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Value at Risk and Expected Stock Returns

Turan G. Bali & Nusret Cakici

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Abstract

Stock size, liquidity, and value at risk (VAR) can explain the cross-sectional variation in expected returns, but market beta and total volatility have almost no power to capture the cross-section of expected returns at the stock level. Furthermore, the strong positive relationship between average returns and VAR is robust for different investment horizons and loss-probability levels. In addition to the cross-sectional regressions at the stock level, this study used a time-series approach to test the empirical performance of VAR at the portfolio level. The results, based on 25 size/book-to-market portfolios, indicate that VAR has additional explanatory power after the characteristics of market return, size, book-to-market ratio, and liquidity are controlled for.

Although previous empirical studies have used a variety of stock characteristics and other factors, such as total risk and diversifiable risk, to explain the cross-section of

expected returns, researchers have not investigated value at risk (VAR) as an alternative risk factor that can explain stock returns. In conducting this study, our goal was to test whether the maximum likely loss measured by VAR can explain cross-sectional and time-series differences in expected returns.

Using monthly and annual regressions, we provide evidence that size, liquidity, and VAR could capture the cross-sectional variation in expected returns of NYSE, Amex, and Nasdaq stocks for the period January 1963 to December 2001. Furthermore, we show that market beta and total volatility have almost no power to explain average stock returns at the individual-stock level. We also compared the relative performance of size, beta, and VAR in explaining the cross-sectional variation in portfolio returns. The results show that all the risk factors considered in the article can capture the cross-sectional differences in portfolio returns but that VAR has the best performance in terms of R^2 values. The strong positive relationship between stock (or portfolio) returns and VAR turns out to be robust over various investment horizons and loss-probability levels.

In addition to using cross-sectional regressions in an asset-pricing framework, we also used time-series regressions to evaluate the empirical performance of VAR at the portfolio level. To mimic the risk factor in returns related to VAR, we devised an alternative factor, HVARL, the difference between the simple average of the high-VAR portfolio returns and the low-VAR portfolio returns. Using 25 portfolios, we investigated the relative performance of total volatility, VAR, and liquidity in terms of their ability to capture time-series variation in stock returns. When we regressed monthly returns for a stock portfolio on the returns for portfolios based on market return, company size, the book-to-market ratio, liquidity, and VAR, we found that VAR can capture substantial time-series variation in stock returns and provide additional explanatory power even after the characteristics of market return, size, book-to-market ratio, and liquidity are controlled for. The results also imply that the relationship between VAR and expected stock returns is not the result of a reversal in long-term returns, of liquidity, or of volatility.

Modern portfolio theory determines the optimum asset mix by maximizing the expected risk premium per unit of risk in a mean–variance framework or the expected value of some utility function approximated by the expected return and variance of the portfolio. In both cases, market risk of the portfolio is defined in terms of the variance (or standard deviation) of expected portfolio returns. Modeling portfolio risk as defined by traditional volatility measures implies that investors are concerned only about the average variation (and covariation) of individual stock returns and does not allow investors to treat the negative and positive tails of the return distribution separately. The standard risk measures determine the volatility of unexpected outcomes under normal market conditions, which corresponds to the normal functioning of financial markets during ordinary periods. Neither the variance nor the standard deviation, however, can yield an accurate characterization of actual portfolio risk during highly volatile periods. Therefore, the set of mean–variance-efficient portfolios may lead to an inefficient strategy for maximizing expected portfolio return while minimizing risk. Our findings suggest a new approach to optimal portfolio selection in a VAR framework. A mean–VAR approach can be introduced to allocate financial assets by maximizing the expected value of some utility function approximated by the expected return and VAR of the portfolio, as well as the investor's aversion to VAR.

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