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COMPETITION AND MARKET SHARE VARIATION

Jonathan D. Ogur

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I. Introduction

Measures of market share variation have long appealed to economists as possible indicators of competition. 1/ However, the existence of competing hypotheses to explain such variation makes the usefulness of these indicators uncertain.

Gort has argued that share instability indicates price competition. 2/ His empirical test considered relationships between instability and such industry structure variables as seller concentration, product differentiation, and the demand growth rate. Concentration was assumed to stabilize market shares by facilitating both explicit and tacit collusion. Product differentiation was alleged to protect existing firms' shares from encroachment by either actual or potential competitors. Gort also hypothesized that rapid demand growth generates instability given variable lags in capacity adjustment by suppliers. We will refer to Gort's explanation of share instability as the "Price Competition" hypothesis.

An opposing view has been offered by Weiss. 3/ Arguing that model or style changes are the main source of share instability and assuming the "Law of Proportionate Effect", he predicted increasing concentration in "differentiated durables" relative to other industries. Thus, Weiss asserted that, rather than reflecting competitive performance, instability causes anti-competitive industry structure change. Weiss' view of share instability will be called the "Non-Price Competition" hypothesis.

A third instability explanation can be derived from the Stigler oligopoly model. 4/ It has been shown that the model generates random market share fluctuations in the absence of price and non-price competition and that these fluctuations are systematically related to such industry structure variables as the number of sellers, the probability of repeat buying, the number of buyers, and the new buyer appearance rate. 5/ This explanation of share variation can be thought of as the "Random" hypothesis.

This paper will develop a generalized Stigler-type oligopoly model. With it, we will predict the signs of relationships between a share instability measure and several industry structure variables under the Random hypothesis. These signs will be contrasted with those implied by the Price and Non-Price Competition hypotheses. Then with market share and industry structure data for the largest 4 firms in 9 industries, we will attempt to discriminate among these hypotheses.

II. A Generalized Stigler-type Oligopoly Model

The original Stigler model assumes a market of equal sized firms. Each buyer purchases one unit of output from a chosen seller in each time period and then reassesses his supplier choice decision. The probability of repeat buying is the same for every firm. Finally, new buyers enter the market at a constant rate.

In our model, we will relax the assumptions of equal sized firms, one unit per buyer, and uniform repeat buying probability. Although we permit buyers to purchase more than one unit per period, we require that a supplier choice decision be made for each unit and that the unit be the same for all buyers. We also assume that the number of units sold is growing at a constant rate. Next, we will derive the i-th firm's market share.

Assume that n firms sold a total of m units in an initial period. Consider the i-th seller with initial period sales s_{oi} where $m = \sum_{i=1}^{n} s_{oi}$. Let b_{ij} be the i-th firm's j-th initial period unit sold. Assume further that, with probability p, buyers do not search for a new present period seller, but, by force of habit, continue with their initial period supplier.

From the i-th seller's present period viewpoint, the b_{ij} can be thought of as s_{oi} independent binomially distributed random variables where

$$b_{ij} = 1 \text{ with probability } p$$
$$= 0 \text{ with probability } 1-p$$

Let $b_i = \sum_{j=1}^{s_{oi}} b_{ij}$ be the number of sales retained by the i-th seller due to habit buying. The expected value of b_i is

$$E(b_i) = s_{oi}\, p \qquad (1)$$

and the variance is

$$Var(b_i) = s_{oi}\, p(1-p). \qquad (2)$$

Of the buyers who engage in search, some will return to their old supplier, others will find a new one. Assume that, on average, the i-th seller attracts s_{oi}/m of total present period sales to searchers (i.e., a share equal to his overall initial period market share). Let c_{ik} be one of these i-th firm sales and the k-th in the market. From the i-th seller's viewpoint, the c_{ik} are m independent binomially distributed random variables where

$c_{ik} = 1$ with probability $(s_{oi}/m)(1-p)$

$= 0$ with probability $1 - (s_{oi}/m)(1-p)$

Let $c_i = \sum_{k=1}^{m} c_{ik}$ be the number of these sales by the i-th firm.

Then

$$E(c_i) = s_{oi}(1-p) \tag{3}$$

and $$Var(c_i) = s_{oi}(1-p)[1-(s_{oi}/m)(1-p)] \tag{4}$$

Next, assume that total sales grow at the rate g from the initial period to the present period. Assume also that, on average, the i-th seller attracts s_{oi}/m of these new sales. Let e_{it} be one of the i-th seller's new sales and the t-th in the market. Then, to that seller, the e_{it} are gm independent binomially distributed random variables such that

$e_{it} = 1$ with probability s_{oi}/m

$= 0$ with probability $1-(s_{oi}/m)$.

The number of these sales made by the i-th firm is

$$e_i = \sum_{t=m+1}^{(1+g)m} e_{it}$$

with mean

$$E(e_i) = g\, s_{oi} \tag{5}$$

and variance

$$Var(c_i) = g\, s_{oi}[1 - (s_{oi}/m)]. \tag{6}$$

Let s_{1i} be the i-th firm's present period sales.

Then $$s_{1i} = b_i + c_i + e_i \tag{7}$$

with expected value

$$E(s_{1i}) = E(b_i) + E(c_i) + E(ei)$$

Substituting from (1), (3), and (5) and combining terms

$$E(s_{1i}) = s_{oi}(1 + g) \qquad (8)$$

Thus, the i-th firm's sales are expected to grow at the industry sales growth rate, leaving its market share unchanged. In other words, $E(S_{oi}) = E(S_{1i})$, where $S_{oi} = \frac{s_{oi}}{m}$ and $S_{1i} = \frac{s_{1i}}{(1+g)m}$.

The variance of S_{1i} is

$$Var(S_{1i}) = \frac{1}{(1+g)^2 m^2} Var(b_i) + Var(c_i) + Var(e_i) + 2 [Cov(b_i, c_i) +$$

$$Cov(b_i, e_i) + Cov(c_i, e_i)]$$

It can be shown that

$$Cov(b_i, c_i) = -p(1-p)(s_{oi}^2/m) \qquad (9)$$

and that

$$Cov(b_i, e_i) = Cov(c_i, e_i) = 0. \quad \underline{6/} \qquad (10)$$

Substituting from (2), (4), (6), (9), and (10) and combining terms,

$$Var(S_{1i}) = \frac{(p^2 - g - 1)[s_{oi}^2/m) - s_{oi}]}{(1+g)^2 \quad m^2}. \qquad (11)$$

Next, we introduce the more general notion of repeat buying to replace the concept of habit buying. Let p_i^* be the probability that a given sale will be made by the i-th firm in both periods.

Then

$$p_i^* = p\,[1-(s_{oi}/m)] + (s_{oi}/m). \quad \underline{7/} \qquad (12)$$

For the industry as a whole, the probability that a given sale will be made by the same supplier in both periods is

$$p^* = p\,(1-H)+H \qquad (13)$$

where $H = \sum_{i=1}^{n} (s_{oi}/m)^2$

is the Herfindahl Concentration Index. 8/

Substituting for p from (13) into (11) and simplifying further

$$Var(s_{1i}) = \frac{[(\frac{p^* - H}{1 - H})^2 - g - 1]\,(S_{oi}^2 - S_{oi})}{(1 - g)^2 m} \qquad (14)$$

Thus, we have shown that under the Random hypothesis, the i-th firm's share variance is a function of the industry repeat buying probability, the Herfindahl Index, the industry sales growth rate, the firm's initial period share, and total initial period industry sales. Next, we will differentiate the i-th firm's share variance (V_i) partially with respect to each of these variables.

$$\frac{\partial V_i}{\partial p^*} = \frac{(S_{oi}^2 - S_{oi})\ 2\ (p^* - H)}{(1+g)^2 m\ (1-H)^2} < 0$$

$$\frac{\partial V_i}{\partial H} = \frac{(S_{oi}^2 - S_{oi})\ (-2)(p^* - H)(1-p^*)}{(1+g)^2\ m\ (1-H)^3} > 0$$

$$\frac{\partial V_i}{\partial g} = \frac{(S_{oi}^2 - S_{oi})\ \left[-2 \left(\frac{p^* - H}{1 - H} \right)^2 + g + 1\right]}{(1+g)^3 m} \gtrless 0$$

$$\frac{\partial V_i}{\partial S_{oi}} = \frac{\left[\left(\frac{p^* - H}{1 - H} \right)^2 - g - 1 \right]\ (2\ S_{oi} - 1)}{(1+g)^2 m} \gtrless 0$$

if $S_{oi} \lessgtr 1/2$

$$\frac{\partial V_i}{\partial m} = \frac{\left[\left(\frac{p^* - H}{1 - H} \right)^2 - g - 1 \right]\ (S_{oi}^2 - S_{oi})}{(1+g)^2\ m^2} < 0$$

Table 1 presents the signs of these partial derivatives and contrasts them with the signs of predicted relationships between V_i and the industry structure variables under the Price and Non-Price Competition hypotheses.

The signs predicted by the Price Competition hypothesis have intuitive appeal. If share variation reflects the intensity of price rivalry, then seller concentration and product differentiation should dampen such variation, while rapid growth should tend to amplify it. On the other

Table 1

Predicted signs of relationships between firm share variation and industry structure variables under three competing hypotheses 9/

Industry Structure Variable	Hypothesis: Price Competition	Non-Price Competition	Random
Repeat Buying Probability (p^*)	NI	NI	-
Herfindahl Index (H)	-	NI	+
Sales Growth Rate (g)	+	NI	+ -
Market Share (S_{oi})	NI	NI	+ -
Industry Size (m)	NI	NI	-
Product Differentiation (d)	-	+	NI

NI = not included.

hand, the signs derived from the generalized Stigler model under the assumption of no price cutting (i.e., the Random hypothesis) lack obvious intuitive appeal. A tendency for seller concentration to amplify random share fluctations and for initial market share to augment subsequent variation below a share of 50 percent simply follow from the model's assumptions. The Non-Price competition hypothesis predicts only that product differentiation will increase market share fluctuation.

Examination of table 1 reveals that we may be able to discriminate between the Price Competition and Random hypotheses based on the sign of an observed relationship between share variation and the Herfindahl Index. If share variation indicates price competition, then we predict relatively stable firm shares in concentrated industries, cet. par. On the other hand, if share variation is merely random, then firms in concentrated industries will tend to have unstable shares.

The sign of the share variation-product differentiation relationship may permit discrimination between the Price and Non-Price Competition hypotheses. If the Price Competition hypothesis is correct, we should observe more stable shares in differentiated product industries. If, on the other hand, the Non-Price Competition hypotheses is the right one, then firms in differentiated goods industries will have relatively unstable shares.

III. Data

In an unpublished doctoral dissertation, Cooke used output data for individual firms in the following industries: air transport, aluminum, automobiles, beer, cigarettes, gasoline, steel, sulphur, and heavy trucks. Output measures, periods of data availability, and original data sources are presented in appendix B. 10/

The data were used to compute a mean market share and a market share variance for each of the four leading firms in each of the nine industries. If all firms were included, the market share of one firm in each industry would not be independent of the others. Four was the largest number of independent market shares obtainable from all nine industries. The data were also used to compute a number of industry structure variables. (See table 1). In the next section, we specify a regression model in terms of these structural variables. Then, with the model, we attempt to discriminate among the three competing explanations of market share variation.

IV. Empirical Test

It may not be possible to estimate a relationship derived from equation (14). In particular, data on p^* are not readily available. 11/ Even if such data were available, the appropriate functional form is not obvious. Nevertheless, it may be useful to estimate some simple specifications in order to gain some information on the signs of relationships between firm market share variance and a number of industry and firm characteristics. For estimation purposes we considered both linear and logarithmic forms of the following model:

$$V_{ij} = V_{ij}(H_j, G_j, F_j, S_{ij}, D_j, E_j) \qquad (15)$$

where V_{ij} = market share variance of the i-th firm in the j-th industry

H_j = average Herfindahl Index for the j-th industry

G_j = average annual growth rate for the j-th industry

F_j = fluctuations about growth trend for the j-th industry 12/

S_{ij} = average market share of the i-th firm in the j-th industry

D_j = 1 for differentiated product industries
0 for undifferentiated product industries 13/

and E_j = gross entry and exit rate for the j-th industry. 14/

The F_j and E_j variables have been added to those considered by the studies cited above. Entry and exit might disrupt collusive agreements in addition to their arithmetic effect on existing firms' shares. Also, growth instability, as well as rapid growth, might disrupt such agreements. Recent research has tended to support those relationships. 15/

Results of estimating the model in linear form are presented in equations (16) and (17). 16/

$$\underset{(515)}{V_{ij} = -931} + \underset{(26.0)}{62.4^{b}\,H_j} - \underset{(40.0)}{77.2\,G_j} - \underset{(36.8)}{72.2\,F_j} + \underset{(14.1)}{649^{a}\,S_{ij}} + \underset{(280)}{224\,D_j} + \underset{(5.08)}{13.9^{a}\,E_j} \qquad (16)$$

$$\bar{R}^2 = 0.50$$

$$F = 6.86^{a}$$

$$\underset{(458)}{V_{ij} = -745} + \underset{(26.9)}{61.7^{b}\,H_j} - \underset{(40.7)}{79.3\,G_j} - \underset{(47.7)}{80.2\,F_j} + \underset{(14.2)}{64.7^{a}\,S_{ij}} + \underset{(450)}{162\,D'_j} + \underset{(5.56)}{14.5^{a}\,E_j} \qquad (17)$$

$$\bar{R}^2 = 0.49$$

$$F = 6.66^{a}$$

a = significant at greater than the 1 percent level.
b = significant at greater than the 5 percent level, but less than the 1 percent level.

In these equations the coefficient of average market share (S_{ij}), the Herfindahl Index (H_j), and the gross entry and exit index (E_j) are significantly greater than zero at conventional levels. 17/ The positive E_j coefficient is consistent with the findings of Caves and Porter cited above. In the cases of S_{ij} and H_j, the positive relationships observed are consistent with the Random hypothesis. Since all average shares in the sample were less than one half, the positive S_{ij} coefficient observed was also predicted by that hypothesis. While inconsistent with above cited studies by Gort and Caves and Porter, the positive H_j coefficient suggests that, for our sample, the random share-variation - augmenting effects of higher seller concentration appear to outweigh any dampening due to reduced price concentration. This somewhat surprising result is, however, consistent with Qualls' view of contrasting price setting arrangements under loose and tight oligopoly. 18/

Briefly, Qualls suggests that in highly concentrated oligopolies, "mutual trust and the interfirm flow of information" yield effective behavioral coordination. The result is price flexibility and uniformity approaching those of pure monopoly. Under moderate to lowly concentrated oligopoly, poorer inter-firm information flows (due to large number of firms) result in greater uncertainty and mistrust. The only way to achieve even slightly supernormal profits may be to adhere to a rigid pricing rule, e.g., "standard unit cost plus customary markup." The Price competition hypothesis stated that collusive agreements tended to break down more in loose oligopoly causing greater share variation. In contrast, Qualls argues that such oligopolies have developed a type of agreement that economizes on relatively expensive information about other firms' activities and is less subject to breakdown under normal circumstances. 19/ To the extent that such arrangements are successful, market share variation may be no different in loose oligopolies than in tight ones, except for the influences postulated in our Random hypothesis.

V. Qualifications

While these results are of interest to the debate on whether share instability primarily reflects price competition, several qualifications should be noted. As indicated above, relevant explanatory variables have been omitted from the model for reasons of data unavailability. Also, recent work suggests that vertical integration, custom building of products, product age, and product R and D expenditures may also be related to share instability. 20/ To include such variables, new data sources will probably have to be tapped (e.g., FTC Line of Business data). Such data sources would permit consideration of samples larger than the 36 leading firms in nine industries used here. Third, the data used were collected from several sources, each with its own definitions and procedures. 21/ Use of data from a single source would reduce these data problems. Finally, the analysis has thus far assumed that industry structure is determined exogenously. Under this assumption we have considered three competing explanations of market share instability. Yet one of these hypotheses, the Non-Price Competition one, is based of the "Law of Proportionate Effect", which assumes that seller concentration (an element of market structure) is determined in part by market share instability. Hence, our ordinary least squares results are inconsistent. Further work should be directed to handling these problems.

Footnotes

1/ For an extensive discussion of this literature, see J.D. Ogur, Competition and Market Share Instability, Staff Report to the Federal Trade Commission No. R-6-15-31, August 1976, pp. 4-25.

2/ M. Gort, "Analysis of Stability and Change in Market Shares," Journal of Political Economy, LXXXI, February 1963, pp. 54-55.

3/ L.W. Weiss, Testimony in Hearings On Economic Concentration, Senate Subcommittee on Antitrust and Monopoly, Part II, March 1965, pp. 728-743, and "Factors in Changing Concentration" Review of Economics and Statistics, XXXVI, February 1963, pp. 70-77.

4/ G.J. Stigler, "A Theory of Oligopoly," Journal of Political Economy, LXXII, February 1964, reprinted in The Economics of Industry, Irwin, 1968, pp. 49-52.

5/ See Ogur, pp. 49-60.

6/ Proofs of these propositions are given in Ogur, pp. 67 and 68, for a Stigler-type model with equal-sized sellers and constant repeat buying probability. The proofs for our generalized Stigler-type model are presented in appendix A.

7/ Proof:

$$p^* = \frac{p s_{oi} + (1 - p)\,(s_{oi}/m)\, s_{oi}}{s_{oi}}$$ where s_{oi} is the number of i-th firm habit buyers and $(1 - p)\,(s_{oi}/m)\, s_{oi}$ is the number of i-th firm searchers who return to that firm.

$$= p + (1 - p)\,(s_{oi}/m)$$
$$= [\,1 - (s_{oi}/m)]\, p + (s_{oi}/m)$$

8/ Proof:

$$p^* = \frac{\sum_{i=1}^{n} p\, s_{oi} + \sum_{i=1}^{n} (1 - p)\,(s_{oi}/m)\, s_{oi}}{m}$$

where $\sum_{i=1}^{n} p\, s_{oi}$ is the total number of habit buyers and $\sum_{i=1}^{n} (s_{oi}/m) s_o$ is the total number of searchers who return to their initial period supplier.

$$= p + (1 - p) \sum_{i=1}^{n} (s_{oi}/m)^2 \quad \text{since} \quad \sum_{i=1}^{n} s_{oi}/m = 1.$$

$$= p\,[\,1 - \sum_{i=1}^{n} (s_{oi}/m)^2] + \sum_{i=1}^{n} (s_{oi}/m)^2 \quad \text{q.e.d.}$$

9/ Also presented are the predicted signs for a product differentiation variable based on the discussion on page 1.

10/ Data were obtained from E.F. Cooke, Sr., "Market Share Measures of Rivary" (doctoral dissertation), Case Western Reserve University, 1975. Cooke, in turn, found these data in various trade publications (see appendix B). Since the sales or production figures are not on a consistent unit basis (in some cases dollar figures are given; in others, physical units), the use of an industry size variable was precluded.

11/ While repeat buying rates may be related to product differentiation, the sign of the relationahip could be either positive or negative.

12/ An exponential growth curve was fitted to the output measure for each industry. G_j is the regression coefficient of time for the j-th industry. F_j is the standard error of estimate of the j-th industry's growth curve.

13/ As an alternative "product differentiation" variable, D_j' was used in place of D_j where $D_j' = 1$ for consumer and durable equipment industries

$= 0$ for other industries.

14/ E_j = number of entering and exiting firms divided by the number of years minus one for the j-th industry.

15/ See R.E Caves and M.E. Porter, "Market Structure, Oligopoly, and Stability of Market Shares", Harvard Institute of Economic Research, Discussion Paper #478, May 1976.

16/ Standard errors of estimate are in parentheses below their respective regression coefficients.

a = significant at greater than the 1 percent level.
b = significant at greater than the 5 percent level, but less than the 1 percent level.

17/ In the logarithmic equations, only the average market share variable was significant (positive).

18/ P.D. Qualls, "Market Structure and Price-Cost Margin Flexibility in American Manufacturing, 1958-70, Federal Trade Commission, Bureau of Economics, Working Paper No. 1, pp. 7 and 8.

19/ Qualls, pp. 10 and 11.

20/ Caves and Porter, p. 23.

21/ See appendix B.

Appendix A

Claim $\mathrm{Cov}(c_i, e_i) = 0$

$$\mathrm{Cov}(c_i, e_i) = E(c_i e_i) - E(c_i)E(e_i)$$
$$= 0$$

if $E(c_i e_i) = E(c_i)E(e_i)$.

However $$E(c_i e_i) = E\left(\sum_{k=1}^{m} c_{ik}\right)\left(\sum_{l=m+1}^{(1+g)m} e_{it}\right)]$$
$$= \sum_{k=1}^{m} \sum_{l=m+1}^{(1+g)m} E(e_{ik})\, E(e_{it})$$

since c_{ik} and e_{it} are independent for any k=l.

Thus $E(c_i e_i) = E(e_i)\ E(e_i)$, q.e.d.,

and similarly for $\mathrm{Cov}(b_i, e_i)$.

We also claim that $\mathrm{Cov}(b_i c_i) = -\ p\ (1-p)\ (s_{oi}^2 / m)$.

proof:

$$\mathrm{Cov}(b_i, c_i) = E(b_i c_i) - E(b_i)\ E(c_i)$$

where $$E(b_i, c_i) = \sum_{j=1}^{s_{oi}} \sum_{k=1}^{m} E(b_{ij} c_{ik}).$$

However, for j=k=1,2, . . . , s_{oi}, if $b_{ij} = 1$,

then $c_{ik} = 0$ and thus $E(b_{ij}\ c_{ik}) = 0$.

Hence

$$E(b_i c_i) = \sum_{j=1}^{s_{oi}} \sum_{k=1}^{m} E(b_{ij} c_{ik})$$
$$= [s_{oi}\ j{=}k\ \ (m-1)]\ [p\ (1-p)\ (s_{oi}/m)] \qquad (18)$$

Where the first term in brackets is the number of $E\ (b_{ij}\ C_{ik})$ such that j=k and the second bracketed term is the probability that $(b_{ij}, c_{ik}) = (1,1)$ for any j=k.

Substituting from (1), (3), and (18) and combining terms,

$\mathrm{Cov}(b_i, c_i) = -p\ (1-p)\ (s_{oi}^2 / m)$ q.e.d.

Appendix B

Industry	Time Period	Output Measure	Source
Air transport	1949-69	Overall air transport revenues, domestic operations, domestic trunk carriers (million of dollars).	CAB *Handbook of Airline Statistics*,, various issues.
Aluminum	1948-66	Primary domestic aluminum production (thousand short tons).	*Moody's* and Annual Reports, various issues.
Automobiles	1946-72	Production in units.	Ward's Communications Inc., *Ward's Automotive Yearbook*, various issues.
Beer	1948-73	Domestic Brewery sales (millions of barrels)	Research Company of America, *Brewing Industry Survey* and *Advertising Age*, various issues.
Cigarettes	1950-73	Domestic output (billions of cigarettes)	J.C. Maxwell, *Historial Trends in the Tobacco Industry*, various issues and *Barron's*, 10/29/73.
Gasoline	1969-73	Motor gasoline sales (billions of gallons)	*National Petroleum News Factbook Issue*, various years.

Appendix B
(continued)

Industry	Time Period	Output Measure	Source
Steel	1953-73	Domestic steel shipments, integrated producers (million of tons).	Age and American Iron and Steel Institute, Report, various issues.
Sulphur	1960-69	Sulphur production (million of long tons)	Moody's, Annual Reports, and U.S. Bureau of of Mines, Minerals Yearbook, various issues.
Heavy Trucks	1960-72	Domestic truck production, 26,001 pounds and over gross vehicle weight (thousands of units)	Ward's Communications, Inc., Ward's Automotive Yearbook, various issues.

Table 1

Observation	Industry	Firm	Number of Years	Average Market Share ($\times 10^2$)	Market Share Variance ($\times 10^6$)	Average Herfindahl Index ($\times 10^2$)	Product Differentiation	Product Durability ~~($\times 10^2$)~~	Gross Entry and Exit Index ($\times 10^4$)	Industry Growth Rate ($\times 10^2$)	Industry Growth Instability Index ($\times 10^2$)
1	Air transport	United	21	20.5641	557.54	14.1219	1	0	30	11.7811	6.5176
2	"	American	21	20.8764	343.05	14.1219	1	0	30	11.7811	6.5176
3	"	TWA	21	14.1223	45.99	14.1219	1	0	30	11.7811	6.5176
4	"	Eastern	21	14.2112	300.77	14.1219	1	0	30	11.7811	6.5176
5	Aluminum	Alcoa	19	41.3535	5524.12	30.9738	0	0	44	8.4652	13.5965
6	"	Reynolds	19	27.3378	427.35	30.9738	0	0	44	8.4652	13.5965
7	"	Kaiser	19	23.9144	633.48	30.9738	0	0	44	8.4652	13.5965
8	"	Anaconda	12	2.9083	48.59	30.9738	0	0	44	8.4652	13.5965
9	Steel	U.S. Steel	21	28.8479	716.82	14.2554	0	0	35	1.6776	11.4951
10	"	Bethlehem	21	17.1447	35.17	14.2554	0	0	35	1.6776	11.4951
11	"	National	21	7.3714	157.66	14.2554	0	0	35	1.6776	11.4951
12	"	Republic	21	8.6684	11.83	14.2554	0	0	35	1.6776	11.4951
13	Heavy Trucks	International	13	26.4003	593.86	16.9453	1	1	25	8.2199	10.6144
14	"	Ford	13	13.1242	877.97	16.9453	1	1	25	8.2199	10.6144
15	"	GM	13	15.0365	382.72	16.9453	1	1	25	8.2199	10.6144
16	"	Mack	13	15.4185	137.34	16.9453	1	1	25	8.2199	10.6144
17	Sulphur	Freeport	10	38.1896	1168.83	28.7050	0	0	11	7.4195	2.8255
18	"	Texas Gulf	10	33.1030	522.53	28.7050	0	0	11	7.4195	2.8255
19	"	Pan American	10	14.4355	221.09	28.7050	0	0	11	7.4195	2.8255
20	"	Jefferson Lake	10	7.9905	420.18	28.7050	0	0	11	7.4195	2.8255
21	Cigarettes	Reynolds	24	30.5186	864.93	21.5164	1	0	4	1.9972	4.2568
22	"	Philip Morris	24	11.7665	1391.93	21.5164	1	0	4	1.9972	4.2568
23	"	Brown & Williamson	24	11.4233	1455.30	21.5164	1	0	4	1.9972	4.2568
24	"	American	24	25.7649	2682.14	21.5164	1	0	4	1.9972	4.2568
25	Automobiles	GM	27	48.6282	2754.71	34.3715	1	1	23	3.3004	21.3810
26	"	Chrysler	27	17.3530	1361.65	34.3715	1	1	23	3.3004	21.3810
27	"	Ford	27	26.3051	1220.43	34.3715	1	1	23	3.3004	21.3810
28	"	Nash-AMC	27	3.8147	288.34	34.3715	1	1	23	3.3004	21.3810

Observation	Industry	Firm	Number of Years	Average Market Share (X10²)	Market Share Variance (X10⁶)	Average Herfindahl Index (X10²)	Product Differentiation	Product Durability ~~(X10²)~~	Gross Entry and Exit Index (x10²)	Industry Growth Rate (X102)	Industry Growth Instability Index (X10²)
29	Beer	Anheuser-Busch	26	10.9018	2447.45	4.2792	1	0	124	1.9334	6.8212
30	"	Schlitz	26	8.4682	784.12	4.2792	1	0	124	1.9334	6.8212
31	"	Pabst	26	6.3259	535.46	4.2792	1	0	124	1.9334	6.8212
32	"	Coors	26	2.9904	497.69	4.2792	1	0	124	1.9334	6.8212
33	Gasoline	Texaco	5	9.5233	3.00	5.9598	1	0	25	5.0038	.5877
34	"	Shell	5	8.8491	8.48	5.9598	1	0	25	5.0038	.5877
35	"	Exxon	5	8.4938	15.04	5.9598	1	0	25	5.0038	.5877
36	"	Amoco	5	8.3052	0.93	5.9598	1	0	25	5.0038	.5877