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REVIEWING THE CAPM

There is room for improvement with this popular asset-pricing model.

The Capital Asset Pricing Model (CAPM) is the most well-known asset-pricing model. It was the first attempt to analyze the equilibrium implications of investing under conditions of uncertainty. It provided a platform for all the subsequent work in asset pricing. The model can be expressed as:

$$E(R_i) - R_f = \beta_i [E(R_m) - R_f]$$

$E(R_i)$ is the expected return on a security (or portfolio), R_f is the risk-free rate, and $E(R_m)$ is the expected return on the broad market. The coefficient β_i measures the sensitivity of the security's return to fluctuations in the broad market.

Based on the assumptions that underlie the CAPM, the fluctuations in a security's return that are unrelated to the broad market can be diversified away. Since β measures the tendency to move with the broad market, this is the part of the security's risk that cannot be diversified away. Consequently, investors should receive a risk premium in the form of a higher expected return for incurring β risk. The main implication of the CAPM is that sensitivity to variation in the broad market, measured by β , should be all that matters for determining expected returns on securities and portfolios.

We ask our pricing models to do a lot. Investors use them to estimate expected returns for securities and portfolios. Companies use them to estimate their cost of capital. Investors use them to evaluate the performance of their portfolios. Since we ask the CAPM to do so many important things, it is necessary to verify that it is doing a good job. Otherwise, we may want to consider using one of the other available models.

The use of CAPM is a favourite because it is a simple model with only one risk factor, the underlying logic is powerful, and it is well known and widely understood.

In evaluating the effectiveness of a pricing model, we

should expect the model:

- to explain the average returns of passive portfolios;
- to explain the variances of well-diversified portfolios;
- to be consistent with economic theory; and
- to be parsimonious.

The CAPM clearly meets the last two criteria, so our evaluation can centre on the first two points. However, the CAPM does not meet the first criterion. When U.S. stocks are placed into portfolios based on their market capitalizations and book-to-market ratios, a clear relation between these variables and average returns emerges. Recall that the CAPM says nothing other than β should be related to returns. In fact, these two variables, market capitalization and book-to-market, are strongly related to returns. They explain differences in portfolio returns that the CAPM cannot.

The CAPM also fails to meet the second criterion, at least when compared to other models. As shown by Fama and French (1993), a three-factor model that explicitly controls for firm size and BtM explains the variances of portfolios better than the CAPM.

There are at least two promising alternatives to the CAPM. One is the previously mentioned three-factor model developed by Fama and French (1993). The other is the style analysis model of Sharpe (1992). While the latter model does a good job of explaining average returns and variances, it is not an asset, pricing model. It is simply a statistical model of returns. Therefore, its use for estimating expected returns and cost of capital is limited. This leaves the Fama/French model as perhaps the most promising alternative. After all, the Fama/French model is currently the most widely used model of stock returns in the academic finance literature. ■

References

- Fama, Eugene F., and Kenneth R. French, 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33, 3-56.
- Sharpe, William F., 1992, Asset allocation: Management style and performance measurement, *Journal of Portfolio Management* 18, 7-19.