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New Tests of the APT and Their Implications: Discussion

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out this fact. Nonetheless, since the Roll and Ross methodology has found wide acceptance, we did provide in our earlier paper (Dhrymes et al. [2]) a number of results based on the Roll and Ross methodology which turn out to be nonsupportive of the implications of APT models—contrary to the assertions of Roll and Ross. In fact, results reported in this paper show that, again in the 30 security context, whether we use a 10-year time-series sample or a 20-year time-series sample, the proper (joint) test of significance for the risk premia vector rejects its nullity in, at most, 10 of 30 groups. When own (total) or residual standard deviation is introduced as an additional variable, then the hypothesis that the vector of risk premia is null is accepted by the proper (joint) test in 30 of 30 groups, i.e., uniformly for the entire sample. It is difficult to imagine a more complete rejection of the crucial implication of such APT models, using the flawed methodology of splitting the universe of assets into 30 security groups.

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DISCUSSION

ALAN KRAUS*: When asking me to discuss this paper, Irwin Friend told me he wanted me to do it because I was perceived to be neutral. I suspected then that "neutral" could be a euphemism for "uninformed"; I suspect now that I run the risk of leading you to share my earlier suspicion. To avoid that, I should immediately share with you my insight that a reading of the Dhrymes et al. paper indicates that there is some disagreement about tests of the Arbitrage Pricing Theory (APT). My comments on the Dhrymes et al. paper are related to that disagreement but I don't propose to take a side in it, here.

The Dhrymes et al. paper presents more than one kind of disagreement with APT tests by others. One aspect Dhrymes et al. stress concerns questions of how the number of factors that are significant (on the first stage) and/or are priced (on the second stage) varies with the sizes of securities groups or the length of the time series. While these questions are clearly interesting in analysis of the stochastic behavior of returns, they are less directly critical to testing the economic content of the APT. Even evidence that *no* factor is priced would not

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logically refute the APT, in exactly analogous fashion that demonstrating a zero slope for the security market line would not logically refute the CAPM. Neither theory includes the requirement that nondiversifiable risk *must* command a positive price. The crucial prediction of each theory is, instead, that *nothing other than* nondiversifiable components is priced.

Thomas Kuhn has argued that a new paradigm supplants an older when it is shown that the former accounts for observed phenomena that were anomalies in the latter. By this reasoning, the most fruitful tests of the APT would be concerned with the ability of the APT to encompass as predictable the many results that are not predictable under the CAPM: small firm effects, January effects, etc. The part of Dhrymes et al. most in keeping with this spirit is Section II, which includes out-of-sample tests of predicted risk components (factor loadings) and unpredicted risk measures (total and residual standard deviations) in explaining subsequent returns. I think the results of these tests are important evidence that must be confronted in any assessment of support for either the APT or the CAPM.

In considering the specifics of the tests in Section II, I would mention two points where improvement might be considered. The first concerns the use of daily returns as though they were serially independent. The well-known effect of bid-ask spreads in introducing negative serial correlation in returns based on daily closing prices should be allowed for in the estimation of variances for the statistical tests. The second point is that there appear to be alternative mechanisms for out-of-sample tests that are more powerful than splitting the sample in two. An example is to set aside an observation, use all other data to explain that observation, repeat this procedure for each observation successively, and analyze the resulting time series of predictions and errors.

My final observation on the debate about testing the APT through factor analysis is spurred by observing that the appearance of earlier papers on the issue by participants at this session has made their positions somewhat predictable at this stage. This emboldens me to place myself in a similar posture by pointing out that there is at least one potential, systematic risk factor that factor analysis can't capture. Since factor analysis is concerned only with factoring an estimated covariance matrix of sums of squares and cross-products, it cannot pick up the presence of systematic coskewness in returns. I have a small vested interest in the position that such a factor affects security pricing, so I feel I must register a small public lament that all APT testing so far has excluded this factor from consideration.