To determine an appropriate weighting scheme, an empirical approach was adopted. The variance of the residuals was calculated for successive quartiles in the distribution of industry sales. From this tabulation, it was clear that the use of industry sales is inappropriate as a weighting variable as it would give too much emphasis to the largest industries. The square root of sales, however, is nearly proportional to the variance of the residuals, and was therefore chosen as the weighting variable.

The weighted regressions were fitted both for all industries, and for all industries except motor vehicles, as this industry is an outlying observation with respect to some of the variables, including the weighting variable. The results appear in tables 9 and 10. As is clear, the R^2 of each of the weighted regressions is considerably higher than the R^2 of its unweighted counterpart. This is to be expected, since the weighting procedure deliberately emphasizes industries with smaller residuals and the R^2 measures the proportion of the weighted variance of the dependent variable explained by the regression equation. Another way of looking at this is that weighting essentially involves multiplying the equation by the root of the weights (in this case by the fourth root of sales) and proceeding by ordinary least squares. The R^2 indicates the success at predicting profit rates multiplied by the fourth root of sales.[40]

The results are impressive. About 75 percent of the weighted variance across all industries is accounted for by these equations and about 65 percent of the weighted variance is explained when the outlying auto industry is excluded.

TABLE 9.—*Weighted regressions with advertising sales ratio*

	Intercept	High advertising-sales ratio	Capital requirements (logs)	Economies of scale (logs)	Growth of demand (logs)	Concentration ratio	Regional industry dummy variable	R^2	Corrected R^2
(1) a. All industries	0.040	*0.29 (1.9)	**0.013 (4.8)		0.0084 (1.0)		**0.028 (1.9)	**0.76	**0.72
b. Motor vehicles excluded	0.045	**0.44 (3.1)	*0.0077 (2.4)		0.0096 (1.3)		0.020 (1.4)	**0.67	**0.62
(2) a. All industries	0.066	*0.28 (1.8)	**0.010 (3.1)	0.0046 (0.9)	0.0096 (1.1)			**0.75	**0.71
b. Motor vehicles excluded	0.074	**0.42 (2.8)	0.0040 (1.2)	0.0052 (1.2)	0.011 (1.4)			**0.67	**0.62
(3) a. All industries	0.040	*0.29 (1.9)	*0.014 (2.4)		0.0081 (0.9)	−0.00003 (0.08)	*0.028 (1.8)	**0.76	**0.72
b. Motor vehicles excluded	0.047	**0.43 (2.9)	0.0090 (1.6)		0.0088 (1.1)	−0.00011 (0.3)	0.021 (1.4)	**0.67	**0.61

* Indicates coefficient is statistically significant at the 95-percent level.
** Indicates coefficient is statistically significant at the 99-percent level.

NOTE.—Figures in parentheses are t values.

The high advertising barrier dummy variable and the advertising-sales ratio variable are introduced alternatively. The former is significant at the 99 per cent level in all equations, the latter at the 95 per cent level when the auto industry is included, at the 99 per cent level otherwise. The collinearity between capital requirements, economices of scale and concentration is again evident, but in contrast to the unweighted regressions, the economies of scale variable is sometimes significant when introduced alongside capital requirements (and the latter variable is sometimes insignificant).

[40] It is important to note that the increase in R^2 is no indication that the weighting used is the correct one. Indeed, a very high R^2 can be obtained by weighting with industry sales, which is clearly inappropriate. A subsequent test, moreover, was made on the extent of heteroscedasticity in the weighted regressions. The residuals from equation 1a in table 10 were calculated and the successive variances of these residuals were compared with the mean root sales in the relevant quartile. The fact that the two variables were nearly proportional provides some confirmation of the use of the square root of sales as the weighting variable.