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Market Structure and Market Value*

After allowing for the intangible capital or "left-out-asset" effects of R & D and advertising and for the effects of growth, no consistent link between traditional market structure variables and market-value-based estimates of economic profits is obvious. Apparently, market structure data are not an attractive proxy for market power. This finding disputes traditional Cournovian and Chamberlinian theory but is consistent with the "contestable markets" literature suggestion that there may be no simple relation between the number and/or relative size of firms and competition.

I. Introduction

While the use of market models to determine the sources of economic profits is quite new, at least two empirical studies considering the market structure and market value relation have appeared to date. Interestingly, they conflict. Thomadakis (1977) found a close positive relation between the four-firm concentration ratio and relative excess valuation, measured as the difference between the market value of the firm and the book value of tangible assets, all normalized by sales. As a result, Thomadakis argued that "industry concentration plays a role in the determination of excess profits from currently held assets and those expected from the firm's investment options" (p. 185). In contrast, Lindenberg and Ross (1981) reported no significant relation between concentration and Tobin's Q ratio, measured as the ratio of the market value of the firm to the replacement cost of tangible assets. This result disputes Thomadakis's findings and a purely structuralist interpretation of economic profits. According to Lindenberg and Ross, market power may or may not be evident in highly concentrated markets since "high Q's can occur in concentrated or unconcentrated markets and, conversely, low Q's, indicating no significant market power, can occur in markets that have high degrees of concentration" (p. 28).

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The purpose of this paper is to reconsider the market structure and market value relation in order to resolve this conflict which has emerged in the literature.

II. Oligopoly Theory

In the Cournot (1838) model, each oligopolist identifies a profit-maximizing activity level based on the assumption each rival will maintain current output. Then, in an interactive process, each rival adjusts output until there is no further incentive for change. In equilibrium, price and firm number will be inversely related. Cournot's theory thus predicts a positive relation between leading firm market share and profits and/or relative firm size and profits. However, the Cournot model is often criticized as naive since it depends on the myopic assumption of exogenously determined rival output in the face of repeated evidence to the contrary. Imel and Helmberger (1971), for example, argue that a relative firm size–profits relation reflects "progressiveness" and "good management." This explanation of market structure–profits relations, based on leading firm efficiency rather than monopoly power, has received further support in studies by Demsetz (1973) and Peltzman (1977), among others. Therefore, questions concerning market share–profits and relative firm size–profits relations remain open and controversial on the basis of both fact and interpretation.

A second line of argument that predicted a market sructure–profits relation was offered by Chamberlin (1933). Chamberlin argued that as firms become "few" in number, interdependence becomes recognized, and tacit or explicit collusion becomes effective. The equilibrium price is one which maximizes joint profits and corresponds to the monopoly price—that is, so long as interdependence is realized. If numbers become so large that individual reactions are no longer expected, collusion breaks down and the competitive result is obtained. Thus, based on a "leading firm collusion" argument, the Chamberlin model predicts a concentration-profits relation. This prediction has motivated an extensive tradition of market structure–performance studies (see Scherer 1980).

These views of a strong market structure–profits relation contrast sharply with alternative theory, which suggets no necessary link between the number and/or size distribution of rivals and industry performance. Bertrand (1883) argues that each oligopolist will set price on the assumption of exogenously determined rival prices. Then, in an iterative process, each rival cuts price to capture the market share of rivals. After a period of adjustment, prices converge to competitive equilibrium norms. Thus, Bertrand predicts no necessary relation between the number and/or relative size of firms and competition. Although Bertrand's behavioral postulates are implausible for much the same

reason as those of Cournot, in recent years the central result of his theory seems to be gaining acceptance among economists.

Indeed, the recent "contestable markets" literature can be viewed as an elegant restatement and extension of Bertrand's theory. Baumol (1982) writes that "once each product obtains a second producer, that is once we enter the domain of duopoly or oligopoly for each and every good, [price-output] choice disappears. The contestable oligopoly which achieves an equilibrium that immunizes it from the incursions of entrants has only one pricing option—it must set its price exactly *equal* to marginal cost and do *all* of the things required for a first best optimum! In short, once we leave the world of pure or partial monopoly, any contestable market must behave ideally in every respect. Optimality is *not* approached gradually as the number of firms supplying a commodity grows" (p. 2).

In other words, the Bertrand-Baumol view of oligopoly rejects the hypothesis of a relation of profits to market structure that is asserted by the other writers mentioned. To test these competing hypotheses, we shall study the effects of three market structure variables (market share, relative firm size, and concentration) on profits. But in order to do this, it is necessary to address certain methodological issues.

III. The Model

It has become traditional to consider the market structure–profits relation using four-firm concentration and accounting profits data. As described above, the use of concentration data is quite consistent with a shared monopoly, or Chamberlin, view. On the other hand, a test of Cournot theory requires an analysis of market share or relative firm size data. Thus, tests of market structure–profits relations are not neutral with respect to the market structure measure analyzed.

The use of accounting profit data also involves problems since these data are before risk adjustment and are influenced by accounting treatments which, for some types of expenditures, can diverge from economic reality. Beginning with Telser (1961), many economists have viewed advertising "as a capital good that depreciates over time and needs maintenance and repair" (p. 197). Similarly, Weiss (1969) has suggested that research and development "yield(s) benefits mainly in the future" (p. 42). Recent empirical studies on both R & D (Hirschey 1982) and advertising (Demsetz 1979; Ayanian 1983) provide strong support for this "intangible capital" argument and suggest that treating these items as current expenses will give a bias to accounting profit rates whenever advertising and R & D are significant.[1] Since both

1. Both Telser and Weiss have also suggested that firm-specific human capital can contribute to a left-out-asset effect. Indeed, it seems likely that intangible capital effects of advertising and R & D relate partly to the value created by a synergistic marketing staff or research team.

theory and evidence indicate advertising and R & D will be substantial in the case of oligopoly (Kamien and Schwartz 1975; Comanor and Wilson 1979), the "left-out-asset" effect can seriously bias estimates of the relation of market structure to profits when profits are measured using accounting data.

A compelling virtue of an approach based on the market value of the firm is that such an approach minimizes the effect of accounting bias. The market value of the firm can be viewed as the risk-adjusted present value of all future profits and has the following major components:

$$MV(F) = MV(T) + MV(I), \tag{1}$$

where $MV(F)$ is market value of the firm and $MV(T)$ and $MV(I)$ are the capitalized values of profits attributable to tangible and intangible assets, respectively.

Although $MV(F)$ is observable, subcomponents $MV(T)$ and $MV(I)$ are not. Nevertheless, accounting book values and replacement cost values can be viewed as useful, though imperfect, measures of the market value of tangible assets. By using such accounting data it is possible to isolate the market value effects of tangible assets from any additional influences of intangible assets such as market power, patents, brand loyalty, goodwill, and so on.

In a first approach along these lines, Thomadakis introduced a measure called relative excess valuation, EV/S, where

$$\frac{EV}{S} = \frac{MV(F) - BV(T)}{S}, \tag{2}$$

and $BV(T)$ is the book value of tangible assets and S is sales.[2] When $EV/S > 0$, market value reflects valuable intangible assets not reflected in book value data, perhaps including market structure influences. Since $MV(T) = BV(T) +$ error (e),

$$EV/S = \frac{MV(I)}{S} + e_1, \tag{3}$$

$$= f_1(X) + e_1,$$

where X includes variables describing market structure and other potential sources of intangible capital.

A second approach, proposed by Lindenberg and Ross, involves using a measure commonly referred to as the "Q ratio," where

2. Relative excess valuation can be thought of as the market value analogue to the return on sales or Lerner index of economic profits. The Lerner index is defined as $L = (P - MC)/P$, where P is price and MC is marginal cost. Under pure competition, $P = MC$ and $L = 0$. The more a firm's pricing departs from the competitive norm, the greater will be L. In empirical research, the equilibrium condition $MC = AC$ (average cost) is often assumed, and $\hat{L} = (P - AC)/P =$ return on sales (see Scherer).

$$Q = \frac{MV(F)}{RC(T)}, \tag{4}$$

and $RC(T)$ is the replacement cost of tangible assets (see Tobin 1978). When $Q > 1$, market value reflects valuable intangible assets not reflected in replacement cost data. Since $MV(T) = RC(T) + \text{error}\ (e)$,

$$Q = 1 + \frac{MV(I)}{MV(T)} + e_2, \tag{5}$$

$$= f_2(X) + e_2,$$

where X is market structure and other additional factors which may influence Q.

Analyses of the market value–market structure relation could be based on either of the *EV/S* or Q approaches. *EV/S*, calculated from historical cost data, has the attractive feature of being normalized by sales—a factor- and leverage-neutral measure that is easily calculated. However, this measure is more likely than Q to be subject to "replacement cost" errors because Q is calculated using replacement cost data. However, because it is normalized by the replacement cost of tangible assets, cross-firm differences in Q can be caused by variations in capital intensity and leverage. Thus, despite the high correlation between *EV/S* and Q, reported by Hirschey and Wichern (1984), it is possible that the conflict between Thomadakis's findings and those reported by Lindenberg and Ross could be the result of the (remaining) variation between these two variables. Accordingly, we shall consider the effects of market structure (as well as the effects of other potentially relevant variables) variables on both *EV/S* and Q.

To the extent that high levels of market share, relative firm size, and concentration indicate an ability to restrict output (i.e., reflect market power), they can lead to above-normal rates of return on investment. However, if investors perceive the presence of lasting market power, the value of the firm will be bid up so that investors receive, ex post, only a risk-adjusted normal rate of return. Thus, positive market structure effects on *EV/S* and Q will be observed only if traditional market structure data indicate sustainable market power, and otherwise not.

Other variables may similarly affect market value of equity. For example, both R & D and advertising will also have market value effects if these expenditures have asset-like characteristics. Another example: anticipated growth will have a positive effect on market values if future investments are expected to earn above-normal rates of return and if such growth is an important determinant of these returns (Miller and Modigliani 1961). Finally, while growth affects the magnitude of anticipated excess returns, a valuation influence may be associated with the degree of stability such returns exhibit. It is generally

accepted that greater riskiness of a stream of future excess returns will reduce the market value of that stream, expected values unchanged.

These remarks suggest a model where

$$Y_i = f(MP_j, \text{R \& D}/S, AD/S, GR, B), \tag{6}$$

and which, in linear form, is written

$$Y_i = b_0 + b_1 MP_j + b_2 \text{R \& D}/S + b_3 AD/S + b_4 GR + b_5 B + u, \tag{7}$$

and Y_i is EV/S or Q; MP_j is the jth market structure proxy for market power (market share, MS, relative firm size, MS/CR, or concentration, CR); R & D/S is R & D intensity; AD/S is advertising intensity; GR is growth; and B is the stock-price beta measure of risk.

IV. Estimation

Before considering the estimation of (7) in detail, let us see how the various market structure proxies (market share, MS; relative firm size, MS/CR; and concentration, CR), together with growth and risk variables, perform on our sample in the absence of variables reflecting R & D and advertising. The estimates are presented in table 1 and are based on a $N = 390$ firm sample from the 1977 *Fortune* 500.[3] (These are all 1977 *Fortune* companies for which a complete set of data could be obtained.) An interesting feature of the results is that they replicate

3. The market value of the firm is measured by the market value of common stock plus the book value of debt. Ideally, the market value of each would have been included. However, the market value of debt is difficult to obtain, and this second best measure of market value is a good approximation. Components used to estimate the market value of common stock, number of shares and closing prices (12/31/77), were obtained from Standard & Poor's Compustat tapes. The book value of debt was calculated using *Fortune* data. Q is calculated as the ratio of the market value of the firm to the replacement cost of tangible assets. EV/S is calculated as the difference between the market value of the firm and the book value of tangible assets, all divided by sales. Alternatively EV/S can be viewed as the difference between the market value of common and stockholders' equity, all normalized by sales. Replacement cost data were obtained from annual 10-K reports to the Securities and Exchange Commission, whereas sales and the (historical cost) book value of tangible assets data were obtained from *Fortune*. Concentration ratios and market share data weighted to reflect firm sales in various four-digit census industries were originally compiled by Economic Information Systems, Inc., and generously made available to this study by Kenneth M. Harlan. See Hirschey (1982) for a detailed description. R & D expenditures were obtained from *Business Week*, and all advertising data had *Leading National Advertisers* as its source. If amortization of the evaporation (exponential) type and constant expenditure growth can be assumed, intangible capital levels will be strictly proportionate to these annual expenditure rates. Weiss reported empirical support for these assumptions, thereby allowing us to consider annual expenditure effects as indicative of intangible capital influences. Growth is defined as the average annual rate of growth in sales over the 1972–77 period. Finally, stock price betas estimated from 60 observations of monthly data were obtained from *Value Line*.

TABLE 1 **Simple Structural Models** ($N = 390$)

	Dependent Variable Is *EV/S*			Dependent Variable Is Q		
Constant	−.238	−.270	−.265	.371	.360	.371
	(−2.48)	(−3.04)	(−2.94)	(3.31)	(3.47)	(3.52)
MS	.532	...	...	.531	...	...
	(2.45)			(2.09)		
MS/CR	...	.202	...	...	.177	...
		(1.83)			(1.37)	
CR	...	...	.043	...	...	.097
			(.41)			(.80)
GR	1.247	1.277	1.289	1.315	1.354	1.362
	(5.36)	(5.54)	(5.57)	(4.85)	(5.03)	(5.03)
B	.104	.112	.110	.258	.268	.266
	(1.31)	(1.42)	(1.40)	(2.79)	(2.91)	(2.88)
R^2	.078	.092	.086	.085	.093	.087
F	10.89	12.89	12.11	11.95	13.05	12.26

NOTE.—*t*-statistics in parentheses.

some earlier findings from well-known studies that used market structure and unadjusted accounting profit rate data.

1. As in Kwoka (1979), a close link between market share and profitability is suggested which, in Kwoka's words, "implies that the distribution of market shares is a far more important—and complex—determinant of industry performance than previously recognized" (p. 108).

2. As in Imel and Helmberger, a positive influence of relative firm size suggests the importance of "progressiveness" and "good management."

3. Like Strickland and Weiss (1976), we find only a small (statistically insignificant) positive effect of concentration on profitability. This is consistent with Lindenberg and Ross's results but conflicts with Thomadakis's findings. Thus, the possibility of sampling bias in the Thomadakis study is raised.[4] However, it is worth noting that since neither value-based study (Lindenberg and Ross, Thomadakis) considered the valuation effects of market share or relative firm size, some model specification error may be present in each. Specifically, the much lower levels of overall explanatory power in table 1 (as compared with table 2) and the high *t*-values of the R & D/*S* and *AD/S* values suggest that equations omitting these two variables are misspecified.

4. Thomadakis analyzed 158 *Fortune* companies taken from a sample studied earlier by Shepherd (1972). Exclusions were made for several reasons, including a high degree of internal diversification. While eliminating diversified firms provides a better matching between firm- and industry-level data, it also causes many nonleading (diversified) firms to be eliminated from consideration. *Fortune* companies are large by definition, and if undiversified they tend to be industry leaders. Thus, the positive concentration "effect" on profits noted by Thomadakis (1977) may simply reflect a close link between his concentration variable and leading firm market share.

TABLE 2 **Market Structure and Market Value** ($N = 390$)

	Dependent Variable Is *EV/S*			Dependent Variable Is Q		
Constant	−.040	−.133	−.148	.566	.492	.481
	(−.46)	(−1.68)	(−1.83)	(5.57)	(5.25)	(5.10)
MS	.030	...	...	−.080	...	...
	(.15)			(−.35)		
MS/CR	...	.077	...	...	.017	...
		(.79)			(.15)	
CR	...	...	−.219	...	...	−.194
			(−2.37)			(−1.78)
R & D/*S*	6.814	6.406	6.400	7.067	6.763	6.716
	(9.40)	(8.86)	(8.94)	(8.27)	(8.00)	(8.03)
AD/S	5.553	5.338	5.268	7.553	7.460	7.366
	(6.32)	(5.94)	(5.43)	(7.34)	(7.11)	(7.09)
GR	1.113	1.086	1.098	1.183	1.153	1.161
	(5.53)	(5.36)	(5.41)	(5.01)	(4.87)	(4.89)
B	−.085	−.079	−.078	.069	.071	.074
	(−1.18)	(−1.09)	(−1.07)	(.82)	(.84)	(.87)
R^2	.317	.307	.308	.315	.310	.309
F	35.65	34.02	34.18	35.32	34.50	34.34

NOTE.—*t*-statistics in parentheses.

The results from estimating equation (7) on all right-hand-side variables are presented in table 2. In terms of both significant individual coefficients and overall explanatory power, market value seems much more closely related to R & D, advertising intensity, and growth than to variables reflecting the size distribution of firms. Indeed, one might argue that previous uncertainty as to the economic importance of various market structure variables has been caused, at least in part, by failure adequately to consider the influence of R & D and advertising.

Moreover, our results show that while the independent effects of both market share and relative firm size are statistically insignificant, the effect of concentration on market value is (surprisingly) negative and "modestly" significant. This suggests that the market share–profits link reported in some earlier studies may be due to rapid leading firm growth caused by superior efficiency rather than by monopoly power. It is worth noting that a negative concentration-profits link has also appeared in recent studies of line-of-business data by Martin and Ravenscraft (1982) and Ravenscraft (1983). In these studies, both models and data are markedly different from those employed here. Clearly, the overall results suggest that simple structural theories of economic profits are incomplete at best and possibly plain wrong.

V. Summary

This paper provides new evidence on the relation of (product) market structure to market value of equity. By using market value of equity as

a measure of economic performance, we avoid well-known problems arising from the measurement of profits from accounting records. After allowing for the effects of growth and intangible capital ("left-out" asset effects of R & D and advertising), no consistent link between traditional market structure variables and market value of equity was detected. Neither market share nor relative firm size had any discernible influence on value of equity, and the effect of concentration was negative and, arguably, of statistical significance on conventional criteria.

These results suggest that cross-industry differences in profits are not positively related to market structure. No simple relation between the number and/or relative size of firms and profits has been found. Conventional characterizations of market structure do not reflect "market power," even approximately.

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