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MARKET, FIRM, AND ECONOMIC PERFORMANCE:

AN EMPIRICAL ANALYSIS

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MARKET, FIRM, AND ECONOMIC PERFORMANCE:

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ABSTRACT

This paper reports the results of a test of structural model of profitability, market structure, firm structure, and expenditures on sales efforts. The test is carried out at the divisional level, using the Line of Business sample.

It is shown that profitability acts as a signal for resource reallocation, within markets and within firms. Although market share has a significant positive impact on profitability, this is not the case for market concentration. Nonprice competition - sales efforts, research and development - are seen to have significant impacts on performance, especially when price competition is strong. The internal organization of the firm is shown to have a significant impact on performance. There is evidence of the exercise of countervailing power from the supply side; the opposite appears to be the case for the demand side of the market.

I. INTRODUCTION

The major purpose of this study is the development and estimation of a structural model of industrial organization for the American manufacturing sector. Subject to this overriding concern, we pursue two primary goals and one subsidiary goal.

This study is one of a number of early projects[1] fortunate enough to have access to data generated by the Federal Trade Commission's Line of Business Program. Although this data base is relatively unfamiliar to students of industrial organization, it offers a rich source of information about American industry.

Our first goal is to carry out this study in a way which will facilitate the exploration of the properties of the LB data base. To the extent that LB data is similar to (but less aggregated than) familiar data, we have adopted specifications which are similar to those commonly employed by students of industrial organization. Our measure of profitability is comparable to the familiar price-cost margin;[2] our measure of advertising is the ratio of expenditures on advertising to sales. Novel results, if any, reflect new data and not novel specifications.

At the same time, the LB Program generates a good deal of data which is unique, at least among data sources describing the whole range of manufacturing industry. This is particularly true with respect to data describing the internal organization of firms. Our second goal is to formulate a model of industrial organization which will take advantage of the unique characteristics of the LB data base to examine issues which researchers have been unable to approach on a cross-section basis.

A growing literature (Strickland and Weiss [1976]; Pugel [1978]; Martin [1979a,b; 1982a,b]; Caves, Porter, and Spence [1980]) argues that industrial structure-conduct-performance relations are intrinsically simultaneous in nature. A methodological goal of this project is to take account of this simultaneity in formulating and estimating our structural model of industrial organization.

Section II, which develops our model, has three related parts. In Part A we present a theoretical analysis of the pricing and advertising decisions of a multimarket firm. Part B interprets the model and relates it to the structural equations which are to be estimated. Part C, which describes the specification of variables, contains an extensive literature review and discussion of specific hypotheses to be tested. Section III reports our empirical results. Section IV offers a summary and concluding comments.

II. MODEL SPECIFICATION

A. A Formal Model

Outline

Oligopoly theory has provided the foundation for most empirical studies of industrial organization. We begin with the theory of monopolistic competition, although a place for oligopolistic behavior will eventually be found.

Products of different producers are almost always differentiated to some extent. Even where product characteristics are relatively standardized, the package of goods and services purchased by customers will vary depending on the source of supply. Outlet location, accompanying services, and distribution channels will all vary from supplier to supplier. In a world of firms which operate in many industries, suppliers within any one industry will be components of organizations with differing characteristics; this also differentiates products taken from different suppliers. So long as there are search costs which must be borne by customers seeking alternative sources of supply, each firm will have a pool of customers - a demand curve - which within limits it can call its own. Monopolistic competition will provide a suitable framework to analyze behavior in such a world.

Price

We begin with a discussion of a firm which produces just one product. We suppose that the firm recognizes a demand curve, $f(p_t)$, describing the maximum amount the firm could sell in one time period as a function of the price the firm sets in that period.

We do not assume that all firms which produce competing products perceive the same potential market. Each firm has an estimate of the maximum amount which would be demanded, for the combination of product characteristics and services which it offers, at different prices. Different combinations of product characteristics and services will attract different pools of customers.[3]

We suppose that in period t the firm has a fraction s_t of its own potential market; the quantity the firm sells in period t is then

$$q_t = (1 + g)^t s_t f(p_t) \quad (1)$$

where g is the rate of growth of demand. To simplify the analysis, we assume that the firm selects one price which it announces it will charge in all periods ($p_t = p$ for all t).[4] In a world of uncertainty, such a decision would in fact be updated periodically.

The firm's share adjusts over time in response to the price announced by the firm. We assume that

$$s_{t+1} - s_t = \frac{k_1 G(p - \bar{p})}{(1 + \delta)^t}, \quad t = 0,1,2,\ldots, \tag{2}$$

where $G(0) = 0$, $G'(\cdot) < 0$, and s_0 is given.[5] The parameter $\bar{p}$ is a kind of limit price. When the firm announces a price above $\bar{p}$, its share declines in each successive period (although the change declines by a factor $1 + \delta > 1$ in each period). When $p > \bar{p}$, either new supplies of similar products are offered or customers turn to suppliers who offer different combinations of product characteristics and services. In the tradition of limit price models, we take $\bar{p}$ as given. It is clear, however, that in a complete model $\bar{p}$ would depend on the prices, product characteristics, and services offered by competing suppliers, as well as the magnitude of search costs.

The parameter k_1 (which eventually assumes an important role) governs the rate of response of share to price. We assume that k_1 and G are such that share always remains between zero and one.

The similarity of this model to those of Gaskins (1971) is obvious. Because we begin with the theory of monopolistic competition, we need not identify our supplier as a dominant firm, and we do not explicitly model a "fringe" of rival producers.

The firm's problem is to select a price p to maximize

$$\sum_{t=0}^{\infty} (1 + r)^{-t}(p - c)q_t \tag{3}$$

where c is the constant average and marginal cost of production and

$$q_t = (1 + g)^t s_t f(p) \qquad t = 0,1,2,... \tag{4}$$

with s_0 given and subject to equation (2).

The assumption that the firm selects one price which it announces for all future periods eliminates much of the mathematical complexity usually associated with intertemporal optimization problems, without changing the essential nature of the results. Substituting (4) into (3), the firm's problem becomes the selection of p to maximize

$$(p - c)f(p) \sum_{t=0}^{\infty} \left(\frac{1 + g}{1 + r}\right)^t s_t \quad . \tag{5}$$

From equation (2), it is easy to show that

$$s_t = s_0 + k_1 G(p - \bar{p}) \frac{1 + \delta}{\delta}\left[1 - \frac{1}{(1 + \delta)^t}\right] \quad . \tag{6}$$

It can then be shown that

$$\sum_{t=0}^{\infty} \left(\frac{1 + g}{1 + r}\right)^t s_t = \frac{1 + r}{r - g}[s_0 + k_2 G(p - \bar{p})] \tag{7}$$

where

$$k_2 = \frac{(1 + \delta)(1 + g)}{r + \delta + \delta r - g} k_1 \quad . \tag{8}$$

Thus the firm selects p to maximize

(9) $$\frac{1 + r}{r - g}(p - c)f(p)[s_0 + k_2G(p - \bar{p})] \quad .$$

The optimal price will satisfy the following condition:

(10) $$p + \frac{f(p)}{f'(p)} = c - \frac{(p - c)k_2G'(p - \bar{p})}{s_0 + k_2G(p - \bar{p})}\frac{f(p)}{f'(p)} < c \quad .$$

As expected, marginal revenue is held below marginal cost because of the present discounted value of future losses of market share engendered by a marginal increase in price. It is then a straightforward but tedious exercise in comparative statics to establish from the first order condition that

(11) $$\frac{\partial p}{\partial k_2} < 0 \quad .$$

From equation (8) and (11), we can easily show that

(12a) $$\frac{\partial p}{\partial k_1} < 0 \quad .$$

(12b) $$\frac{\partial p}{\partial \delta} > 0 \quad .$$

(12c) $$\frac{\partial p}{\partial g} < 0 \quad .$$

(12d) $$\frac{\partial p}{\partial r} > 0 \quad .$$

Hence increases in either the rate at which the impact of price on share declines (δ) or the rate at which future losses of share are discounted (r) increase price. In contrast, increases in the growth rate of demand (which increase the loss of sales corresponding to any loss of share) and increases in the sensitivity of share to price (k_1) decrease price.

Because

$$\frac{\partial}{\partial p}\left(\frac{p - c}{p}\right) = \frac{c}{p^2} > 0 \quad , \tag{13}$$

the comparative static effects given by the equations (12) for price carry over to profitability as measured by the price-cost margin.

Price and Advertising[6]

We now suppose that the firm has an additional control variable, which we will call advertising. It will be clear that a similar analysis could be carried out for other strategic variables of the firm which influence demand (such as non-advertising expenditures to promote sales or product-differentiating research and development).

Suppose that both the potential market of the firm and the rate at which the firm's share of that market changes depend on current advertising:

$$q_t = (1 + g)^t s_t f(p, A) \tag{14}$$

$$s_{t+1} - s_t = \frac{k_1 G(A, p - \bar{p})}{(1 + \delta)^t} \quad . \tag{15}$$

We assume $f_p < 0$ and $f_A > 0$. In addition, we take $G(A,0) = 0$, $G_A > 0$ and $G_p < 0$. If $p < \bar{p}$, so that $G > 0$ and the firm is gaining share, then advertising increases the rate at which share is gained. If $p > \bar{p}$, so that $G < 0$ and the firm is losing share, than advertising decreases the rate at which share is lost. For simplicity, we suppose that the firm selects one price level and one advertising level for all future periods.

The firm acts to maximize

$$(16) \qquad \sum_{t=0}^{\infty}(1 + r)^{-t}[(p - c)q_t - p_t^A A]$$

subject to (14) and (15) (where p_t^A is the price of advertising in period t). It is straightforward but tedious to show that the firm acts to maximize

$$(17) \qquad \frac{1 + r}{r - g}(p - c)f(p,A)[s_0 + k_2 G(A,p - \bar{p})] - A \sum_{t=0}^{\infty}(1 + r)^{-t}p_t^A \quad ,$$

where k_2 is given by equation (8).

The first order condition for maximization with respect to price is

$$(18) \qquad p + \frac{f(p,A)}{f_p(p,A)} = c - \frac{(p - c)k_2 G_p(A,p - \bar{p})}{s_0 + k_2 G(A,p - \bar{p})} \frac{f(p,A)}{f_p(p,A)}$$

which may be compared to equation (10). The first order condition for maximization with respect to advertising may be written

$$(19) \qquad [\sum_{t=0}^{\infty}(1 + r)^{-t}p_t^A]\frac{A}{pf} = \frac{1 + r}{r - g}(\frac{p - c}{p})[\varepsilon_{f,A}(s_0 + k_2 G) + \varepsilon_{G,A}k_2 G] \quad .$$

where $\varepsilon_{f,A}$ is the elasticity of demand with respect to advertising, $\varepsilon_{G,A}$ is the elasticity of G with respect to advertising, and arguments have been omitted for compactness. The left hand side of (19) corresponds to the advertising-sales ratio in the conventional Dorfman-Steiner formulation. The right hand side consists of two terms, one involving the elasticity of demand with respect to advertising and the other the elasticity of the rate of share response with respect to advertising. The assumption that $G_A > 0$ insures that the second right hand side term is positive. When advertising reduces the rate at which share is lost, firms will advertise more intensely on that account than they otherwise would.

The Multi-Product Firm

We now extend the above model to the case of a firm which produces a number (N) of distinct commodities. Such a firm will possess a number of common assets (brand name; R & D program; corporate management team) which will be allocated among the divisions of the firm to maximize overall profit. Suppose that the present discounted value of firm profit on product i is

$$(20) \qquad \pi_i = \sum_{t=0}^{\infty}(1 + r)^{-t}\{[p_i - c(\alpha_i)]q_{it} - p_t^A A\}$$

where

(21) $$q_{it} = (1 + g_i)^t s_{it} f(p_i, A_i)$$

and

(22) $$s_{i,t+1} - s_{it} = \frac{k_{1i} G_i (A_i, p_i - \overline{p}_i)}{(1 + \delta_i)^t}$$

and s_{i0} is given. The index i now refers to the firm's production of product i. The parameter α_i is an index of the allocation of the (tangible and intangible) common assets of the firm to the production of good i. We assume that $c_i'(\alpha_i) < 0$. For simplicity, we suppose that the firm makes a once and for all allocation of such resources.

The overall profit maximization decision of the firm is then to select a vector of prices $(p_1, p_2, \ldots, p_N)$, a vector of advertising levels $(A_1, A_2, \ldots, A_N)$, and an allocation of common assets $(\alpha_1, \alpha_2, \ldots, \alpha_N)$ to maximize

(23) $$\pi = \sum_{i=1}^{N} \pi_i - C(\alpha_1 + \alpha_2 + \ldots + \alpha_N) \quad ,$$

where $C(\cdot)$ is the cost of the common assets of the firm. We suppose that $C' > 0$ and $C'' > 0$.

By solving equation (22) recursively for product i share, substituting that expression into equation (21), and substituting that expression into equation (20), we obtain an expression for π_i which, except for the presence of the subscript i, is identical to (17). The firm acts to maximize

$$\pi = (1 + r)\sum_{i=1}^{N}\frac{1}{r - g_i}\{[p_i - c_i(\alpha_i)]f(p_i,A_i)[s_{i0} + k_{2i}G(A_i,p_i - \bar{p}_i)] \tag{24}$$

$$- A_i \sum_{t=0}^{\infty}(1 + r)^{-t}p_t^A\}$$

$$- C(\alpha_1 + \alpha_2 + \ldots + \alpha_N) \quad .$$

The first order conditions for each price and advertising variable will have the forms of (18) and (19), respectively, with appropriate subscripting. The first order conditions for common assets to product i will require the firm to allocate common assets to industry i until the present discounted value of the marginal reduction in average cost for product i equals the marginal cost of common assets.

B. Interpretation

Our simplest model - of a one product firm with one control variable (price) - provides the most clearcut comparative static results (equations (12)). From the point of view of empirical testing, the critical parameter is k_1, which governs the rate at which share erodes in response to a particular price level. Any industry or firm characteristic which reduces the sensitivity of share to price will increase the optimal price and price-cost margin. We will use this argument to justify the inclusion of a number of variables describing firm and industry characteristics in the structural equation which we specify in explanation of profitability.

The comparative static implications of the price-advertising and multiproduct models are ambiguous (and for that reason are not presented). This ambiguity arises on two distinct levels. The first involves certain partial derivatives (for example, $\frac{\partial A}{\partial k_1}$) in the specific models which have been written down. Many of these derivatives cannot be signed in general. This problem is typical of theoretical models of advertising in particular and industrial organization in general. As indicated in a recent survey (Comanor and Wilson [1979, p. 457]):

> While these theoretical models are important for their explanations of how advertising might work, it is evident that no consensus has developed. At the end of this discussion as at the beginning, much depends on the effect of advertising on demand elasticities, and there appears to be no general rule. There are plausible models on both sides of the issue, so that any resolution of this controversy depends on the empirical evidence.

There is, however, a deeper ambiguity, which goes beyond arguments about the signs of particular derivatives to the robustness of results across models. For example, it is a clear implication of Dorfman-Steiner type models that the relationship between advertising and profitability will be positive (Schmalensee [1972, pp. 20-43]); this includes equation (19). But a very reasonable generalization of the basic Dorfman-Steiner model by Cubbin [1981] suggests that lower entry barriers, which would imply lower profitability, may increase the optimal advertising-sales ratio. This indicates a possible negative relationship between profitability and sales efforts. In a narrow sense, this affects our expectations concerning one aspect of the simultaneous structure-performance relationship. From a methodological perspective, however, it suggests that we maintain a sense of skepticism concerning the predictions of particular models, even if those predictions are unambiguous in the context of the models which generate them.

With this in mind, we outline below a simultaneous equations model designed to test the relationships inherent in the theoretical discussion of Section II-A. But where the literature is ambiguous, or suggests that those models are limited, we have attempted to fairly present arguments on all sides. Like Comanor and Wilson, we argue that the resolution of many of the research questions of industrial organization will depend on the empirical evidence. Like Samuelson [1964, p. 340], we argue that[7]

> ...the first duty of an economist is to describe correctly what is out there: a valid description without a deeper explanation is worth a thousand times more than a clever explanation of nonexistent facts.

C. Specification of the Model

Outline

We propose to estimate a five-equation subsystem of a complete model of industrial organization. We attempt to explain profitability, two measures of relative line-of-business size (size relative to the market, or market share, and size relative to the firm, or firm share), and two measures of sales expenditures (expenditures on advertising and other expenditures on sales efforts).

Our models suggest that any firm or industry characteristic which influences the speed with which customers can locate alternative sources of supply will influence profitability. Certainly factors which describe what Williamson [1975, p. 8] calls the outer environment - "... market structure measures such as concentration, barriers to entry, excess demand, and so forth" - will influence the sensitivity of the sales of any one supplier to price. However, different suppliers in the same industry are components of different firms, and the inner environment of the firm will also influence the supplier's ability to extract extraordinary profits (Williamson [1970, p. 180; 1975, p. 8]; see also Caves [1980]). Previous studies of the impact of internal organization on performance have generally relied on qualitative evaluations of firm structure.[8] Using the Line of Business sample, we are able to construct quantitative measures of firm characteristics, including advertising expenditures, other expenditures on sales efforts, capital intensity, research and development, diversification, and administrative cost. Details of the definitions of these variables, and the effects which we expect on performance, are discussed below.

The models outlined above, which have price as a primary control variable, implicitly determine firm sales as well. The models thus provide an implicit explanation of a critical element of market structure, namely market share. All else equal, we expect that any firm or market characteristic which reduces the rate at which customers switch to other suppliers in response to price increases will increase market share. We discuss below the specification of a structural equation, explaining market share, which is consistent with this view.

Firm structure is itself endogenous (although the process of firm diversification is not explicitly treated in the models developed above). A basic element of firm structure is the fraction of firm sales made in each product group within which the firm competes. Firm or industry characteristics which reduce these fractions increase diversification. We specify below an equation explaining the fraction of firm sales which takes place in each industry within which the firm operates, a variable which (by analogy with market share) we label "firm share." We will assume that the intangible assets of the firm are allocated among divisions of the firm in proportion to firm share.[9]

The models developed above suggest that industry and firm characteristics which increase the sensitivity of demand to advertising or the sensitivity of the rate at which customers respond to price changes to advertising will increase expenditures on advertising. By analogy, we expect a similar effect for all types of expenditures on sales efforts. We specify below equations which attempt to explain expenditures on media advertising per dollar of sales at the LB level and all other expenditures on sales efforts per dollar of sales at the LB level in terms of explanatory variables which measure either the impact of sales efforts on demand or the impact of sales efforts on the rate at which share responds to price.

The Sample

The Line of Business Program employs an industrial classification scheme which is sometimes more aggregated than the 4-digit Standard Industrial Classification, but usually less aggregated than the Input-Output Table Detailed Industry classification. The complete 1975 sample contains 4527 LBs, which are components of 475 firms and 275 industries (of which 261 manufacturing and 14 nonmanufacturing). We consider manufacturing industries only in this study.[10] All LBs in industries described as "miscellaneous" or "not elsewhere classified" were excluded from the sample on the grounds that such LBs will not operate in the same industry in a meaningful economic sense; industry-level variables for such observations would be ill-defined. Because lagged profitability appears in the system, and because lagged values of other endogenous variables were used as instruments, only LBs which were surveyed in both 1974 and 1975 were included in the sample. This eliminated a number of "births" and "deaths" - LBs which came into or departed the survey. Others were eliminated following a classification of Weiss and Pascoe [1981]. Because we measure size by the natural logarithm of assets, observations with nonpositive accounting values for assets were excluded from the sample. One firm was excluded to avoid a potential conflict of interest.[11] The sample employed here contains 2297 LBs, components of 218 industries and 424 firms.

Endogenous Variables

Profitability

We employ a measure of profitability which, like the price-cost margin derived from the Census of Manufactures, is a rate of return on sales. The margin of total revenues and transfers at the LB level over operating costs, media advertising costs, other selling costs, and administrative costs traceable to the LB is expressed as a percentage of total revenues and transfers.

Table 1: Distribution of 1975 Price-Cost Margin

Lower Bound	Upper Bound	Number Of LBs
50%	75%	9
40	49.99	15
30	39.99	46
20	29.99	208
10	19.99	668
0	9.99	975
-10	-0.01	260
-20	-10.01	67
-30	-20.01	22
-40	-30.01	8
-50	-40.01	4
-60	-50.01	5
-90	-60.01	4
-190	-90.01	6

Maximum*	58.87
Mean	7.87
Minimum*	-125.80
Standard Deviation	14.06

*To prevent disclosure of values pertaining to individual LBs, extreme values of LB data reported in this table and elsewhere in this paper are the arithmetic averages of the six extreme values.

At this point we confront the issue of common costs. Any large diversified firm possesses (tangible and intangible) assets which are employed for the benefit of all divisions of the firm. The expenses associated with such assets must be subtracted from the revenues of the firm to calculate the profitability of the firm, but they cannot properly be assigned or traced to any one LB of the firm. For the purposes of the Line of Business survey, expenses are divided into those which can be traced to particular LBs and those which cannot be so traced. Nontraceable expenditures are then allocated to the LB level by arbitrary accounting methods (which are described). Since nontraceable expenditures cannot in principle be assigned to any one LB, we do not subtract them when we compute our measure of profitability, which is thus gross to the common costs of the firm.[12] Table 1 describes the sample properties of this measure of profitability.

High profitability is a signal to reallocate resources. To rivals, it is a signal to enter, or, if entered, to alter product characteristics. For this reason, we include lagged profitability[13] as an explanatory variable in our market share equation, and expect that greater lagged profitability will result in a lower current market share (Orr [1974]), all else equal. Profitability is likewise a signal to reallocate resources within the firm. We include lagged profitability as an explanatory variable for firm share, and expect firm share to be less for LBs with lower values of lagged profitability.

The model of advertising developed above suggests (equation (19)) that advertising will be greater, the greater the price-cost margin. We include current profitability in our structural equations for expenditures on media advertising per dollar of

Table 2: Correlation Matrix, Market and Firm Structure Variables

	MS75	HERF72	FS75	DIV75
MS75	1.0000	0.4327	0.4262	0.1708
HERF72		1.0000	0.1389	0.0617
FS75			1.0000	0.4886
DIV75				1.0000
Minimum	0.0002	0.0016	0.0003	0.0396
Mean	0.0458	0.0571	0.1279	0.2564
Maximum	0.9592	0.2763	1.0000	1.0000
Standard Deviation	0.0846	0.0576	0.1949	0.1934

MS = market share; HERF = approximate Herfindahl index of industry concentration; FS = firm share; DIV = Herfindahl index of firm diversification across industries.

sales and expenditures on other sorts of sales efforts per dollar of sales, and expect a positive impact. As noted above in the discussion of the model of Cubbin [1981], a negative relationship is possible.

Market Structure/Firm Structure

Market share (LB sales divided by industry sales) is a fundamental element of market structure. Firm share (LB sales divided by firm sales) is a fundamental element of firm structure. Measures of industry concentration and firm diversification can be derived from market share and firm share respectively. The nature of each of these variables will be discussed in turn.

The LB market share figures employed in this study are derived from the sales reported for individual LBs and industry sales figures taken from the Annual Survey of Manufactures.[14] There are a number of channels through which market share may influence profitability. Gale [1972, p. 413] indicates that

> Large market share may be expected to yield high profitability (1) by giving the firm a share-based product differentiation advantage, (2) by allowing the firm to participate in an oligopolistic group tight enough to effect some joint restriction of output, (3) by increasing the firm's bargaining power in this oligopoly situation and (4) by allowing the firm to take advantage of economies of scale.

Scherer [1980, pp. 282-285] reviews attempts to distinguish the market power aspects of market share from the scale economy effects. This topic is the subject of ongoing research by Shepherd (preliminary results in Shepherd [1979] suggest that market power dominates scale economies for the firms in Shepherd's sample) and Mueller [1981], who finds

> In sum, efficiency and collusion are difficult to separate conceptually, and when one makes assumptions strong enough to allow separate, testable hypotheses neither seems to be present in a large fraction of industries, neither seems to account for the positive correlation between profits and concentration traditionally found.

We simply note here that a positive impact of market share on profitability may reflect either the ability to influence price or access to scale economies or both.

We expect firms to expand where they enjoy market power or have access to scale economies; thus market share should have a positive impact on firm share.

There are externalities involved in the decision to advertise or to engage in other sales efforts. Such activities may engender a general increase in demand, benefiting rivals as well as the firm which incurs the expense. The larger is market share, the more likely is the firm which incurs the expense to reap the benefits. For this reason, we expect a positive impact of market share on advertising and on other sales efforts at the LB level.

We expect market concentration to influence the rate at which share is lost to rival producers when price rises, hence to have an effect on profitability. The mainstream view is that as market concentration rises so does the ease of (implicit or explicit) collusion. In terms of the model presented above, k_1 is expected to be a negative function of market concentration (which by the back door introduces oligopoly into our model, even though it is based in the theory of monopolistically competitive markets).

Occasional alternative explanations of the impact of concentration on profitability have been heard. Caves and Porter [1976] point out that many of the factors which impede entry and allow concentration to generate economic profit in the long run also impede exit and can result in lower profit from time to time in the short run. Baumol [1982] describes models within which (because of zero entry and exit costs) as few as two suppliers generate a competitive outcome.

Where products are differentiated, we can imagine circumstances in which the rate at which sales are diverted to rivals if price rises increases with market concentration. If price rises, customers must search to locate alternative suppliers who offer a combination of product characteristics and services which satisfy their needs. If the market is concentrated, there is a small number of alternative suppliers; search costs should be lower, all else equal. Similarly, when the number of suppliers is small, rivals are unlikely to be unaware of marketing opportunities created by changes in price. If there are many suppliers, there will be many alternative combinations of product characteristics available, but the requisite search (and search cost) may also be greater. If search costs are lower when markets are concentrated, and producers do not successfully collude, then profitability may be less in concentrated markets than in unconcentrated markets, where each producer supplies a relatively small group of consumers with strong preferences for his particular combination of product characteristics and services.

Market power may have a positive impact on profit without having a positive impact on the rate of profit on sales. For example, a LB which enjoys market power because of a product differentiation advantage may earn a larger profit on greater sales than it would in the absence of market power; if the proportional increase in sales exceeds the proportional increase in profit, then the rate of profit on sales will be lower than it would otherwise be.

If firms which operate in concentrated markets tend to specialize in those markets, then the impact of concentration on firm share will be positive. A negative impact of market concentration on firm share will suggest that firms in concentrated markets tend to diversify outside of such markets.

Comanor and Wilson [1974, pp. 144-5] expect a positive impact of concentration on advertising intensity in industries which produce a homogeneous product, but suggest probable negative effects when the product is heterogeneous. They adopt an agnostic stance with respect to the expected impact of market concentration on advertising in a cross-section study. We take the same position here concerning the expected impact of market concentration on media advertising and on other sales expenditures.

Our preferred index of market concentration is the Herfindahl index of market concentration,

$$HERF_j = \sum_{i=1}^{N_j} MS_{ij}^2 \qquad (25)$$

(where MS_{ij} is the market share of firm i in industry j and N_j is the number of firms in industry j). Since HERF is defined in terms of an endogenous variable, it is itself endogenous. We employ an approximate Herfindahl index (MINL) of Schmalensee [1977], which is computed from seller concentration ratios reported in the 1972 Census of Manufactures.

The variable which we have labeled firm share (FS) is computed by dividing LB sales by firm sales. Each firm possesses tangible and intangible assets which benefit all divisions of the firm. Firm share is an index of the impact of these assets at the LB level. For this reason, we expect a positive impact of firm share on profitability and on market share. If firm share has an impact on the intensity of sales efforts, it is probably positive: the potential return to advertising or other sales efforts will be greater, all else equal, in larger divisions of the firm.

We measure firm diversification (DIV) by a Herfindahl index of the diversification of firm sales across industries (Berry [1974, 1975]):

$$DIV_i = \sum_{j=1}^{M_i} FS_{ij}^2 \qquad (26)$$

(where FS_{ij} is the share of firm i sales accounted for by its operations in industry j and M_i is the number of industries within which firm i operates). Note that a greater value of the diversification index means that the firm is less diversified. Since DIV is defined in terms of an endogenous variable, it is itself endogenous.

If LBs which are components of diversified firms are more efficient (being able to shift resources to or from other divisions of the firm as appropriate) or if they enjoy greater market power than otherwise identical LBs because of access to intangible firm assets, then diversification will have positive effects on profitability and market share.[15] If sales efforts by different divisions of the same firm are complementary, then the marginal benefit to the firm of media advertising or other sales efforts by particular LBs will be greater than otherwise. In this case, the expected impact of diversification on the intensity of sales efforts is positive (and the expected sign of the coefficient of DIV in the advertising and other sales effort equations is negative).

These four variables (MS, HERF, FS, DIV) are all functions of LB sales. Market share equals LB sales divided by industry sales, but industry sales is the sum of the sales of all LBs which operate in the industry (in principle; of course, we do not have observations for all LBs in any industry). Similarly, firm share equals LB sales divided by the sum of the sales of all LBs of the firm.[16]

Sales Efforts

LB advertising per dollar of sales (LASR) includes all expenditures on media advertising which can be traced to the individual LB. Firm advertising per dollar of sales (FASR) includes all expenditures on media advertising by the firm

Table 3: Correlation Matrix, Sales Effort Variables

	LASR75	FASR75	IASR72	LOSR75	FOSR75
LASR75	1.0000	0.5523	0.5754	0.3236	0.2189
FASR75		1.0000	0.4344	0.2351	0.3830
IASR72			1.0000	0.3530	0.2428
LOSR75				1.0000	0.4918
FOSR75					1.0000
Minimum	0.0000	0.0000	0.0450	0.0000	0.0000
Mean	1.3941	1.4358	1.5963	6.6622	6.8633
Maximum	38.1429	14.0129	22.2260	50.7422	25.7237
Standard Deviation	3.4522	2.0976	2.9360	6.7046	4.5958

LASR = LB expenditures on media advertising as a percentage of sales; FASR = firm expenditures on media advertising as a percentage of sales; IASR = industry average expenditures on advertising as a percentage of sales; LOSR = LB expenditures on other sales efforts as a percentage of sales; FOSR = firm expenditures on other sales efforts as a percentage of sales.

(traceable and nontraceable). Our industry advertising-sales ratio (IASR) is taken from the 1972 input-output table.

Other selling expenses include salesmen, displays at the point of sale, coupons, and trade and advertising allowances to distributors (Weiss, Pascoe, and Martin [1982]). Other selling expense as a percentage of sales at the LB level (LOSR) includes only expenses which can be traced to the LB level. Firm other selling expenses (FOSR) includes traceable and nontraceable expenditures.

The sales expense variables are described in Table 3.

As the previous quotation from Comanor and Wilson [1979] suggests, the expected impact of advertising and sales efforts on profitability and market share is a subject of long-standing controversy. Boyer [1974] distinguishes between goodwill advertising (which in terms of the models developed above we would describe as reducing the rate at which share is lost as price increases) and informative advertising (which has the opposite effect). Industry-level studies have found a positive impact of advertising intensity on profitability (for example, Comanor and Wilson [1967]; Martin [1982a,b]). Empirical results thus suggest that the impact of advertising and other sales efforts on profitability will be positive, although we should perhaps be neutral in principle.

If sales efforts do bind customers more closely to the supplier who undertakes the sales efforts, then LBs which invest heavily in advertising or other sales efforts per dollar of sales should attract a larger pool of customers, all else equal, hence enjoy a larger market share. If firm-level advertising or other sales efforts generate a brand name which benefits all divisions of the firm, then FASR and FOSR will have positive effects on profitability and on market share. If advertising can be a tool of entry, then LBs which operate in industries where the industry advertising-sales ratio is large ought to have smaller market shares, all else equal.

If firm sales efforts generate a brand name which can be exploited in more than one industry, then FASR and FOSR ought to be associated with lower firm shares for each LB of the firm. If differentiation is industry-specific, the opposite will be the case. If high levels of industry advertising signal vigorous competition, then firms are likely to diversify into other industries. The expected impact of IASR on firm share is negative.

Other Endogenous Variables

(a) Research and Development

Differences in technological opportunities across industries will be an important factor in explaining variations across industries in research and development expenditures (Scherer [1980, p. 434]). In the absence of an effective way to measure such variations, we do not attempt to specify a structural equation to explain LB research and development expenditures per dollar of sales (LBRD), although we treat it as an endogenous variable.[17]

The expected impact of research and development activity on profitability is subject to the same sort of ambiguity which characterizes promotional activities. If research and development either reduces cost or creates a product differentiation advantage, then the impact on profitability and on market share should be positive. However, in one of the few

Table 4: Correlation Matrix, Research & Development Variables

	LBRD75	FRD75
LBRD75	1.0000	0.3153
FRD75		1.0000
Minimum	0.0000	0.0000
Mean	1.9468	2.2702
Maximum	81.3223	30.5480
Standard Deviation	5.5978	3.9814

LBRD = expenditures on R & D per dollar of sales by the LB;
FRD = firm expenditures on R & D per dollar of sales.

empirical studies of the effect of research and development on profitability, Caves, Porter, and Spence [1980, p. 234] find a negative impact. They employ a sample of Canadian firms, and interpret their finding to indicate that research and development expenditures reflect defensive reactions to international competition. Scherer [1980, p. 408] similarly suggests that heavy investment in research and development may signal a market environment in which actual and potential competition is intense. If this is the case, it would suggest that clients can move rapidly in response to price increases. Under these circumstances, we expect a negative relationship between research and development expenditures and profitability and market share.

If an ongoing research and development program is the kind of asset which can be exploited in more than one industry, than the possession of such an asset will encourage

Table 5: Correlation Matrix, Administrative Cost Variables

	LBADMIN75	FADMIN75
LBADMIN75	1.0000	-0.0067
FADMIN75		1.0000
Minimum	0.0000	0.0000
Mean	6.5871	1.3518
Maximum	48.5276	16.2733
Standard Deviation	4.1015	1.6648

LBADMIN = administrative costs per dollar of sales traceable to the LB; FADMIN = overhead administrative costs per dollar of firm sales (not traceable to any LB).

diversification and reduce firm share. If research and development activity and sales efforts are alternative strategies to differentiate the product, then advertising per dollar of sales and other sales efforts per dollar of sales will be negatively related to research and development expenditures.

(b) Internal Organization

Williamson [1970, p. 180; 1975, p. 8] has emphasized the importance of the internal organization of the firm in explaining market performance. His own work and that of his students (Bhargava [1973]) has employed qualitative evaluations of organizational form. He has emphasized the benefits of the multidivisional form of internal organization (Williamson [1970, p. 133]):

> ....the transformation of a large business firm for which divisionalization is feasible from a unitary to a multidivisional form organization contributes to (but does not assure) an attenuation of both the control loss experience and subgoal pursuit (...) that are characteristic of the unitary form. Realization of these attenuation effects, however, requires that the general office be aggressively constituted to perform its strategic planning, resource allocation, and control functions.

Firms which are operated under a multidivisional form, and which are actually administered so that the potential benefits of the multidivisional form are realized, will have a higher level of administrative cost per dollar of sales which cannot be traced to any particular LB. We measure nontraceable administrative costs per dollar of sales (FADMIN), and expect to find a positive impact on profitability and market share. If firms which have invested in a corporate management team are more likely to diversify (to fully exploit this asset), then firm share will be negatively related to FADMIN.

In contrast, we expect that firms which do not benefit from effective corporate control will have a high level of administrative cost which can be traced to the LB level. We expect such costs to be negatively related to profitability and market share, and positively related to firm share.

Table 6: Correlation Matrix, Size Variables

	LBKAP	FKAP	IKAP
LBKAP	1.0000	0.3544	0.2519
FKAP		1.0000	0.1162
IKAP			1.0000
Minimum	0.1487	32.4	46.7
Mean	95.7	1,121.3	3,020.3
Maximum	6,151.0	12,896.9	33,380.9
Standard Deviation	374.1	1,674.1	5,460.6

(Dollar Values in millions).

(c) Size

The impact of firm size on profitability has been a subject of recurring interest (Hall and Weiss [1967]; Marcus [1969]; Shepherd [1972a,b]); likewise the impact of market size on concentration (Pashigian [1969]; Ornstein et al [1973]). We measure size by the natural logarithm of assets (Hall and Weiss [1967, p. 322]; Shepherd [1972a, p. 29]), and expect LB size, firm size, and industry size to enter our structural equations. For a detailed discussion of the definition of LB and firm assets employed here, see Martin [1981], which suggests that our results are robust to the use of alternative definitions of assets. Industry assets are taken from the Annual Survey of Manufactures.

Ornstein et al [1973] emphasize the importance of avoiding approximately tautological relationships. For this reason, we exclude LB size and industry size from the market share equation, and we exclude LB size and firm size from the firm share equation. In fact, by dividing LB sales by industry sales to obtain market share, we have allowed for variations in industry size in the market share equation; by dividing LB sales by firm sales to obtain firm share, we have allowed for variations in firm size in the firm share equation. For the same reason, we exclude the absolute firm size and industry size variables from the profitability and sales effort equations, which contain two measures of relative LB size (market share, firm share) and one measure of absolute LB size (LOG (LBKAP)).[18]

All else equal, we expect large LBs and large firms to enjoy capital cost advantages. For this reason, we expect absolutely large LBs to be more profitable, and we expect LBs which are components of large firms to have larger market shares, than would otherwise be the case. The caveat of Caves and Pugel [1980, p. 14] should, however, be noted:

> It should perhaps be stressed, in light of the common expectation that a large firm can do anything a small firm can but not vice versa (...), that the concept of mobility barriers explains why smaller firms might be systematically more profitable than large. For instance, efficiently supplying small (and profitable) but specialized niches of a differentiated-product market may not be consistent with the best use of a large firm's strategic assets.

Table 7: Correlation Matrix, Capital Intensity Variables

	LBKSR	FKSR	IKSR
LBKSR	1.0000	0.3524	0.3038
FKSR		1.0000	0.2918
IKSR			1.0000
Minimum	0.0274	0.0628	0.0791
Mean	0.5159	0.5149	0.4094
Maximum	5.6477	1.7624	1.6778
Standard Deviation	0.4230	0.2038	0.2613

LBKSR = line-of-business capital-sales ratio; FKSR = firm capital sales ratio; IKSR = industry capital-sales ratio.

All else equal, we expect a LB which operates in a large industry to loom large in its firm. The expected impact of industry size on firm share is positive.

Exogenous Variables[19]

Capital Intensity

Weiss [1974, pp. 198-9] suggests that when profitability is measured by a rate of return on sales, the capital-sales ratio should be included as an explanatory variable, to allow for the normal rate of return on capital. For this reason, we expect the coefficient of the LB capital-sales ratio (LBKSR) in the profitability equation to be positive.

Both the firm and the market allocate capital (Williamson

Table 8: Scale Economy Variables

	MES	CDR
Minimum	0.1000	23.3000
Mean	2.7310	89.0349
Maximum	24.7000	100.0000
Standard Deviation	2.6959	12.4462

MES = average output of plants accounting for at least half of industry output, as a percentage of industry output; CDR = cost disadvantage ratio.

[1975, pp. 141-8]). The return per dollar of sales earned by LB assets will depend on the opportunity cost of investing those assets in LB operations, and this opportunity cost is precisely the rate of return which could be earned elsewhere in the firm or in the industry. We thus expect firm (FKSR) and industry (IKSR) capital-sales ratios to be positively related to the rate of return on sales.

Scale Economies

Entry conditions will be strongly affected by the nature of production economies of scale. To capture variations in such economies across industries, we calculate an estimate of minimum efficient scale as a percentage of industry output (MES) and the cost disadvantage ratio (CDR; as defined by Caves, Khalilzaden-Shirazi, and Porter [1975]). We expect MES to be positively and CDR negatively related to profitability and to market share. Firms which operate at efficient scale in industries where MES is large are likely to have a sizeable investment in fixed assets. The possession of such assets will increase the return expected from diversification into other industries within which the assets may be employed (Caves and Porter [1977, pp. 257-8]). If this is the case, MES will have a negative effect on firm share.

Demand Characteristics

It has long been recognized that interindustry differences in the price elasticity of demand will have an impact on performance (Johnson and Helmberger [1967]). We allow for differences in demand conditions across industries by measuring the fractions of industry output going to different types of consumers. From the 1972 input-output tables, we compute the fractions of total commodity output going to final consumer demand (CONS), to the Federal government (FEDSR), and to state and local governments (SLSR).

It is natural to suppose that profitability will rise, all else equal, the greater are sales to final consumer demand. Such industries are likely to be more susceptible to product differentiation, and less likely to face market power on the buying side (Weiss [1974, pp. 226-7]). Weiss [1974, p. 228] finds a positive impact on industry profitability of an interaction variable which is the product of the four-firm seller

Table 9: Industry Demand Variables

	Minimum	Mean	Maximum	Standard Deviation
CONS	0.0000	0.2126	0.9865	0.0065
FEDSR	0.0000	0.0383	0.6595	0.1107
SLSR	0.0000	0.0159	0.3049	0.0328
GR7475	-77.6121	2.4267	44.3757	14.0457
IMSR	0.0000	0.0619	1.9287	0.0980
EXSR	0.0000	0.0606	0.4841	0.0633

CONS = fraction of commodity output going to final consumer demand; FEDSR = fraction of commodity output going to the Federal government; SLSR = fraction of commodity output going to state and local governments; GR7475 = growth of industry shipments between 1974 and 1975; IMSR = sales by importers as a fraction of shipments by domestic producers; EXSR = export sales as a fraction of shipments by domestic producers.

concentration ratio and the percentage of sales going to final consumer demand. Industry-level studies for 1967 have found a positive impact of CONS on profitability when this variable is entered linearly (Martin [1979a, 1982a]), while industry-level studies using 1972 data have found a negative effect (Martin]1982b]) for the same specification.

The more important are sales to final consumer demand, the more likely are expenditures on advertising or other sales efforts to create product differentiation; we expect LASR and LOSR to be positively affected by CONS. If product differentiation is in fact established, such markets may be occupied by small LBs serving specialized segments of the market. In this case, the expected impact of CONS on market share is negative.

Models of the impact of government-industry relationships on profitability have emphasized the relative bargaining power of government and industry (Agapos and Dunlap [1970]; Poirier and Garber [1974]). Potentially, the Federal government has great bargaining power with respect to firms in the private sector, especially firms producing primarily defense-related products. If this power is realized, industries which depend on the Federal government for a large portion of their sales should be less profitable, all else equal. On the other hand, if those who view the Federal government-private sector relationship as symbiotic (Marfels [1978]) are correct, then sales to the Federal government should have a positive impact on profitability (and on market share).

If the Federal government exercises its potential bargaining power effectively, then activities aimed at cultivating product differentiation are unlikely to be important for sales to the Federal government. If the impact of FEDSR on profitability is negative, then we expect similar negative effects of FEDSR on LASR and LOSR.

In contrast to the Federal government, no single state or local government is likely to exert much bargaining power with respect to national suppliers. For this reason, profitability is likely to be higher when a large fraction of commodity sales goes to state and local governments. The expected impact of SLSR on market share and firm share, if any, is unclear, but advertising and especially sales efforts (to deal with multiple levels of local government) is positive.

Existing firms will earn more profit if demand increases unexpectedly. The impact of the growth rate of industry sales (GR7475) between 1974 and 1975 on LB profitability should be positive. Entry should also be easier when industry sales are rising, all else equal. This will tend to reduce market share. If LBs in growing industries tend to grow more rapidly on that account, they will for that reason have a larger firm share. The returns from successful product differentiation will be greater in growing industires; the expected impact of industry growth on advertising and other sales efforts is positive.

Although the ratios of export sales (EXSR) and import sales (IMSR) to sales by domestic producers provide information about demand conditions, they may also provide information about the nature of entry conditions. With respect to exports, Pugel [1978, p. 16] argues that

> ...exporting increases the rewards to innovation by expanding the market for innovation. These greater rewards may be protected from the competitive process by barriers to entry based on patents, secrecy, or capital costs. Export profits may be enhanced by the lesser antitrust restrictions on export marketing collusion among domestic producers.

For these and other reasons,[20] Pugel expects a positive effect of exports on profitability, which his results confirm.

When an important part of domestic sales is imported, the ability of customers to find alternative sources of supply when prices rise will be increased. To the extent that importers have different interests than domestic producers, it will be more difficult to maintain any sort of oligopolistic coordination (the comments of Newman [1978] on goal congruence are relevant here). We expect the impact of IMSR on profitability to be negative.

If (to anticipate the countervailing power argument presented below) import competition tends to encourage domestic concentration, then LBs in industries for which imports are important will tend to have higher market shares, all else equal, than they otherwise would.

Countervailing Power

The essence of the countervailing power argument (which to some extent we anticipated above in our discussion of the impact of government purchases on performance) is that the exercise of market power by actors on one side of a market will be restrained by economic power which arises on the other side of the market. We calculate for each industry an average Herfindahl index of concentration among supplying industries (SHERF), weighted by (current and capital account) purchases of inputs, and an average Herfindahl index of concentration among consuming industries (BHERF), weighted by (current and capital account) shipments of output. As noted by Lustgarten [1976], such weighted average measures are biased upward if an industry deals with a great many buying (alternatively,

Table 10: Countervailing Power Variables

	Minimum	Mean	Maximum	Standard Deviation
BHERF	0.0003	0.0795	0.7827	0.1352
SHERF	0.0035	0.0387	0.1420	0.0184
BDISP	0.0151	0.2555	1.0000	0.2693
SDISP	0.0126	0.1110	0.6570	0.1085
WASRB	0.0000	0.7426	6.1232	0.8147
WASRS	0.2200	0.8336	1.7042	0.2440

BHERF = weighted average of Herfindahl indices of concentration of buying industries; SHERF = weighted average of Herfindahl indices of concentration of supplying industies; BDISP = Herfindahl index of dispersion of industry shipments; SDISP = Herfindahl index of dispersion of industry purchases; WASRB = weighted average advertising-sales ratios of purchasing industries; WASRS = weighted average advertising-sales ratios of supplying industries.

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supplying) industries, each of which is relatively concentrated. For this reason, we include with BHERF and SHERF a Herfindahl index measuring the dispersion of sales across purchasing industries (BDISP) and a Herfindahl index measuring the dispersion of purchases of inputs across supplying industries (SDISP).[21]

These variables should be negatively related to profitability, since high values indicate that sales are made to a few concentrated industries or that inputs are purchased from a few concentrated industries. If concentration on either the supply side or the demand side evokes concentration, then market share and firm share should be positively affected by these variables. If sales efforts are used to attempt to neutralize countervailing market power, then advertising and other sales efforts should be positively affected by these variables.[22]

We also investigate the impact on advertising and other sales efforts of average advertising intensity by supplying industries (WASRS), weighted by (current and capital account) purchases of inputs, and average advertising by purchasing industries (WASRB), weighted by (current and capital account) shipments of output. If the countervailing power view of the world is correct, then LASR and LOSR should be positively affected by these variables.

Distribution Channels

Wholesalers and retailers play a critical role in the movement of goods throughout the economy (Ritz [1980, p. 43]):

> The I-O tables do not trace actual flows of commodities for resale to and from trade. If trade were shown as buying and reselling commodities, industrial and final users would make most of their purchases from either (or both) wholesale and retail trade.

Wholesalers may provide an important element of product differentiation, depending on the package of services provided with the product (Office of Management and Budget [1978, p. 241]):

Table 11: Distribution Cost Variables

	Minimum	Mean	Maximum	Standard Deviation
WSOUT	0.0000	10.6986	76.4935	9.3033
WSIN	0.4908	3.1022	12.6085	1.3595
RTLOUT	0.0000	12.3480	195.0184	19.0674
RTLIN	0.0000	0.0597	1.9064	0.1301

WSOUT = average wholesale expense of outgoing shipments, as a percentage of output in producers' prices; WSIN = average wholesale expense of incoming shipments, as a percentage of input in producers' prices; RTLOUT, RTLIN similarly defined for retail expense.

> The chief functions of establishments included in Wholesale trade are selling goods to trading establishments or to industrial, commercial, institutional, farm, and professional business users; and bringing buyer and seller together. In addition to selling, functions frequently performed by wholesale establishments include maintaining inventories of goods; extending credit; physically assembling, sorting, and grading goods in large lots; breaking bulk and redistribution in smaller lots; delivery; refrigeration; and various types of promotion such as advertising and label designing.

Porter [1974] has argued that the retailer influences the level of rents available to manufacturing and distribution combined, as well as the allocation of such rents between manufacturing and distribution, by dint of sales efforts within the store. A similar argument may be made with respect to the activities of the wholesaler in connection with transactions at intermediate stages in the vertical chain stretching from raw materials to the final consumer. The wholesaler can control the service level provided by his own sales force, the quality of delivery service, the nature of credit terms, the breadth and depth of product lines offered to purchasers and the emphasis within those product lines placed on the products of particular suppliers. The wholesaler may vary his own margin as needed to earn the loyalty of consumers.

For each industry, we compute (from input-output data tapes) average incoming and outgoing wholesale and retail cost as a percentage of the value of the associated shipments. These variables will be high when distributors provide essential services, which are a large part of the value of the combination of physical product and service taken by the final consumer. The provision of such services will increase overall product differentiation, hence overall return, but will also enhance the ability of the distributor to claim a greater share of the overall return. The net impact on LB profitability is unclear. In industry-level tests (Martin [1982b]), high levels of retail cost, either incoming or outgoing, had a positive impact on profitability, while wholesale expense favored the shipping party (incoming wholesale expense had a negative effect on manufacturing industry profitability, outgoing wholesale expense had a positive impact).

If (again along countervailing power lines), manufacturing concentration increases when distributors exercise bargaining power because they provide essential services, then market share and firm share should be larger when the distribution variables are large, all else equal. Following Porter [1974, p. 424], we expect LASR to be less and LOSR greater where outgoing distribution is greater.

Transportation Cost

From input-output data tapes, we measure incoming and outgoing surface, air and pipeline transportation cost as a percentage of the value of incoming and outgoing shipments, respectively, in producers' prices.

Surface transportation (SURF) includes shipments by rail, truck, and water. Pipe transportation costs are associated in the input-output data tapes with the shipments of three commodities - coal, crude petroleum and natural gas, and petroleum refining. Only petroleum refining appears in our sample of LBs which operate in manufacturing industries. Outgoing pipe transportation cost would thus serve as an industry-specific dummy variable, and is excluded for that reason. Incoming pipe transportation cost measures the importance of petroleum-related products as inputs.

High surface transportation costs are likely to indicate local markets, hence greater profitability associated with a given market share or level of market concentration (when those variables are measured on a national basis). High levels of air transportation cost, on the other hand, probably indicate more nearly national markets, suggesting a greater

Table 12: Transportation Cost Variables

	Minimum	Mean	Maximum	Standard Deviation
SURF OUT	0.0000	3.3359	44.5071	4.3011
SURF IN	0.2122	2.0453	13.1838	1.8813
AIR OUT	0.0000	0.1112	1.3854	0.2194
AIR IN	0.0000	0.0266	0.2797	0.0405
PIPE IN	0.0000	0.0456	3.4565	0.3722

SURF OUT = rail, truck, and water transportation expense of shipping industry output, as a percentage of industry output in producers' prices; AIR OUT = air transportation expense of shipping industry output, as a percentage of industry output in producers' prices; SURF IN and AIR IN similarly defined for the industry's inputs; PIPE IN = pipeline transportation expense of delivering the industry's inputs, as a percentage of the value of those inputs in producers' prices.

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degree of effective competition associated with any given values of the variables which describe market structure.

These variables may also proxy differences in product characteristics: products which will bear a high level of air transportation cost per dollar of sales are likely to be of high value per unit weight and volume. Products for which surface transportation cost is high are likely to be bulky and of low value per pound.

Scherer et al [1975, p. 187] indicate that high transport costs encourage multiplant operation. This may reduce the regional nature of markets which are characterized by high transportation costs, as firms integrate horizontally across distinct geographic markets. Similarly, when transportation (or, for that matter, distribution) expense is great, firms may have incentives to integrate forward into transportation (respectively, distribution). This would tend to reduce firm share, all else equal.

III. RESULTS

Table 13 lists the variables used in this study. Table 14 outlines the five equations which are estimated. For estimation purposes, variables with the superscript "E" in Table 15 are treated as endogenous. Following Kelejian [1971], squares and cross-products of a number of instrumental variables were included as instrumental variables. Each equation is identified with respect to the other equations in this subset of a complete model.

Examination of the residuals from ordinary least squares regressions suggested the presence of heteroskedasticity. The estimates reported in Table 15 are corrected for heteroskedasticity on the assumption that the variance of the error term is multiplicatively related to LB sales, firm sales, and industry sales.[23] Ravenscraft [1981] gives an extensive treatment of the heteroskedasticity problem for the profitability equation. Tables 17 and 18 (Appendix) report estimates which are not corrected for heteroskedasticity.

For simplicity, we confine outselves to equations which are linear in the variables and the coefficients to be estimated. Ravenscraft [1981] examines interaction effects for the profitability equation.

A. Profitability

As expected, lagged profitability has a significant negative impact on market share and a significant positive

Table 13: Variable Names and Descriptions

PCM	LB profitability as a percentage of sales.
MS	LB market share.
HERF	Herfindahl index of industry concentration.
FS	LB firm share.
DIV	Herfindahl index of firm diversification.
LASR	Expenditures on advertising per dollar of LB sales.
FASR	Expenditures on advertising per dollar of firm sales.
IASR	Expenditures on advertising per dollar of industry sales.
LOSR	Expenditures on other sales efforts per dollar of LB sales.
FOSR	Expenditures on other sales efforts per dollar of firm sales.
MES	Minimum efficient scale as a percentage of industry output.
CDR	Cost disadvantage ratio.
CONS	Fraction of commodity output going to final consumer demand.
FEDSR	Fraction of commodity output going to the federal government.
SLSR	Fraction of commodity output going to state and local governments.
GR7475	Percentage growth of industry shipments from 1974 to 1975.
IMSR	Sales by importers as a fraction of shipments by domestic producers.
EXSR	Export sales as a fraction of shipments by domestic producers.
BHERF	Average of Herfindahl indices of buying industries.
SHERF	Average of Herfindahl indices of supplying industries.
BDISP	Herfindahl index of dispersion of industry shipments.
SDISP	Herfindahl index of dispersion of industry purchases.
WASRB	Average of advertising-sales ratios of buying industries.
WASRS	Average of advertising-sales ratios of supplying industries.
WSOUT	Percentage wholesale expense of outgoing shipments.
WSIN	Percentage wholesale expense of incoming shipments.
RTLOUT	Percentage retail expense of outgoing shipments.
RTLIN	Percentage retail expense of incoming shipments.
SURF OUT	Percentage outgoing surface transportation cost.
SURF IN	Percentage incoming surface transportation cost.
AIR OUT	Percentage outgoing air transportation cost.
AIR IN	Percentage incoming air transportation cost.
PIPE IN	Percentage incoming pipeline transportation cost.
LBRD	LB expenditures on R & D per dollar of sales.
FRD	Firm expenditures on R & D per dollar of sales.
LBADMIN	LB traceable administrative costs per dollar of sales.
FADMIN	Firm overhead administrative costs per dollar of sales.
LOG(LBKAP)	Natural logarithm of LB assets.
LOG(FKAP)	Natural logarithm of firm assets.
LOG(IKAP)	Natural logarithm of industry assets.
LBKSR	LB capital-sales ratio.
FKSR	Firm capital-sales ratio.
IKSR	Industry capital-sales ratio.

Table 14: Equations To Be Estimated

	PCM75	PCM 4	MS7	HERF72	FS75	DIV75	LASR75	FASR75	IASR72	LOSR75	FOSR75	MES	CDR	CONS	FEDSR	SLSR	GR7475	EXSR	IMSR	BHERF	SHERF	BDISP
(1)	-1		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
(2)		X	-1		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
(3)		X	X	X	-1		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
(4)	X		X	X	X	X	-1	X	X		X			X	X	X	X			X	X	X
(5)	X		X	X	X	X		X	X	-1	X			X	X	X	X			X	X	X

	SDISP	WASRB	WASRS	WSOUT	WSIN	RTLOUT	RTLIN	SURF OUT	SURF IN	AIR OUT	AIR IN	PIPE IN	LBRD75	FRD75	LBADMIN75	FADMIN75	LOG(LBKAP)	LOG(FKAP)	LOG(IKAP)	LBKSR	FKSR	IKSR
(1)	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X
(2)	X			X	X	X	X	X	X	X	X	X	X	X	X	X		X				
(3)	X			X	X	X	X	X	X	X	X	X	X	X	X	X			X			
(4)	X	X	X	X	X	X	X						X	X			X					
(5)	X	X	X	X	X	X	X						X	X			X					

Note: - 1 indicates dependent variable; X indicates explanatory variable.

Table 15: Two-Stage Least Squares Estimates

	PCM75	MS75	FS75	LASR75	LOSR75
Intercept	10.5059*** (3.8114)	-0.054530*** (8.3214)	-0.109324*** (3.6213)	0.9736*** (2.5758)	2.0647*** (2.6573)
<u>Profitability</u>:					
PCM75^E				-0.0087* (1.5798)	-0.1281*** (11.3165)
PCM74		-0.000076*** (3.2905)	0.000421*** (3.3298)		
<u>Market Structure</u>:					
MS75^E	9.5728*** (3.0120)		0.937900*** (23.4424)	0.4155 (0.6844)	2.3791** (1.9065)
HERF72^E	-40.8283*** (5.8153)		-0.064152 (0.9092)	-0.3298 (0.2914)	-7.3406*** (3.1550)
<u>Firm Structure</u>:					
FS75^E	3.5156** (2.0989)	0.068860*** (16.4698)		0.1933 (0.5800)	0.1763 (0.2574)
DIV75^E	-2.5944** (1.7134)	0.003505 (1.2040)		-0.2709 (0.8742)	-1.5450*** (2.4254)
<u>Advertising</u>:					
LASR75^E	0.1605* (1.3063)	0.000055 (0.2792)	0.000648 (0.6417)		
FASR75^E	-0.3141* (1.4742)	0.000184 (0.4168)	0.004849** (2.2930)	0.8420*** (23.2985)	-0.6037*** (8.1264)
IASR72^E	0.2407** (1.8642)	-0.000419* (1.5339)	-0.004404*** (3.1650)	0.4192*** (15.9691)	0.3800*** (7.0422)

Table 15: (Continued)

	PCM75	MS75	FS75	LASR75	LOSR75
Other Sales Efforts:					
LOSR75^E	-0.4347***	0.000028	-0.000438		
	(7.9006)	(0.2714)	(0.9278)		
FOSR75^E	0.4053***	0.000426***	0.000062	-0.1026***	0.7194***
	(5.0657)	(2.7014)	(0.0849)	(7.3778)	(25.1675)
Scale Economies:					
MES	0.4759***	0.002701***	-0.000733		
	(3.7220)	(8.9801)	(0.5854)		
CDR	-0.0256	0.000023	-0.000296*		
	(1.2355)	(0.4691)	(1.5095)		
Demand Conditions:					
CONS	-2.6876*	-0.005076	0.007242	0.5919*	2.6619***
	(1.4366)	(1.1772)	(0.3917)	(1.5557)	(3.4038)
FEDSR	-26.9739***	-0.007413	0.006012	-1.9152	-4.3193
	(2.7761)	(0.4103)	(0.0600)	(0.9804)	(1.0757)
SLSR	29.8476***	-0.010756	-0.045520	4.6226***	13.7877***
	(3.7428)	(0.6007)	(0.6760)	(2.5937)	(3.7635)
GR7475	0.1174***	0.000045	0.000193	0.0026	0.0172**
	(6.1691)	(0.9941)	(1.0138)	(0.6503)	(2.0995)
EXSR	9.2794**	-0.024546**	-0.034965		
	(1.8915)	(2.2058)	(0.7267)		
IMSR	-1.9315	0.014137**	0.008774		
	(0.7626)	(1.8889)	(0.3664)		

Table 15: (Continued)

	PCM75	MS75	FS75	LASR75	LOSR75
Countervailing Power:					
BHERF	20.6457*** (2.4959)	0.003251 (0.2049)	-0.033435 (0.3821)	1.5800 (0.9356)	-0.1370 (0.0395)
SHERF	-23.4058** (1.6614)	0.020298 (0.6231)	-0.085286 (0.6125)	1.7062 (0.6070)	-11.3224** (1.9597)
BDISP	5.7204*** (3.8221)	0.002542 (0.7881)	0.010780 (0.7077)	-0.0912 (0.2872)	0.4217 (0.6464)
SDISP	-6.0651** (2.3577)	-0.001954 (0.3464)	0.014356 (0.4920)	-1.5175*** (2.8455)	-2.9280*** (2.6710)
WASRB				-0.1444** (2.0136)	-0.3820*** (2.5913)
WASRS				-0.2851 (0.9615)	4.2853*** (7.0317)
Distribution Expense:					
WSOUT	0.0966*** (3.0719)	0.000177** (1.9006)	0.000183 (0.5959)	-0.0041 (0.7020)	0.0501*** (4.1945)
WSIN	-1.4129*** (5.9183)	0.000931** (1.6894)	0.000181 (0.0810)	-0.0789** (1.7132)	-0.4908*** (5.1826)
RTLOUT	0.0063 (0.2801)	0.000028 (0.4586)	0.000369* (1.6378)	0.0049 (1.0034)	-0.0252*** (2.5013)
RTLIN	1.3737 (0.6478)	-0.005294 (1.0271)	0.000676 (0.0318)	0.1608 (0.3466)	-0.0688 (0.0722)

Table 15: (Continued)

	PCM75	MS75	FS75	LASR75	LOSR75
Transportation:					
SURF OUT	0.0970* (1.3023)	0.000068 (0.3655)	-0.001481*** (2.9239)		
SURF IN	0.4175*** (2.3463)	0.000105 (0.3070)	-0.002973** (1.8998)		
AIR OUT	-2.1971** (1.6950)	0.002953 (1.1890)	-0.016998* (1.5142)		
AIR IN	-2.2348 (0.3099)	0.015173 (0.9861)	0.044969 (0.5935)		
PIPE IN	-4.4208*** (6.5948)	-0.005906*** (3.0778)	0.041311** (2.0565)		
Research & Development:					
LBRD75^E	-0.3172*** (5.6813)	-0.000298*** (2.4581)	0.000093 (0.1542)	-0.0207** (1.8788)	-0.0142 (0.6263)
FRD75^E	0.2022*** (2.8053)	-0.000480*** (2.9744)	-0.002678*** (4.2792)	0.0043 (0.2971)	0.0450* (1.5158)
Internal Organization:					
LBADMIN75^E	-0.3359*** (5.2537)	0.000294** (2.1956)	0.001576*** (2.5947)		
FADMIN75^E	0.9386*** (5.6620)	0.001053*** (2.9806)	0.006742*** (3.8817)		

Table 15: (Continued)

	PCM75	MS75	FS75	LASR75	LOSR75
<u>Size</u>:					
LOG(LBKAP)^E	0.6407***			-0.0598	-0.1289*
	(2.4452)			(1.2807)	(1.3428)
LOG(FKAP)^E		0.019187***			
		(37.9691)			
LOG(IKAP)^E			0.024637***		
			(9.7418)		
<u>Capital Intensity</u>:					
LBKSR	-5.3201***				
	(6.7304)				
FKSR	5.0932***				
	(3.8150)				
IKSR	1.8137*				
	(1.4237)				
GOF	0.2484	0.2634	0.2799	0.4467	0.3944
DF	2258	2262	2262	2271	2271

* Indicates statistical significance at the 10% level.
** Indicates statistical significance at the 5% level.
*** Indicates statistical significance at the 1% level.

Asymptotic t-statistics in parentheses. The goodness-of-fit measure (GOF) is the square of the correlation coefficient between actual and fitted values; see Haessel [1975]. Superscript "E" indicates that the variable is treated as endogenous.

impact on firm share. This is consistent with the argument that profitability acts as a signal for the reallocation of resources. In view of the fact that the lag is for just one year, the effects are reasonably large. An increase of one standard deviation in lagged profitability causes market share to decline by over 2% of mean market share, and causes firm share to rise by almost 5% of mean firm share.

Current profitability has a negative and modestly significant impact on advertising expenses; its impact on other sales efforts is also negative, and highly significant. This constrasts with the industry-level effect of profitability on advertising intensity, generally found to be positive (Martin [1982b]), and on other selling expense per dollar of sales, also found to be positive at the industry level (Weiss, Pascoe, and Martin [1981]). Although our results contrast with those at the industry level, they are consistent with the argument of Cubbin [1981] that advertising intensity may increase when entry is less difficult. They are also consistent with the findings of Primeaux [1981]. Our results suggest that advertising and other sales efforts become more attractive, as a competitive strategy, when conventional price competition is intense.

B. Sales-Related Variables

Market share has a positive and significant effect on profitability, firm share, and other sales efforts. There is no significant impact on advertising intensity. As noted above, the positive impact of market share on profitability may reflect either market power at the LB level or the realization of economies of scale.

The market concentration variable (HERF) has a negative and statistically significant impact on profitability and on other sales expenditures per dollar of sales. As shown in Table 16, qualitatively similar results are obtained for the profitability and other sales effort equations if market concentration is measured by the four-firm seller concentration index. There is no significant impact of market concentration as measured by HERF on either firm share or advertising intensity.

The negative coefficient of HERF in the other sales effort equation is consistent with the extension of oligopolistic coordination to sales efforts in concentrated industries. The negative coefficient of the Herfindahl index in the profitability equation may reflect the prevalence of suboptimal capacity, excess capacity, or X-inefficiency in concentrated industries (Siegfried and Wheeler [1981]). It may reflect increases in price below the economy-wide average during a period of inflation (Weiss [1974, p. 200]). It may indicate that the very impediments to entry which encourage concentration restrict exit in the short run (Caves and Porter [1976]). It may reflect the translation of market power into reduced risk (Hall and Weiss [1967, p. 328]; Gale [1972, p. 419]).

With the exception of the exit barrier interpretation, these explanations for a result which is in marked contrast to the results of most industry-level studies rely on some sort of inefficiency occurring under concentration. This sort of interpretation is not consistent with the estimated effects of lagged profitability on market share and firm share, which suggest that profitability is an effective signal for resource reallocation.

In terms of the model of the behavior of a diversified firm developed above, the negative estimated coefficient of the market concentration measure in the profitability equation suggests that share is eroded more rapidly in response to price increases in more concentrated industries, all else equal. This will be the case if the search costs borne by consumers seeking alternative suppliers are smaller when the market is dominated by a few large suppliers.

One can argue that the familiar results of industry-level studies of the relationship between profitability and market concentration are not entirely comparable to the results reported here. If we focus on market share and the Herfindahl index of market concentration, we may write the profitability equation as

$$(27) \qquad PCM_{ij} = \alpha MS_{ij} + \beta HERF_j + \ldots ,$$

where PCM_{ij} is the price-cost margin of the division of firm i which operates in industry j and α, β are coefficients to be estimated. Multiplying both sides of equation (27) by the market share of firm i in industry j (MS_{ij}) and summing over all LBs which operate in industry j yields (in view of equation (25))

$$(28) \qquad PCM_j = (\alpha + \beta)HERF_j + \ldots ,$$

where PCM_j is the industry j price-cost margin and omitted terms are now weighted averages for the industry.

Thus the coefficient of the Herfindahl index of market concentration in an industry-level study reflects not only the potential joint exercise of market power but also LB-specific market power or the realization of scale economies, as reflected in market share. This combination of effects cannot be separated at the industry level. In view of the high correlation between the Herfindahl index and the conventional measure of joint market power, the four-firm seller concentration ratio, this observation applies to studies which employ the four-firm seller concentration ratio as a measure of market concentration.[24]

The industry-level coefficient of the Herfindahl index implied by our disaggregated estimates (-31.2555) is negative and statistically significant at the 1% level (standard error 6.7126). This contrasts with the result of an industry level study (Martin [1982b]) in which the directly estimated coefficient of the Herfindahl index was positive and statistically significant.

Substituting equation (25) into equation (27), we obtain

$$\text{(29)} \qquad PCM_{ij} = \alpha MS_{ij} + \beta \sum_{k=1}^{N_j} MS_{kj}^2 + \ldots ,$$

where

$$\text{(30)} \qquad \sum_{k=1}^{N_j} MS_{kj} = 1 \quad .$$

Differentiating (30) with respect to own market share gives

$$\text{(31)} \qquad \frac{\partial}{\partial MS_{ij}} (PCM_{ij}) = \alpha + 2\beta [MS_{ij} + \sum_{\substack{k=1 \\ k \neq i}}^{N_j} MS_{kj} \frac{\partial}{\partial MS_{ij}} (MS_{kj})]$$

where from (30)

$$\text{(32)} \qquad 1 + \sum_{\substack{k=1 \\ k \neq i}}^{N_j} \frac{\partial}{\partial MS_{ij}} (MS_{kj}) = 0 \quad .$$

Equation (32) embodies the constraint that if the market share of one LB rises, the combined market shares of all other LBs must fall (although in general nothing can be said about the way in which the market share of any particular LB will change). The effect of this constraint is that the coefficient of 2β on the right hand side of equation (31) is something less than MS_{ij}, and may even be negative. If we begin with a situation in which all firms but one have the same market share, and the market share of that one firm increases, then the coefficient of 2β in equation (31) reduces to the difference between the market share of the unique firm and the common market share of all other firms (this difference may of course be negative). Although other special cases can be analyzed, we may refer to the mean value of market share for this sample (from Table 2, 0.0458) and argue that on average the coefficient of 2β in equation (31) will be sufficiently small that we can take α as the partial effect of a change in market share on profitability, unless market share is very large.

Similar qualifications apply to the impact of market share on firm share, advertising intensity, and other sales efforts. Since firm share and the firm diversification index are functionally related in precisely the same way that market share and the Herfindahl index of market concentration are related, a similar analysis applies to the role of firm share in the profitability, market share, advertising intensity, and sales effort equations.

Our results suggest that LBs which are large in their firm and which are components of more diversified firms are more profitable than they would otherwise be. If we write the LB-level profitability equation as

$$PCM_{ij} = \lambda FS_{ij} + \mu DIV_i + \ldots \tag{33}$$

where FS_{ij} is the share of sales in industry j in the sales of firm i and DIV_i is a Herfindahl index of the diversification of firm i, we may multiply both sides of equation (33) by FS_{ij} and sum over all industries in which firm i operates. The result is an implied firm-level profitability equation,

$$PCM_i = (\lambda + \mu) DIV_i + \ldots \quad , \tag{34}$$

where the omitted variables are now weighted averages across industries for the firm. The firm-level coefficient of the diversification index implied by our disaggregated estimates is positive (0.9212), implying that more diversified firms are less positive, but not significantly different from zero (standard error 1.4653).

Market share has a positive and significant impact on firm share, which is consistent with the interpretation that firms expand where they enjoy market power or scale economies. Similarly, LBs which are large in their firm tend to have larger market shares.

Neither market share nor market concentration has a significant effect on advertising intensity. But LBs with a large market share devote more resources to other sales efforts, while LBs in concentrated industries devote fewer resources to other sales efforts. The other sales effort per dollar of sales equation may be aggregated from the LB to the industry level in the same way as the profitability equation (equations (27) and (28)). The implied industry-level coefficient of HERF in the other sales effort equation is negative (-4.9615) and significantly different from zero (standard error 2.0353).

The estimated coefficient of the diversification index in the other sales effort equation is negative and statistically significant, which means that diversified firms spend more per dollar of sales on sales efforts than less diversified firms, all else equal. This will be the case if the return to sales efforts in any one market by the diversified firm is greater than it would otherwise be because it generates benefits in other markets (which might well be the case for a firm brand name).

C. Advertising and Other Sales Efforts

LB advertising has a barely significant positive impact on profitability, while the effect of other sales efforts by the LB is negative and quite significant. The impact of other sales efforts on profitability is consistent with the negative estimated coefficient of profitability in the other sales effort equation, and reinforces the explanation that other sales efforts are undertaken when conventional competition is intense. Alternatively, other sales efforts may be an effective tool of entry, improving performance.

LBs which are components of firms which advertise intensely themselves advertise intensely, and devote fewer resources to other sales efforts. LBs which are components of firms which spend heavily on sales efforts themselves spend heavily on sales efforts, and advertise less intensely. It appears that advertising and other sales efforts are alternative strategies, and that firms tend to employ one or the other sort of sales technique in all industries where they compete.

LBs which operate in industries characterized by a high level of advertising per dollar of sales tend to be more profitable, to have smaller market shares, to be components of more diversified firms, and to spend more on both advertising and other sales efforts than would otherwise be the case. Such industries are probably characterized by a high degree of product differentiation, with many producers or groups of producers, each supplying a relatively small segment of the market.

LBs which are components of firms which invest heavily in other sales efforts tend on that account to be more profitable and to have larger market shares. A firm-level corporate marketing program is apparently a valuable asset, which increases sales and the profitability earned on such sales.

D. Scale Economies

Minimum efficient scale, as estimated here, has a positive effect on profitability and on market share, but a negative effect on firm share, as expected. The negative impact on firm share is not significant. The impact of the cost disadvantage ratio on profitability is negative, as expected, but statistically insignificant. There is a negative and marginally significant impact of the cost disadvantage ratio on firm share. When the cost disadvantage ratio is large, small-scale operations are at a relatively small disadvantage, in terms of labor productivity, with respect to large-scale enterprises. It is not surprising that LBs which operate in such industries tend to be smaller in their firms, all else equal.

E. Demand Conditions

LBs in industries with a large share of output going to final consumer demand tend to be less profitable, to advertise more intensely, and to devote more resources to other sales efforts, all else equal.

LBs in industries with a high level of sales to the Federal government are significantly less profitable, all else equal; such sales have no significant impact on market share, firm share, advertising intensity, or other sales efforts.

In contrast, LBs which operate in industries with a large fraction of sales going to state and local governments tend to be more profitable, to advertise more intensely, and tp spend more on other sales efforts. The results with respect to profitability are consistent with industry-level results for 1967 (Martin [1982a]) and 1972 (Martin [1982b]). Advertising and other sales efforts presumably reflect marketing efforts directed toward multiple levels of local and regional government.

As expected, LBs which inhabit growing industries are significantly more profitable. They also tend to have smaller market shares than would otherwise be the case, and to spend more on non-advertising sales efforts.

Like Pugel[1978], we find that LBs which operate in export-intensive industries are more profitable. They also tend to smaller in their industry, in a statistically significant way. Export-intensive industries, on this evidence, are inhabited by small but profitable operations, perhaps producing a differentiated product for particular groups of customers (at home and abroad).

LBs which operate in import-intensive industries are less profitable, as expected, but the coefficient is not significantly different from zero. Industry import intensity does have a significant positive impact on market share. This is consistent with a countervailing power interpretation of the effect of imports on market structure.

F. Countervailing Power

The estimates reported here are consistent with the exercise of countervailing power from the supply side. LBs which operate in industries facing fewer or more concentrated supplying industries are less profitable. If supplying industries advertise more intensely, then LBs spend more on sales efforts per dollar of sales than would otherwise be the case (although the direct impact of SHERF and SDISP on LOSR is negative).

In contrast, the estimated coefficients for variables describing the buying side of the market have signs which are contrary to those called for by the countervailing power hypothesis. LBs in industries which face fewer and more concentrated buying industries are more profitable, all else equal; if those industries advertise more intensely, then

LBs spend less per dollar of sales on advertising and on other sales efforts.

The common, although unexpected, thread in these results is that in both incoming and outgoing transactions it is the supply side which benefits. A possible interpretation is that LBs at all levels benefit to some degree from market power located near the ultimate consumer.

G. Distribution Expense

Outgoing retail distribution expense has a significant negative impact on other sales efforts, contrary to expectations. The coefficient of outgoing wholesale distribution cost in the other sales effort equation is positive, however, as expected. For our sample of manufacturing LBs, sales efforts are a strategy to be used against the wholesaler, who deals with the immediate consumer, rather than the retailer, who deals with the ultimate consumer.

In addition, LBs which operate in industries with a high level of outgoing wholesale distribution cost tend to be more profitable and to have larger market shares. High incoming wholesale expense, which also increases market share, lowers profitability (and both types of sales efforts).

Both incoming and outgoing wholesale expense increase market share, hence concentration; this is consistent with a countervailing power interaction between producer and wholesale distributor. In terms of profitability, wholesale distribution expense favors the shipping party.

H. Transportation

Both incoming and outgoing surface transportation costs have significant positive effects on profitability. This suggests that LBs which operate in industries with high transportation costs operate in markets which are less than national in area. Such expenses also have a significant negative impact on firm share. If firms which operate LBs in industries characterized by high transportation costs integrate into transportation activity, then the firm shares of manufacturing LBs will indeed be less.

Outgoing air transportation expense has marginally significant negative effects on profitability and firm share. The effect on profitability is to be expected if products distributed by air tend to move in national markets.

LBs which operate in industries for which petroleum-related products are important inputs are less profitable, have smaller market shares, and are components of less diversified firms (i.e., have larger firm shares) than would otherwise be the case.

I. Research and Development

Research and development expenditures at the LB level have a statistically significant negative impact on both profitability, market share, and advertising intensity. This suggests that research and development is an important strategy in relatively unconcentrated industries (smaller market shares), where price competition is strong (lower profitability), and that it is an alternative to advertising.

Research and development at the firm level has a positive effect on profitability but a negative impact on both market share and firm share. A firm-level research and development program is apparently the kind of asset which encourages diversification (lower firm shares) and enhances profitability in each industry where it is applied, perhaps by adapting the product to fit the preferences of a particular market segment.[25]

J. Internal Organization

In this sample of divisions of large, diversified manufacturing firms, divisions of firms with a high level of administrative cost at the division level are less profitable and larger in their firm and their industry. Divisions of firms which have a high level of overhead or common administrative cost are more profitable and have larger firm and market shares. An effective corporate management structure enhances profitability at the LB level.

Recall, however, that our measure of profitability at the LB level is gross to the common costs of the firm. By aggregating our LB profitability equation to the firm level, we can compute the implied impact of firm-level administrative costs on firm-level profitability, when firm profitability is net of such administrative costs.

To aggregate our estimated profitability equation to the firm level, we multiply both sides of the equation by firm share and add over all divisions of the firm (see the discussion of equations (33) and (34)). The result is a firm-level gross profitability equation in which one right hand side variable is FADMIN75, with coefficient from Table 15 (since LBADMIN includes traceable administrative costs only and FADMIN includes non-traceable administrative costs only, the two coefficients are not combined after aggregation). To obtain a profitability equation at the firm level for which profitability is net of firm level administrative cost, we then subtract FADMIN75 from both sides of the equation. The right hand side coefficient of FADMIN75 in this equation is 0.9386 - 1 = - 0.0614, which is insignificantly different from zero (t-statistic 0.3704). Corporate supervision enhances LB profitability but has no significant impact on firm profitability.[26]

K. Size

LB size, as measured here by the natural logarithm of LB assets, has a significant positive impact on profitability and a barely significant negative impact on other sales efforts. LBs which are components of large firms tend to have larger market shares, and LBs which operate in large industries tend to have larger firm shares.

The impact of LB size on profitability as estimated here parallels Shepherd [1972a], and contradicts Hall and Weiss [1967].

L. Capital Intensity

We argued above that LBs with a greater capital-sales ratio should be more profitable, reflecting the normal rate of return on capital. In fact, the estimated coefficient of the LB capital-sales ratio is negative and statistically significant. In view of the wide variations observed for this variable within each industry (compare, in Table 7, the range of LBKSR and the range of IKSR), high values of this variable may reflect inefficient factor combinations.

We expect positive coefficients for the firm and industry capital-sales ratios, since they reflect the opportunity cost of capital. These expectations are confirmed.

IV. CONCLUSION

We have examined an enormous range of issues which fall within the field of industrial organization. The following particular results may be singled out:

(1) Profitability serves as a signal for resource allocation among industries and within firms. Rivals move resources into industries where profitability is high, reducing the market share of firms which operate in such industries; firms reallocate resources internally away from divisions which operate in less profitable industries, decreasing the share of such divisions in the firm.

(2) Market share is a significant factor in increasing profitability at the LB level. This may reflect either market power at the LB level or the realization of scale economies or both. In contrast, LBs which operate in concentrated industries tend to be significantly less profitable, all else equal. Possible explanations for this surprising result fall into two broad categories. The benefits of joint market power may be diverted into the protection of some sort of inefficiency. Alternatively, if search costs of customers exploring alternative sources of supply are lower when there are only a few relatively large suppliers, the ability of individual producers to maintain prices above the competitive level may actually be less in concentrated markets.

(3) LBs which are components of more diversified firms tend to be somewhat more profitable than they would otherwise be.

(4) Less profitable LBs spend more on advertising and on other sales efforts per dollar of sales, all else equal. The fact that LBs spend more per dollar on advertising and other sales efforts when profitability is low suggests that strategy turns to product/service differentiation when price competition is intense. The positive impacts of non-advertising sales efforts at the firm level on profitability and on market share suggest that such sales efforts do have some barrier-raising effect. LBs which operate in industries characterized by a high level of advertising tend to be more profitable, to have smaller market shares, and to be components of more diversified firms. Such industries are likely to consist of a number of relatively independent strategic groups, each occupying a distinct segment of product characteristic space.

(5) LBs which invest heavily in research and development are less profitable, all else equal. It may be that research and development is most attractive as a strategy when conventional competition is intense. Neither LB- nor firm-level research and development expenditures increase market share, although firm-level research and development increases LB-level profitability.

(6) The internal organization of the firm - the level within the firm at which administrative costs are incurred - is an important factor in determining the performance of the LBs which constitute the firm. Management at the firm level increases LB profitability; management at the division level does not.

(7) Large LBs are more profitable. LBs which are components of large firms tend to have larger market shares. LBs which operate in large industries tend to be larger in their firm.

(8) There is mixed support for the notion that countervailing power acts to restrain market power. This appears to be the case from the supply side but not the demand side of the market. The impact of sales to the Federal government and to state and local governments on profitability can also be given a countervailing power interpretation.

This study confirms the importance of nonprice competition in industrial markets. The unexpected possibility that more concentrated markets may yield superior performance, in terms of profitability, clearly requires additional analysis.

Appendix

Table 16 reports estimates, corrected for heteroskedasticity, with the four-firm seller concentration ratio (measured in percentage terms) used in place of the approximate Herfindahl index to measure market concentration. Table 17 reports estimates using the approximate Herfindahl index, uncorrected for heteroskedasticity. Table 18 reports estimates using the four-firm seller concentration ratio, uncorrected for heteroskedasticity.

Table 16: Two-Stage Least Squares Estimates (Concentration Measured by CR4)

	PCM75	MS75	FS75	LASR75	LOSR75
Intercept	13.1962*** (4.7506)	-0.052866*** (8.0304)	-0.100091*** (3.2007)	1.1581*** (2.9643)	2.2637*** (2.8136)
<u>Profitability</u>:					
PCM75^E				-0.0084* (1.5092)	-0.1286*** (11.2555)
PCM74		-0.000075*** (3.2783)	0.000423*** (3.3377)		
<u>Market Structure</u>:					
MS75^E	9.8198*** (3.1213)		0.927918*** (23.3113)	-0.0094 (0.0157)	2.0973* (1.7070)
CR472^E	-0.1145*** (5.9726)		0.000026 (0.1397)	0.0043* (1.3521)	-0.0193*** (2.9800)
<u>Firm Structure</u>:					
FS75^E	3.3671** (2.0119)	0.068887*** (16.4989)		0.2345 (0.7050)	0.1859 (0.2714)
DIV75^E	-2.4306* (1.6079)	0.003523 (1.2114)		-0.2822 (0.9104)	-1.5806*** (2.4758)
<u>Advertising</u>:					
LASR75^E	0.1811* (1.4744)	0.000059 (0.3026)	0.000547 (0.5420)		
FASR75^E	-0.3788** (1.7777)	0.000180 (0.4088)	0.005036*** (2.3822)	0.8425*** (23.3371)	-0.6183*** (8.3160)
IASR72^E	0.2554** (1.9953)	-0.000446** (1.6496)	-0.004462*** (3.2277)	0.4118*** (15.7103)	0.3848*** (7.1297)

Table 16: (Continued)

	PCM75	MS75	FS75	LASR75	LOSR75
Other Sales Efforts:					
$LOSR75^E$	-0.4352*** (7.9450)	0.000022 (0.2102)	-0.000416 (0.8820)		
$FOSR75^E$	0.4185*** (5.2428)	0.000423*** (2.6852)	0.000064 (0.0878)	-0.1035*** (7.4837)	0.7258*** (25.4796)
Scale Economies:					
MES	0.4330*** (3.4916)	0.002724*** (9.0603)	-0.001392 (1.1851)		
CDR	-0.0360** (1.7268)	0.000021 (0.4236)	-0.000274* (1.3945)		
Demand Conditions:					
CONS	-2.8804* (1.5113)	-0.004882 (1.1210)	0.002857 (0.1541)	0.4618 (1.1917)	2.2108*** (2.7704)
FEDSR	-2.3154 (0.7911)	-0.003968 (0.6269)	-0.035284 (1.2201)	-0.1547 (0.2755)	-4.5887*** (3.9678)
SLSR	25.9443*** (3.2289)	-0.011114 (0.6143)	-0.059016 (0.8654)	4.3930*** (2.4399)	12.5348*** (3.3806)
GR7475	0.1137*** (5.9462)	0.000042 (0.9246)	0.000198 (1.0312)	0.0019 (0.4792)	0.0170** (2.0636)
EXSR	10.8616** (2.2602)	-0.026205*** (2.4344)	-0.040479 (0.8483)		
IMSR	-2.2458 (0.8871)	0.014007** (1.8558)	0.013940 (0.5820)		

Table 16: (Continued)

	PCM75	MS75	FS75	LASR75	LOSR75
Countervailing Power:					
BCR4	0.0830*** (3.7236)	0.000013 (0.3004)	-0.000245 (1.1253)	-0.0011 (0.2221)	-0.0049 (0.4920)
SCR4	-0.0903*** (2.5311)	-0.000012 (0.1512)	-0.000424 (1.1675)	-0.0064 (0.9448)	-0.0225* (1.6049)
BDISP	6.5860*** (4.3185)	0.002794 (0.8618)	0.009515 (0.6174)	-0.0878 (0.2709)	0.6781 (1.0163)
SDISP	-7.6650*** (2.9662)	-0.002628 (0.4679)	0.019882 (0.6772)	-1.4723*** (2.7654)	-2.7728*** (2.5290)
WASRB				-0.1595** (2.1345)	-0.3481** (2.2617)
WASRS				-0.2240 (0.7504)	4.4368*** (7.2163)
Distribution Expense:					
WSOUT	0.1291*** (4.0367)	0.000177** (1.8658)	0.000112 (0.3561)	-0.0057 (0.9465)	0.0539*** (4.3800)
WSIN	-1.3132*** (5.5414)	0.000920** (1.6650)	0.000447 (0.2026)	-0.0851** (1.8465)	-0.4776*** (5.0325)
RTLOUT	0.0061 (0.2705)	0.000020 (0.3318)	0.000357* (1.5845)	0.0052 (1.0547)	-0.0247*** (2.4365)
RTLIN	0.2751 (0.1307)	-0.005459 (1.0520)	0.002650 (0.1258)	0.3313 (0.7120)	-0.0924 (0.0965)

Table 16: (Continued)

	PCM75	MS75	FS75	LASR75	LOSR75
Transportation:					
SURF OUT	0.1159*	0.000032	-0.001590***		
	(1.5275)	(0.1684)	(3.0725)		
SURF IN	0.3181**	0.000079	-0.003541**		
	(1.7589)	(0.2252)	(2.1898)		
AIR OUT	-2.5304**	0.002703	-0.017526*		
	(1.9401)	(1.0859)	(1.5502)		
AIR IN	1.3405	0.015913	0.027572		
	(0.1854)	(1.0207)	(0.3596)		
PIPE IN	-4.3190***	-0.005831***	0.040850**		
	(6.4586)	(3.0208)	(2.0343)		
Research & Development:					
LBRD75^{E}	-0.3084***	-0.000301***	0.000073	-0.0213**	-0.0144
	(5.5454)	(2.4836)	(0.1209)	(1.9378)	(0.6353)
FRD75^{E}	0.2035***	-0.000476***	-0.002602***	0.0047	0.0501**
	(2.8257)	(2.9536)	(4.1576)	(0.3257)	(1.6839)
Internal Organization:					
LBADMIN75^{E}	-0.3445***	0.000294**	0.001598***		
	(5.3887)	(2.1912)	(2.6176)		
FADMIN75^{E}	0.9379***	0.001038***	0.006711***		
	(5.6679)	(2.9394)	(3.8656)		

Table 16: (Continued)

	PCM75	MS75	FS75	LASR75	LOSR75
<u>Size</u>:					
LOG(LBKAP)^E	0.6362*** (2.4334)			-0.0591 (1.2667)	-0.1258* (1.3092)
LOG(FKAP)^E		0.019177*** (38.3631)			
LOG(IKAP)^E			0.024591*** (9.8369)		
<u>Capital Intensity</u>:					
LBKSR	-5.3346*** (6.7674)				
FKSR	5.1486*** (3.8658)				
IKSR	1.0781 (0.8226)				
DF	2258	2262	2262	2271	2271

* Indicates statistical significance at the 10% level.
** Indicates statistical significance at the 5% level.
*** Indicates statistical significance at the 1% level.

Asymptotic t-statistics in parentheses. Superscript "E" indicates that the variable is treated as endogenous.

Table 17: Two-Stage Least Squares (Uncorrected for Heteroskedasticity)

	PCM75	MS75	FS75	LASR75	LOSR75
Intercept	11.1791***	-0.147889***	-0.236021***	0.8193**	2.0594***
	(3.6122)	(7.8763)	(5.0481)	(2.0564)	(2.5696)
Profitability:					
$PCM75^E$				-0.0112**	-0.1059***
				(2.0434)	(9.6405)
PCM74		0.000151*	0.000684***		
		(1.3308)	(2.4023)		
Market Structure:					
$MS75^E$	6.8523*		1.134975***	0.2739	1.6115
	(1.6189)		(22.9805)	(0.3128)	(0.9149)
$HERF72^E$	-43.4337***		-0.026509	-0.4248	-8.9638***
	(5.3474)		(0.2414)	(0.3245)	(3.4033)
Firm Structure:					
$FS75^E$	2.7747*	0.222796***		0.1647	0.1552
	(1.3682)	(25.2929)		(0.3926)	(0.1839)
$DIV75^E$	-2.7769**	-0.016998**		-0.2726	-2.0739***
	(1.7192)	(1.9875)		(0.8001)	(3.0261)
Advertising:					
$LASR75^E$	0.0882	0.000362	0.000901		
	(0.6925)	(0.5287)	(0.5253)		
$FASR75^E$	-0.1516	-0.000518	0.001854	0.8545***	-0.5229***
	(0.6413)	(0.4107)	(0.5840)	(20.7040)	(6.2982)
$IASR72^E$	0.2352*	-0.002562***	-0.005440***	0.4587***	0.3744***
	(1.6178)	(3.2840)	(2.7619)	(15.5473)	(6.3086)

Table 17: (Continued)

	PCM75	MS75	FS75	LASR75	LOSR75
Other Sales Efforts:					
$LOSR75^{E}$	-0.3630***	0.000007	-0.000900		
	(6.2501)	(0.0216)	(1.1535)		
$FOSR75^{E}$	0.3500***	0.000488	-0.000404	-0.1149***	0.6541***
	(4.0200)	(1.0359)	(0.3466)	(7.2479)	(20.5124)
Scale Economies:					
MES	0.4684***	0.010306***	-0.002079		
	(3.1829)	(17.6023)	(0.9958)		
CDR	-0.0289	-0.000038	-0.000223		
	(1.2476)	(0.3078)	(0.7163)		
Demand Conditions:					
CONS	-3.0442*	-0.031294***	0.072731***	0.5567*	3.0134***
	(1.4375)	(2.8214)	(2.6163)	(1.3104)	(3.5258)
FEDSR	-24.6219**	0.219686***	0.049971	-1.8585	-4.3793
	(2.2919)	(4.0752)	(0.3391)	(0.8358)	(0.9790)
SLSR	29.0932***	0.052427	-0.149492	5.4005***	12.1737***
	(3.3543)	(1.1234)	(1.2813)	(2.9948)	(3.3557)
GR7475	0.1196***	0.000128	0.000153	0.0046	0.0164*
	(5.5411)	(1.1119)	(0.5281)	(1.0498)	(1.8645)
EXSR	8.3906*	-0.089091***	-0.098720*		
	(1.5389)	(3.0685)	(1.3540)		
IMSR	0.1559	0.032222**	0.004087		
	(0.0528)	(2.0408)	(0.1032)		

Table 17: (Continued)

	PCM75	MS75	FS75	LASR75	LOSR75
Countervailing Power:					
BHERF	20.3092**	-0.250562***	-0.059758	1.6879	0.2133
	(2.2134)	(5.3502)	(0.4700)	(0.8806)	(0.0553)
SHERF	-16.5449	0.037485	0.088319	1.9984	-6.3138
	(1.0412)	(0.4471)	(0.4165)	(0.6322)	(0.9928)
BDISP	5.7859***	0.036873***	-0.008637	-0.4587*	-0.4753
	(3.4143)	(4.1759)	(0.3780)	(1.2837)	(0.6612)
SDISP	-3.4040	-0.029920**	0.113019***	-1.6562***	-3.1776***
	(1.1476)	(1.9396)	(2.9417)	(2.6400)	(2.5177)
WASRB				-0.1339*	-0.4032***
				(1.6129)	(2.4142)
WASRS				-0.1767	4.1833***
				(0.5329)	(6.2732)
Distribution Expense:					
WSOUT	0.1088***	0.000372**	0.001066**	-0.0076	0.0528***
	(2.9338)	(1.8724)	(2.1376)	(1.0743)	(3.6827)
WSIN	-1.5837***	0.000845	0.001796	-0.0666*	0.5427***
	(5.8879)	(0.6078)	(0.5142)	(1.2897)	(5.2200)
RTLOUT	-0.0064	0.000072	0.000325	0.0097**	-0.0182**
	(0.2455)	(0.5129)	(0.9208)	(1.8070)	(1.6814)
RTLIN	2.6621	0.009688	-0.003766	0.0611	-0.0877
	(1.1297)	(0.7734)	(0.1197)	(0.1231)	(0.0878)

Table 17: (Continued)

	PCM75	MS75	FS75	LASR75	LOSR75
Transportation:					
SURF OUT	0.1025* (1.2881)	0.001511*** (3.6971)	-0.003246*** (3.1400)		
SURF IN	0.3195** (1.6613)	-0.003820*** (3.7900)	-0.003418* (1.3121)		
AIR OUT	-1.9124* (1.3778)	-0.001367 (0.1838)	0.000592 (0.0318)		
AIR IN	-2.0358 (0.2481)	0.057248* (1.3776)	0.036960 (0.3348)		
PIPE IN	-4.7212*** (5.3116)	-0.029037*** (6.0910)	0.037064*** (3.0273)		
Research & Development:					
LBRD75^{E}	-0.4179*** (6.7793)	0.000180 (0.5411)	0.000641 (0.7801)	-0.0230** (1.7470)	-0.0236 (0.8926)
FRD75^{E}	0.2589*** (3.4150)	0.000659* (1.6032)	-0.004512*** (4.4795)	0.0027 (0.1774)	0.0452* (1.4689)
Internal Organization:					
LBADMIN75^{E}	-0.5047*** (7.2945)	-0.000409 (1.0732)	0.003093*** (3.2711)		
FADMIN75	0.8913*** (4.6651)	0.002808*** (2.7169)	0.004290** (1.6868)		

Table 17: (Continued)

	PCM75	MS75	FS75	LASR75	LOSR75
Size:					
LOG(LBKAP)^E	1.1106*** (3.9916)			-0.0156 (0.2934)	0.0456 (0.4254)
LOG(FKAP)^E		0.023128*** (15.3760)			
LOG(IKAP)^E			0.042993*** (11.3037)		
Capital Intensity:					
LBKSR	-6.8136*** (10.0263)				
FKSR	4.9102*** (3.3368)				
IKSR	1.8587* (1.2972)				
R^2	0.4153	0.5388	0.5103	0.5360	0.6966
DF	2258	2262	2262	2271	2271

* Indicates statistical significance at the 10% level.
** Indicates statistical significance at the 5% level.
*** Indicates statistical significance at the 1% level.

Asymptotic t-statistics in parentheses. Superscript "E" indicates the variable is treated as endogenous.

Table 18: Two-Stage Least Squares (Uncorrected for Heteroskedasticity)

	PCM75	MS75	FS75	LASR75	LOSR75
Intercept	13.9351*** (4.4417)	-0.147983*** (7.8021)	-0.216476*** (4.5918)	0.9992*** (2.3945)	2.0868*** (2.4830)
Profitability:					
$PCM75^E$				-0.0107** (1.9499)	-0.1052*** (9.5014)
PCM74		0.000180* (1.5863)	0.000727*** (2.5492)		
Market Structure:					
$MS75^E$	7.0791** (1.6875)		1.109403*** (22.6941)	-0.1776 (0.2057)	1.1626 (0.6688)
$CR4^E$	-0.1186*** (5.4396)		0.000399* (1.3602)	0.0031 (0.8748)	-0.0220*** (3.0948)
Firm Structure:					
$FS75^E$	2.5951 (1.2813)	0.223122*** (25.3085)		0.2220 (0.5302)	0.1891 (0.2242)
$DIV75^E$	-2.6240* (1.6276)	-0.106474** (1.9256)		-0.2895 (0.8495)	-2.1084*** (3.0719)
Advertising:					
$LASR75^E$	0.1051 (0.8251)	0.000269 (0.3921)	0.000671 (0.3906)		
$FASR75^E$	-0.2067 (0.8773)	-0.000252 (0.1994)	0.002421 (0.7631)	0.8555*** (20.7383)	-0.5304*** (6.3840)
$IASR75^E$	0.2442** (1.6951)	-0.002442*** (3.1509)	-0.005640*** (2.8923)	0.4522*** (15.2955)	0.3801*** (6.3837)

Table 18: (Continued)

	PCM75	MS75	FS75	LASR75	LOSR75
Other Sales Efforts:					
LOSR75[E]	-0.3633*** (6.2795)	0.000049 (0.1561)	-0.000855 (1.0969)		
FOSR75	0.3597*** (4.1424)	0.000456 (0.9690)	-0.000578 (0.4974)	-0.1151*** (7.2900)	0.6591*** (20.7259)
Scale Economies:					
MES	0.4169*** (2.9288)	0.010364*** (17.6038)	-0.003661** (1.8293)		
CDR	-0.0403** (1.7243)	-0.000010 (0.0836)	-0.000146 (0.4690)		
Demand Conditions:					
CONS	-3.1811* (1.4838)	-0.033981*** (2.9925)	0.067894*** (2.3838)	0.4648 (1.0852)	2.6851*** (3.1127)
FEDSR	-0.2894 (0.0893)	-0.078651*** (4.6338)	-0.015557 (0.3558)	-0.0010 (0.0016)	-4.3268*** (3.4210)
SLSR	25.5974*** (2.9233)	0.053658 (1.1359)	-0.178148* (1.5119)	5.3154*** (2.9079)	11.7113*** (3.1811)
GR7475	0.1155*** (5.3291)	0.000145 (1.2501)	0.000118 (0.4037)	0.0043 (0.9760)	0.0172** (1.9351)
EXSR	9.9558** (1.8628)	-0.111058*** (3.9000)	-0.127791** (1.7790)		
IMSR	-0.1317 (0.0446)	0.039114*** (2.4668)	0.009705 (0.2445)		

Table 18: (Continued)

	PCM75	MS75	FS75	LASR75	LOSR75
Countervailing Power:					
BCR4	0.0834*** (3.3931)	-0.000613*** (4.9149)	-0.000307 (0.9144)	-0.0009 (0.1758)	-0.0055 (0.5117)
SCR4	-0.0803** (1.9797)	0.000144 (0.6743)	-0.000717* (1.3256)	-0.0032 (0.4127)	-0.0028 (0.1777)
BDISP	6.6692*** (3.8567)	0.034948*** (3.8922)	-0.012478 (0.5345)	-0.4651 (1.2763)	-0.3301 (0.4497)
SDISP	-4.9234** (1.6553)	-0.028613** (1.8534)	0.112898*** (2.9308)	-1.5814*** (2.5027)	-3.2437*** (2.5487)
WASRB				-0.1397* (1.6098)	-0.3435** (1.9656)
WSARS				-0.1592 (0.4764)	4.2251*** (6.2773)
Distribution Expense:					
WSOUT	0.1426*** (3.7747)	0.000264* (1.3033)	0.000973** (1.9091)	-0.0096* (1.3154)	0.0549*** (3.7174)
WSIN	-1.4864*** (5.5667)	0.000663 (0.4791)	0.001762 (0.5077)	-0.0736* (1.4244)	-0.5312*** (5.1072)
RTLOUT	-0.0072 (0.2762)	0.000040 (0.2860)	0.000334 (0.9417)	0.0097** (1.8060)	-0.0176* (1.6240)
RTLIN	1.5869 (0.6777)	0.008005 (0.6395)	-0.001390 (0.0443)	0.2493 (0.5003)	0.0407 (0.0405)

Table 18: (Continued)

	PCM75	MS75	FS75	LASR75	LOSR75
Transportation:					
SURF OUT	0.1188*	0.001615***	-0.003908***		
	(1.4688)	(3.9110)	(3.7006)		
SURF IN	0.2391	-0.003888***	-0.003925*		
	(1.2165)	(3.7808)	(1.4773)		
AIR OUT	-2.2078*	-0.001170	-0.002923		
	(1.5818)	(0.1558)	(0.1559)		
AIR IN	1.2587	0.043267	-0.003946		
	(0.1530)	(1.0286)	(0.0355)		
PIPE IN	-4.6460***	-0.028986***	0.036653***		
	(5.2322)	(6.0758)	(2.9967)		
Research & Development:					
LBRD75[E]	-0.4107***	0.000082	0.000584	-0.0231**	-0.0233
	(6.6880)	(0.2475)	(0.7117)	(1.7666)	(0.8823)
FRD75[E]	0.2616***	0.000654*	-0.004437***	0.0041	0.0483*
	(3.4542)	(1.5879)	(4.4024)	(0.2662)	(1.5688)
Internal Organization:					
LBADMIN75[E]	-0.5131***	-0.000353	0.003164***		
	(7.4182)	(0.9245)	(3.3408)		
FADMIN75[E]	0.8920***	0.002759***	0.004067*		
	4.6778)	(2.6673)	(1.6001)		

Table 18: (Continued)

	PCM75	MS75	FS75	LASR75	LOSR75
Size:					
$LOG(LBKAP)^E$	1.1147***			-0.0194	0.0487
	(4.0120)			(0.3641)	(0.4538)
$LOG(FKAP)^E$		0.023386***			
		(15.5439)			
$LOG(IKAP)^E$			0.042804***		
			(11.3603)		
Capital Intensity:					
LBKSR	-6.8405***				
	(10.0865)				
FKSR	4.9589***				
	(3.3783)				
IKSR	1.0612				
	(0.7197)				
R^2	0.4178	0.5381	0.5108	0.5360	0.6960
DF	2258	2262	2262	2271	2271

* Indicates statistical significance at the 10% level.
** Indicates statistical significance at the 5% level.
*** Indicates statistical significance at the 1% level.

Asymptotic t-statistics in parentheses. Superscript "E" indicates that the variable is treated as endogenous.

FOOTNOTES

1. Weiss and Pascoe [1981], Mueller [1981], Long [1981], Ravenscraft [1981], among others.

2. Discussed by Weiss [1974, p. 199].

3. The question of the selection of product characteristic/ service combinations is beyond the scope of this paper. See Lancaster [1979] for a recent discussion.

4. A continuous-time version of this model, which does not impose this assumption, is presented in Martin [1982d]. Although we pose the problem in this way primarily to obtain mathematical simplicity, an announced stable price policy may in fact reduce the incentives of customers to explore alternative sources of supply.

5. Study of the scale of initial entry is not without interest, but waits accumulation of a time series sample.

6. For a similar extension of the models of Gaskins [1971], see Martin [1979c].

7. This quotation is used by Adams [1982], in an essay on methodology which merits attention.

8. For a survey, see Caves [1980]. Teece [1981] employs an ingenious alternative approach.

9. Gale [1972, p. 413] ascribes a similar role to market share.

10. See Martin [1982c] for a study of wholesaling LBs.

11. The author has consulted in an antitrust case involving the American Hospital Supply Corporation, which for that reason was excluded from the sample. Comparison of the results reported here with the results of Ravenscraft [1981] for profitability suggest that the sample restrictions imposed here will not critically alter the results.

12. See Long [1981] for evidence that the results of structural estimation at the LB level are robust to alternative methods of allocating common costs.

13. Morris Adelman has suggested in private communication that current profitability may be a better measure of the incentives for resource reallocation than lagged profitability. When current profitability is substituted for lagged profitability in the market share and firm share equations, below, no substantive changes in the nature of the results takes place.

14. Partly because of differences in industry definition and partly because of the treatment of vertical integration in the Line of Business survey, market share estimates for sum industries sum to more than one, and in some cases exceed one. Ravenscraft [1981] employs an adjusted set of market share figures. Early versions of this paper were estimated with the market share estimates employed here and with preliminary versions of the Ravenscraft figures; empirical results were robust.

15. Berry [1974] finds no evidence that diversification increases concentration; see also Scherer [1980, Chapter 12] and Caves [1981].

16. This may suggest the estimation of a single equation explaining LB sales. Preliminary investigation of such a model indicated that such an equation would display a high degree of heteroskedasticity and involve a complex combination of interaction terms, making interpretation difficult.

17. Scherer [1981] employs Line of Business data in a study of research and development.

18. In addition, LOG(LBKAP) and LOG(IKAP) together will be highly collinear with market share; LOG(LBKAP) and LOG(FKAP) will be highly collinear with firm share.

19. Exogeneity is a matter of degree, and some of the variables which we treat as exogenous are arguably endogenous. This is true, for example, of the LB capital-sales ratio, which our results suggest is not given by technical production relationships. Our classification is acceptable for the purposes of this study; for other purposes, it might well have to be revised.

20. James Langenfeld has pointed out in private communication that there tax advantages associated with export sales.

21. The criticisms by Guth et al [1976] of Lustgarten [1975] are not compelling. There are, of course, an infinite number of indices of estimated buyer (or supplier) concentration which can be computed from publicly available data. Lustgarten's summarizes in a single index characteristics of the concentration of all buying industries; the index proposed by Guth et al uses only a subset of this information.

22. These variables exclude an industry's purchases of its own output and exclude negative transactions. For further discussion, see Martin [1982b].

23. This may suggest an error components model of the error structure, which is computationally difficult in view of the unbalanced nature of the sample. Tables 17 and 18 in the Appendix report estimates which are not corrected for heteroskedasticity.

24. See Martin and Ravenscraft [1982] for further discussion. Tables 16 and 18 report results obtained using the four-firm seller concentration ratio in place of the approximate Herfindahl index as a measure of market concentration.

25. James Langenfeld has pointed out that even though we have treated R & D expenditures as endogenous, there may none the less be a simultaneity problem here. It may be that if we were able to estimate a properly specified equation explaining LBRD75, we would find a negative coefficient for PCM75; this may be the relationship that we are picking up here.

26. I am grateful to David Ravenscraft for clarifying discussion of this point. For wholesaling LBs, the implied effect of FADMIN on firm-level net profitability is positive, not negative; see Martin [1982c].

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