4 (Summer 1996):32–48

The authors introduce a risk management tool called "market exposure" to help money managers determine how risky a portfolio is relative to a benchmark. They focus on the measurement and management of market risk for a global bond portfolio. The manager of such a portfolio should define a set of risk factors and exploit correlations between markets. The authors explain how to incorporate volatilities and correlations to more accurately measure market exposure and hence improve overall portfolio management.

The primary task facing money managers today is the quest to beat some specified benchmark. Popular benchmarks include pension liabilities, a market index, or cash. Managing the risk of a portfolio is becoming increasingly difficult because portfolios are including more global securities and derivatives are more widely used. With this increased complexity comes the need for more powerful and more accurate risk management tools.

The authors develop a risk management tool called "market exposure" to address how risky a portfolio is relative to its benchmark. Market exposure is defined as the sensitivity of a portfolio to moves in the overall market. (Market here is used to mean the typical basket of permissible securities.) Mathematically, market exposure is the slope coefficient of a linear regression of the return on the manager's portfolio on the return of the appropriate market portfolio.

The market portfolio for a domestic equity investor is represented by a domestic equity index, and the market portfolio for a domestic

Robert B. Litterman is at Goldman, Sachs & Company. Kurt D. Winkelmann is at Goldman Sachs International. The abstract was prepared by Robert Brooks, CFA, Financial Risk Management, Inc.

bond investor is represented by a domestic bond index. For the bond market, the market exposure is approximately the duration of the investor's portfolio divided by the duration of the benchmark portfolio adjusted for differences in the respective volatilities.

Asset returns are typically decomposed into exposures to underlying fundamental risk factors. Examples in the bond market of relevant risk factors include credit rating and yield-curve information (level, slope, and curvature). By defining risk factors, managers are able to attribute any deviation from the benchmark to differences in risk factor exposures plus a residual term that is hopefully small. The portfolio's risk can be decomposed into two parts: exposures that affect the overall market and residual exposures that affect the portfolio but not the market.

Global bond fund managers seek to provide superior returns relative to the appropriate global bond index. The fund manager must deviate from the allocations implied in the appropriate global bond index to provide superior performance. Hence, the bond fund manager takes on risk. The level of risk an active manager assumes can be measured by the standard deviation of the return differences of the portfolio compared with the index. This risk measure is called tracking error, which can be decomposed into two components: market exposure resulting from different allocations from the index and residual risk resulting from risks that do not affect the index.

The expected portfolio return is equal to the market exposure measure times the index return because residual risks should not contain any risk premium. Residual risk can be totally diversified.

The authors examine their approach to risk management—the market exposure tool—by using daily data from February 1988 through March 1995, and they downweight at a rate of 10 percent a month. They document that volatilities vary among maturities and among countries. Also, most major bond markets are not highly correlated with each other or with currencies. Hence, simply relying on relative durations gives misleading results because the

duration approach assumes that all markets are perfectly corre-lated. Using a historical example, the authors show that the market-exposure approach is much more accurate than other approaches.

The global bond trader typically seeks to be market neutral and takes advantage of inappropriate relative prices. The authors argue that a portfolio is market neutral if and only if the market portfolio has no expected excess return.

The authors demonstrate that one can determine a set of implied views for any given set of selected weights (assuming the selection is optimal). They review several different approaches for designing a market-neutral trade, including using strictly duration, using regression weights to minimize volatility, and using volatility-weighted durations. A zero duration strategy typically has a direc-tional bias because yield-curve movements are not parallel. Rather than pursue zero duration, the authors recommend defining a market-neutral trade as one with zero market exposure.

The active bond manager should focus on opportunities that add residual risk while maintaining an appropriate level of market exposure. Using the authors' measure of market exposure that explicitly incorporates volatilities and correlations, bond managers can improve their portfolio management.