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The Relative Efficiency of Various Portfolios: Some Further Evidence: Discussion

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comparing the relative efficiency of a stock portfolio to two variants of a market-weighted portfolio of bonds and stocks, there was no clear dominance, with the specific results depending upon the time period and type of analysis. With more accurate predictive distributions, the results might well have been different, but it should be noted that the procedures used in this paper to assess the predictive distributions were in the same spirit as those used in prior tests of the Sharpe-Lintner model.

A Monte Carlo analysis of the techniques used in this paper helped to put these results in perspective by showing that an investor may find it extremely difficult to ascertain differences in the relative efficiency of different risky portfolios with only 27 years of monthly data—the amount of data used in most of the tests in the paper. What all this suggests, though it does not prove it, is that prior tests of the Sharpe-Lintner model may not be as sensitive to the correct specification of the “market” portfolio as some have suggested.

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DISCUSSION

ROLF W. BANZ*: Marshall Blume’s paper is an innovative attempt to identify the optimal proxy for the market portfolio. His main interest is in the normative aspect of the question: which one of the risky portfolios examined provides the maximum amount of utility when combined with the riskfree asset? Blume calls this measure “relative efficiency.” This question is quite different from the current controversy concerning optimal market proxies. Fama [1] and Roll [3] have pointed out that a misspecification of the market portfolio can theoretically

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invalidate the results of most tests of the capital asset pricing model (henceforth CAPM) and the efficient market hypothesis. The "true" market portfolio includes all marketable assets while all proxies ignore important classes of assets. While Stambaugh [4] has shown that the results of a number of tests of the CAPM are not sensitive to the choice of a particular proxy, it is nevertheless possible that the use of other proxies, let alone the true market portfolio, could reverse the results. Blume's contribution does not deal with this question. Instead, he implicitly assumes that the true market portfolio is mean-variance efficient. If this is the case, then relative efficiency is indeed the proper criterion for the choice of a market proxy. But mean-variance efficiency of the true market portfolio is the one testable implication of the CAPM. Therefore, even if Blume finds an optimal portfolio, it does not necessarily follow that that portfolio should be used in tests of the CAPM. However, it is of considerable interest from a normative viewpoint whether it is possible to find significant differences in relative efficiency between the portfolios examined by Blume.

Blume's methodology differs from the standard approach which would use the Sharpe measure (ratio of mean returns to standard deviation of returns) to determine optimality. He uses parameter estimates based on historical returns in conjunction with a power utility function to arrive at optimal combinations of risky portfolios and the riskfree asset. He then calculates the actual amount of utility derived from holding these portfolios for one month. Repeated application of this method allows him to determine optimality directly in terms of "utils." This approach has the advantage that it allows him to take estimation risk (as defined in Klein and Bawa [2]) into account, but the results are, of course, dependent on the choice of utility function.

Blume's method requires that the distributions of portfolio returns are stationary. While this is the case for all empirical work based on historical parameter estimates, it is a particularly important assumption in this paper. The reduction of estimation risk requires the use of all information available and Blume uses up to 300 months of data for parameter estimation. A casual look at a time series of a stock index (or at Blume's Table 1) suggests that the variation of returns was considerably larger in the thirties and the seventies than in the intermediate thirty years. Using data from both high and low variation periods, we arrive at an "average" standard deviation estimate which may not be appropriate for the immediately following month. Fortunately, we can assess the severity of the problem by looking at some of Blume's results. If the time series of excess returns were relatively stable, we would expect the portfolio proportions of the risky assets to be stable through time since these optimal proportions, for a given utility function, depend only on historical mean excess returns and standard deviations. Also, if the time series were stationary and if an optimal portfolio did indeed exist, we could expect the results to become more significant as more information is utilized, i.e., for longer estimation periods.

The results of Blume's tests show clearly that nonstationarity of returns is a problem. His Table 3 shows that portfolio proportions invested in the risky portfolios change dramatically through time. We might have expected to find relatively stable proportions when 300 months of data are used for estimation

since the weight of one observation is relatively low and 25 years of data might be enough to capture the long term "average" behavior of the time series. However, it appears that the nonstationarities are severe enough to make the concept of a long term average of little, if any, value in the present context. Table 2 supports this view. The longer estimation periods lead to weaker results than the shorter ones.

What do the results tell us? To put them into their proper perspective, consider his results based on the Sharpe measure in Table 4. They show us that not a single pair of portfolios has a significant difference in Sharpe's measure for both time periods and both standard deviation estimations. It is clear that the choice of a particular estimate of the standard deviation of return is a critical input to the tests. Given the nonstationarity of the returns, this result is hardly surprising. But it also appears that the results based on Blume's method are very difficult to interpret. If investors with power utility functions use the historical parameter estimates, as inputs to Blume's method, his conclusions are correct: investors would find it very difficult to ascertain which portfolio provides superior relative efficiency. But since it is far from certain that this estimate of the standard deviation is the appropriate one, the results reflect the degree of ignorance of the investors rather than the "true" differences in relative efficiency.

There remain a few minor points to comment on. Blume's approach takes estimation risk into account. If the true return distribution is normal and we use a diffuse prior, the predictive distribution is a t -distribution (Klein and Bawa [2]). By assuming that this t -distribution can be approximated by a normal for large degrees of freedom, Blume's optimal portfolio proportions are the same as those found when estimation risk is ignored, or alternatively, he assumes that the predictive distribution is based on an infinite amount of data with sample parameters equal to the ones obtained from the actual sample.

Finally, Blume's inconclusive evidence with respect to relative efficiency has no bearing on the question concerning the correct measurement of the market portfolio. It is not possible to conclude that this controversy has "little economic content." In principle, tests using the CAPM may have very different outcomes for different market proxies (and the true market portfolio) even though we are not able to identify the optimal proxy empirically.

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