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Introduction

Beta is a statistic developed from the Capital Asset Pricing Model ("CAPM"). Beta measures part of a security's risk in the process of estimating the expected return to the security.

Beta is typically misused whenever it is offered as a measure of risk, significantly understating the risk relevant to most retail investors.

Capital Asset Pricing Model

Harry Markowitz's pioneering work on modern portfolio theory showed that efficient portfolios, i.e. portfolios with the least risk for any given level of expected return, could be identified if we knew every security's expected return, variance and covariances.

William Sharpe demonstrated that calculating efficient portfolios could be dramatically simplified if the returns to portfolios were interrelated only through their individual relationship with returns to the market portfolio.

Beta measures this *relationship* between a security's returns and variations in the markets' returns. It does not measure the variations in a security's returns, which is the relevant risk for most investors.

Beta and Expected Returns

The expected return on a diversified portfolio of stocks is greater than the return on Treasury securities. This difference - *the equity risk premium* - is compensation investors receive for bearing the risk of stock market fluctuations.

The expected return on a security is the risk free rate of return plus the security's beta multiplied by the equity risk premium.

The risk free interest rate and the equity risk premium are constant across portfolios. Differences in expected returns across portfolios are solely a function of differences in the betas.

The average beta of all stocks is 1.0 and the majority of stocks have betas between 0.75 and 1.25. To say one security has a higher beta than another security tells us almost nothing about their relative risk since both are likely to have a lot of risk not captured by beta.
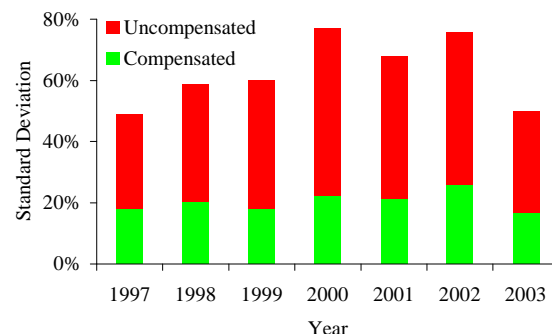
Uncompensated Versus Compensated Risk

The returns to individual securities vary more widely than the returns to well diversified portfolios of stocks. The market doesn't compensate for the risk in a stock's returns which isn't related to market returns.

This uncompensated risk in individual stocks – the risk not captured by beta – is a coin toss layered onto a market bet, increasing risk without any corresponding increase in expected return.

A portfolio combining several stocks with the same beta will have the same expected return as each of the individual stocks but will have much less risk because uncompensated risk is uncorrelated across stocks. So long as there is uncompensated risk in a portfolio, diversification can reduce risk without reducing expected return.

The figure below shows the average total risk in the 500 individual S&P 500 stocks. Each year the uncompensated risk (in red) is much greater than the compensated risk captured by beta.

Risk in Concentrated S&P Stock Postions

Conclusion

Beta measures only compensated risk. Investors need to consider total risk including - and especially - uncompensated risk when evaluating an investment. Investors as a general rule should therefore not use beta to measure risk.

June 30, 2005