

In short, we posit that capital markets respond to risk as they respond to expected rates of return. We should, therefore, expect to find a structure of risk-compensated rates of return that motivate or discourage investment. Part of the earnings differentials observed among alternative investments can be attributed to risk; these are the risk premiums that compensate for differences in risk exposure.

III. EMPIRICAL RESULTS

To test the hypothesis that profits are larger for firms with greater risk exposure, it is necessary to translate the theoretical definition of risk into statistical terms.⁹ We can do this by assuming managers' anticipations, on average, are correct, thereby permitting the observed mean rate of return to be used as a proxy (Ref. 4). Risk exposure, as defined here, can then be measured by moments of the distribution of earnings.¹⁰

The risk variables were calculated from

$$\sigma_i = \left[\sum_{t=1}^n \frac{(r_{it} - \hat{r}_{it})^2}{n} \right]^{1/2} \quad (1)$$

and

$$S_i = \sum_{t=1}^n \frac{(r_{it} - \hat{r}_{it})^3}{n\sigma_i^3} \quad (2)$$

where

r_{it} = observed rate of return for firm i in year t ;

$\hat{r}_{it}$ = predicted rate of return from trend for firm i , year t ;

σ_i = standard deviation of rates of return about trend, firm i ;

S_i = skewness about trend for firm i ;

and n is the number of years included in the sample.

The model can now be stated explicitly as

$$\bar{r}_i = r_0 + b_1\sigma_i + b_2S_i \quad (3)$$

where

$\bar{r}_i$ = average rate of return on net worth for firm i ;

r_0 = intercept; and b_1 , b_2 are the coefficients of the standard deviation and skewness, respectively—the risk coefficients.

The signs of these coefficients are expected to be

$$b_1 > 0$$

$$b_2 < 0.$$

Estimates of the relationship between average rate of return and risk exposure appear in Table 1. Regressions (1) and (2) show the individual contribution of standard deviation and skewness in explaining variations in firms' average rates of return. Regression (3) combines both effects, accounting for about 15 percent of the observed variation in rates of return. The correlation coefficients

⁹ The term *profit* as used here is roughly equivalent to net business income, i.e., the difference between accounting revenues and costs. To adjust for differences in firm size, profit is usually expressed as a percentage of some base. The choice of a profit base is important for some industries. Aerospace profits, for example, when measured as a percentage of assets rather than net worth (Refs. 1, 29) differ substantially in rank compared with other groups. Among the many possible measures (Refs. 2, 15, 33), rate of return on net worth appears the most appropriate for studies of the risk-profit relationship.

¹⁰ The mean may not be an appropriate proxy for managers' anticipations if earnings are serially correlated. In such a case, earnings can be predicted from knowledge of the autoregressive structure so that computing moments about the mean would tend to overstate the firm's risk exposure. To compensate for this possibility, we adjusted each firm's earnings to remove any trend effect and then tested for autocorrelation using the Durbin-Watson statistic (Ref. 5). Evidence of positive serial correlation was found for nine of the firms, and they were removed from the sample.

Following the convention established in Refs. 4 and 30, we used standard deviation, rather than variance, as a measure of dispersion. Also, since we are concerned with the ability of firms to predict profit rates, the rates of return are unweighted. are low, but the estimates of b_1 and b_2 are statistically significant at the .01