

While there may be other variables which affect the estimated relationships between advertising and profits, the importance of both advertising variables is relatively insensitive to changes in specification of the variables and the models examined in this paper.³⁶

Significant correlations also exist between capital requirements, economies of scale, and concentration. This is not surprising, for one should expect the first two variables to have some effect on the latter. At the same time, however, concentration is influenced by other factors, such as the past record of merger activity in the industry. To examine the extent to which concentration is explained by scale economies and capital requirements, two multiple regression equations were fitted. The results, which are striking, appear in table 8.

TABLE 8.—*Multiple regression analysis—Concentration and technical entry barriers*

Concentration *	Intercept	Capital requirements (logs)	Economies of scale (logs)	Regional industry dummy variable	R ²	Corrected R ²
(1) Natural units.....	49.9	**7.08 (3.9)	**6.91 (2.6)	-11.2 (1.2)	**0.71	**0.68
(2) Logarithms.....	3.85	**0.244 (5.1)	**0.238 (3.4)	-0.294 (1.2)	**0.81	**0.79

* Four-firm concentration ratios.

Figures in parentheses are *t* values. The statistical significance of the regression coefficients is tested by means of one-tailed *t* test and of the multiple correlation coefficients by means of the *F*-ratio test.

**Indicates coefficient is statistically significant at the 99-percent level.

Absolute capital requirements, scale economies, and the local market dummy variable³⁷ together account for a substantial share in the variation in national concentration ratios. In logarithmic form, over 80 per cent of the variation is explained by these variables. What is surprising is the small share of variation left to be accounted for by other factors. With this high a degree of inter-correlation, it is understandable that the estimated coefficients for concentration are not statistically significant. The role of concentration appears closely linked to that of technical entry barriers and there is little remaining influence which is evident.³⁸

HETEROSCEDASTICITY AND WEIGHTED REGRESSIONS

An examination of the residuals from a leading equation (number 4 in table 5) revealed that heteroscedasticity is present, as small industries typically have large residuals. There are two possible reasons for this phenomenon. The smaller industries may tend to have fewer firms, so that the variance of average profit rates is larger. The smaller industries may also have smaller firms. Previous studies have indicated that the variance of profit rates among small firms is greater than among larger firms,³⁹ and this would also account for a larger variance for smaller industries.

³⁶ This result, however, does not apply to average advertising expenditures per firm, which is more strongly correlated with the other explanatory factors. As a result, its statistical significance in regression analysis appears to depend on which of the other variables are included in the estimating equation.

³⁷ The regional industry dummy variable was included because the concentration ratios are constructed on a national basis. The negative sign on the coefficient represents simply the downward bias of the national ratios in those industries.

³⁸ One should be wary of drawing any policy conclusion on the basis of this equation. Merger activity may be highly correlated with entry barriers. Furthermore, there is some element of spurious correlation between the scale economies measure and concentration. The scale economies measure used here is 0.5 times the reciprocal of the number of the largest plants required to account for one-half of industry output. It is, therefore, related to plant concentration. Since plant concentration and firm concentration may be expected to be correlated even in the absence of variations in relative scale economies, some spurious correlation exists between concentration and relative scale economies. (The authors are indebted to Joe S. Bain for the elaboration of this point.)

³⁹ Sydney S. Alexander, "The Effect of Size of Manufacturing Corporation on the Distribution of the Rate of Return, this REVIEW, XXXI (Aug. 1949), 229-235.