



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Industry, Control
Organization, etc.
C

INDUSTRY STRUCTURE AND PROFITABILITY

Norman R. Collins

Professor of Agricultural Economics and Business Administration

and

Lee E. Preston

Professor of Business Administration

University of California, Berkeley

Paper prepared for
Western Economic Association Annual Meeting
Corvallis, Oregon
August 22-23, 1968

Recent studies have yielded evidence of a significant association between certain industry structure characteristics and indicators of industry profitability [4, 5, 6, 8, 9, 10]. This evidence has generally supported the hypothesis, derived from economic theory, that high concentration and significant entry barriers are associated with high rates of return and price-cost margins. Our own work in this area [1, 2, 3,] has been based upon the extensive collection of data for SIC four-digit manufacturing industries published by the U.S. Census. Concentration data are available for these Census industries, and we have constructed for analytical purposes a profitability indicator, the percentage price-cost margin, that can be computed directly from Census data.

Our initial analysis of these data for 1958 and 1963 revealed a significant and positive association between measured four-firm concentration and the computed margin. However, a large part of the variation in margins among industries remained unexplained, and we have subsequently examined the influence of additional aspects of industry structure on the concentration-margins relationship. An obvious approach to further analysis was the grouping of industries into subsamples with similar characteristics. In principle, the more accurately industries are defined and the greater the similarities (other than structure) among them, the more clearly the impact of structural differences should be revealed. A priori, we hypothesized a greater similarity

among industries within the same broad areas of economic activity than among industries selected at random. We therefore classified the four-digit industries into their respective two-digit groups and conducted a cross-sectional analysis on this basis. As we have reported previously, we found significant associations within some two-digit industry groupings and not within others. Further, the coefficients for the statistically significant relationships varied considerably in value. These results were somewhat perplexing in view of the significant association found both in the entire collection of four-digit industry data and in the analysis of larger and less well-defined industry aggregates. We have therefore attempted to identify other characteristics and variables that might be expected on theoretical grounds to account for the presence or strength of a significant concentration-margins association, and to analyze the 1963 data in the light of these expectations. This paper summarizes the essential rationale of our work and our major previous results, and presents our more recent findings in some detail.

Concentration and Price-Cost Margins

Our basic hypothesis is that there is a positive association among industries between four-firm concentration ratios and indicators of profitability. Although previous studies of this hypothesis have typically used some measure of rate of return on assets or equity as the profitability indicator, rate of return data are not directly available for the four-digit industry classifications for which concentration ratios are computed. Some form of averaging or alternative data-generating

procedure is therefore required. Our solution to this problem has been to construct a profitability index that can be computed directly from Census data for the four-digit industries. Our margin index is defined as the difference between industry gross revenues and direct costs, expressed as a percentage of revenues. The details of this computation are explained in the Appendix.

The percentage price-cost margin was selected both for its computability and for its more general conceptual relevance. The market structure model underlying our analysis deals with the relation between prices and costs and with the discrepancy between them that gives rise to profits. The profitability of the firm as a fiscal unit--involving debt-equity ratios, degree of financial consolidation, intertemporal shifts of income and expense for tax purposes, etc.--is a larger and somewhat different matter. The margin is, if anything, the simpler concept, and its computation is subject to fewer essentially arbitrary and possibly distorting adjustments.

The major deficiency in the price-cost margin as a profit indicator arises from the varying importance of fixed costs among industries. Under equally competitive long-run conditions, margins over variable costs would be higher in industries with higher fixed-variable cost ratios. Thus, if there are substantial variations in the importance of fixed or capital costs among industries, these variations must be specifically taken into account in the interpretation of observed differences in their price-cost margins.

The gross association between four-firm concentration, margins, and capital-output ratios in 1963 may be observed in Table 1, which

TABLE 1

AVERAGE PRICE-COST MARGINS AND CAPITAL-OUTPUT RATIOS
FOR 417 FOUR-DIGIT MANUFACTURING INDUSTRIES
CLASSIFIED BY CONCENTRATION RATIO DECILES, 1963

Concentration Ratio Decile	Number of Industries	Average Price- Cost Margin (percent)	Average Capital- Output Ratio
1 - 10	20	23.3	26.5
11 - 20	79	21.8	26.9
21 - 30	76	24.0	32.7
31 - 40	79	24.2	34.5
41 - 50	49	23.8	37.7
51 - 60	41	26.7	37.9
61 - 70	32	28.5	44.2
71 - 80	18	29.0	49.8
81 - 90	11	38.0	51.8
91 - 100	12	30.2	57.7
Overall Average		24.9	35.6
Total	417		

Source: See Appendix.

shows average data for industries grouped by concentration deciles. For industries with four-firm concentration less than 50 percent, average margins are less than 25 percent and fluctuate within a narrow range of 2.4 percentage points with no tendency to vary systematically. By contrast, average margins for industries with more than 50 percent concentration tend to be substantially higher and to rise as concentration increases. Some of this margin variation is undoubtedly due to differences in capital-output ratios, which increase systematically along with concentration.

Principal Results: 1958 and 1963

Comparable concentration and margin data were available for 288 four-digit industries for 1958 and for all 417 industries reported by the Census for 1963.¹ A simple linear regression analysis of the two sets of data yielded the following results (t ratio in parenthesis):

$$\begin{array}{l} \text{1958 data} \\ (N = 288) \end{array} \quad Y = 13.90 + .13 X_1 \\ (6.36)^1$$

$$r^2 = .12$$

$$\begin{array}{l} \text{1963 data} \\ (N = 417) \end{array} \quad Y = 20.25 + .12 X_1 \\ (6.91)^1$$

$$r^2 = .10$$

¹The entire set of SIC four-digit manufacturing industries was used in the analysis of 1963 data. For 1958, however, it was not possible to include all of the industries. There was a significant revision of SIC industry definitions in 1957, but the concentration data for 1958 were computed on the basis of pre-1957 definitions. Thus, in combining the 1958 concentration data with the other Census data for that year, it was necessary to work with those industries that were comparable on both the old and revised definitions. For a more complete discussion of the 1958 data, see [2:Ch.IV].

where Y = price-cost margin and X_1 = four-firm concentration ratio.¹ Both regression coefficients for the concentration ratio variable are significant at the 1 percent level. They indicate that margins increase by a little more than 1 percentage point for each 10 percentage point increase in industry concentration.² Although concentration is thus shown to be positively related to price-cost margins, only about 10 percent of the inter-industry variation in the margins is statistically explained by this variable.

Two additional variables have been included in our analysis. As noted above, both theoretical considerations and inspection of the data suggest an association between capital-output ratios and margins among industries. We have therefore computed from Census data the ratio of gross book value of assets to value of shipments for each industry and included this ratio as an independent variable. The second added variable represents an attempt to take account of differences in the geographic extent of markets in different industries. The published concentration data under analysis are computed on a national basis. However, in geographically dispersed industries serving regional and local markets, the effective level of market concentration is likely to be higher than the national ratio would indicate. Some investigators

¹Variables used in this study are summarized and fully explained in the Appendix.

²No precise significance should be attached to the difference in the constant terms shown above. As explained in the Appendix, the 1963 price-cost margin is a slightly more gross measure than the 1958 figure. However, margins computed on the same basis for the two years were on the average higher in 1963.

have chosen to take account of this problem by classifying industries by type of geographical market. Our approach has been to compute an index that measures the extent to which productive facilities and output in the various industries are centralized in a few locations or scattered throughout the country. The index, more fully explained in the Appendix, is constructed so that the lower its value, the greater the degree of geographic dispersion of the industry. We hypothesize that the lower the index, the more likely it is that the industry has a regional or local market orientation, and thus the higher the level of effective market concentration and the expected price-cost margin for any given level of national concentration.

Results of regression analysis including these additional variables are as follows:

$$\begin{array}{l} \text{1958 data} \\ (N = 288) \end{array} \quad Y = 14.60 + .12 X_1 - .02 X_2 + .01 X_3$$

$$(5.76) \quad (1.03) \quad (.49)$$

$$R^2 = .13$$

$$\begin{array}{l} \text{1963 data} \\ (N = 417) \end{array} \quad Y = 19.54 + .10 X_1 - .03 X_2 + .09 X_3$$

$$(5.43) \quad (2.49) \quad (5.81)$$

$$R^2 = .19$$

where X_2 = index of geographic dispersion and X_3 = capital-output ratio and the other variables are defined as before. Neither of the added variables proved statistically significant in the 1958 data, although their signs are in the expected directions. Regression coefficients of both variables are statistically significant (at the 2 percent and 1 percent levels,

respectively), and with the expected signs, in the 1963 results. Regression coefficients for the four-firm concentration ratio (X_1) were positive and statistically significant at the 1 percent level in both instances. As before, a 10 percentage point increase in concentration is associated with an increase of approximately 1 percentage point in margins.

Marginal Concentration

The n -firm concentration ratio summarizes only a small portion of the size distribution of firms in an industry, and students of industry structure have long been aware that other size distribution characteristics may be significant in explaining industry performance. However, until recently, the analysis of additional size distribution characteristics has generally been based on an industry-by-industry descriptive approach. A recent study by Miller [6] analyzes the impact of the distribution of industry shares among successive groups of firms--top four, next four, next twelve, etc. These data, which he describes as the "marginal concentration" attributable to each successive group of firms, may be computed from the published data on four-, eight-, and twenty-firm concentration.

Miller's analysis was based upon profit rates for a sample of (roughly three-digit) industries as reported by the Internal Revenue Service in Statistics of Income. His concentration data therefore were averages of constituent four-digit industries. His important finding was that the marginal concentration of the fifth through the eighth largest firms was negatively associated with profit rates, and thus tended to

offset the positive association between four-firm concentration and rates of return found in his data. Miller concluded:

. . . the negative sign indicates that the tendency to maximize joint industry profits breaks down if the industry contains more than three or four firms of substantial size. Read literally, the negative sign indicates that the larger the share produced by firms ranked 5-8, the lower the industry profit rate ceteris paribus. The inference is that these firms ranked below the largest four tend not to participate in a tacit cartel, that they view their interests as best served by action independent of any implicit collusion on price [6:264].

Miller's results, based on concentration data for 1958, have been corroborated by our analysis of concentration and margins in 1963. When marginal concentration of the fifth to eighth largest firms is added to the regression analysis, the following results are obtained:

$$Y = 21.00 + .11 X_1 - .03 X_2 + .10 X_3 - .19 X_4$$

(6.04) (2.23) (6.20) (2.84)

$$R^2 = .20 \qquad (N = 417)$$

The coefficient for marginal concentration (X_4) is negative and significant at the 1 percent level; thus, there is little doubt that increases in the shares of the fifth to eighth largest firms tend to offset the effects of four-firm concentration on industry margin levels. Indeed, read directly, the equation states that marginal concentration increases are almost twice as effective in reducing margins as four-firm concentration increases are in raising them. Miller's results showed an even greater difference between the two coefficients.

Additional Hypotheses

The preceding analysis has involved the investigation of variables that, along with four-firm concentration, contribute to an explanation of differences in levels of price-cost margins among industries. Although significant and consistent results were obtained from each analysis of the total collection of data, an important finding in our previous work was that comparable results were not always obtained from the analysis of subsamples. This is not surprising. The hypothesis that concentration and margins are associated rests on the assumption that the ability of firms to exercise market control is determined primarily by their market shares. However, many other factors besides market shares may affect the ability of large firms to exercise substantial control or leadership in an industry. We have therefore sought to identify characteristics that might be expected, on a priori grounds, to account for the presence or absence of a concentration-margin association among industries, or for differences in the strength of such associations where they are observed.

We have analyzed the following two hypotheses using 1963 data:

(1) The association between concentration and margins will be substantially stronger in industries in which the largest firms have substantial cost or demand advantages over their smaller rivals, than in other industries.

(2) The association between concentration and margins will differ substantially among industries serving different types of markets, particularly as between industries dealing primarily in producer and in consumer goods.

Differential Advantage of the Largest Firms

Theory would suggest that where the largest firms in an industry enjoy distinct advantages over their smaller rivals, the potential competitive impact of the latter would be reduced and the ability of the largest firms to pursue a shared-monopoly pattern of behavior would therefore be enhanced. Large-firm advantages might arise from differences in either demand or cost conditions. If the smaller firms in an industry have higher costs, their ability to pursue aggressively competitive policies against the larger firms is substantially reduced. The largest firms will be able to gain higher margins and profits from any given price common to both groups of firms; they will also be able to use additional expenditures or the threat of price reductions that cannot be matched by the smaller units as a means of disciplining the industry and expanding their market control. Cost advantages of larger firms might be due to many factors, including their longer operating histories, favorable access to scarce resources or locations, and genuine scale economies. All of these factors accounting for lower costs may also be associated with entry barriers, which would further tend to strengthen the market positions and widen the range of discretion of the largest firms.

The largest firms may also enjoy differential advantages with respect to demand. These advantages may arise from longer periods of buyer acceptance, more extensive distribution systems, or successful product differentiation through marketing and advertising. To the extent these factors are operative, the largest firms may face different and less elastic demand conditions than their smaller rivals, and therefore be able to obtain higher prices and margins for their products.

It is not possible to obtain comparable cross-sectional data on the relative cost or demand advantages of the largest firms for any large sample of four-digit industries. We are able to examine, however, the extent to which the largest firms obtain higher (or lower) margins than all other firms in their respective industries, and we take such differences to indicate advantages (or disadvantages) of the largest firms with respect to their potential industry rivals. We hypothesize that where the largest firms obtain higher margins, their ability to exercise market control will be greater, and therefore the association between concentration and margins will be substantially stronger, than in other instances.

Computation of margins for the largest and all other firms in each industry revealed a very wide distribution of margin differences. Inspection of the data indicated that a difference percent up to ± 3 percentage points between the two margins may be treated as a range of substantial equality; margin differences for 128 industries fell within this range. In 194 industries the largest firms had margins more than three points higher than other firms, and in 86 industries large-firm margins were more than three points lower.¹ Repetition of our regression analysis for each of these three groups of industries yielded the following results:

¹Data required for these computations were available only for 1963 and only for 408 industries; details of the computations are explained in the Appendix.

$$\begin{array}{lcl} \text{Large-firm margins} & Y = 22.13 + .17 X_1 - .004 X_2 + .05 X_3 - .17 X_4 \\ \text{greater (N = 194)} & (6.51) \quad (.26) \quad (2.13) \quad (1.51) \end{array}$$

$$R^2 = .24$$

$$\begin{array}{lcl} \text{Equality range} & Y = 17.42 + .05 X_1 - .03 X_2 + .12 X_3 + .05 X_4 \\ \text{(N = 128)} & (1.73) \quad (2.09) \quad (5.28) \quad (.53) \end{array}$$

$$R^2 = .28$$

$$\begin{array}{lcl} \text{Large-firm margins} & Y = 20.39 - .03 X_1 - .005 X_2 + .14 X_3 - .23 X_4 \\ \text{less (N = 86)} & (1.03) \quad (.29) \quad (4.44) \quad (1.97) \end{array}$$

$$R^2 = .26$$

These results show very clearly that industry average price-cost margins are much more affected by changes in four-firm concentration in those industries where the largest firms have substantial margin advantages. For the 194 industries in which the largest firms have higher price-cost margins, the regression coefficient for four-firm concentration (X_1) is significant at the 1 percent level and indicates that a 10 percentage point increase in concentration is associated with a 1.7 percentage point increase in margins. By contrast, in industries where large and small firms have about the same margins, the coefficient is smaller and significant only at the 10 percent level, and in the third group of industries there is no significant relationship between the industry average price-cost margins and four-firm concentration.¹

¹Note also the varying size and significance of the other coefficients, particularly the capital-output ratio (X_3), among the three sets

Before concluding that these results support our hypothesis, a further analysis is required. Our dependent variable, the industry average margin, and our classification statistic, the margin difference between large and other firms, are definitionally related in that the industry margin is the weighted average of the margins of the two constituent groups of firms. Hence, if large-firm margins were the same in all industries, and remaining-firm margins also the same in all industries, the weighting process would yield an association between industry average margins and concentration when, in fact, no such association existed in the underlying data. Where large-firm margins were higher, the association would be positive; where they were lower, it would be negative. Where margins were the same in both groups, of course, no association would be found as a result of the weighting process alone.

In order to examine these possibilities, we have repeated our analysis with the margins for the largest firms and for the remaining firms, in each of three margin-difference groupings, as the dependent variable. The complete results are too extensive for presentation here, but their principal features may be briefly summarized. Margins for the four largest firms are very strongly related to concentration in those

of results. The impact of the capital-output ratio on margins is substantially greater in industries where the largest firms do not have large margin advantages. The regression coefficient for the capital-output ratio is significant at the 5 percent level for those industries with higher margins for the largest firms and at the 1 percent level for the other two groups.

industries where the largest firms have a substantial margin advantage.

The simple regression relationship is:

$$M_4 = 19.98 + .31 X_1 \quad r^2 = .36$$

(10.47)¹

In this equation, M_4 represents the margins for the four largest firms; the regression coefficient is significant at the 1 percent level. In the equality-range industries the relationship is weaker, and in the third group of industries the sign of the coefficient is negative. Hence, it is clear that the positive association between margins and concentration found in the main body of the data is very substantially due to the impact of concentration on the margins of the four largest firms in those industries in which those firms possess a substantial margin advantage.

A second important result is that, although the margins of the remaining firms are on the average somewhat higher in the high-difference industries, remaining-firm margins are not significantly associated with concentration in any of the three groups of industries. This suggests that if there is any "umbrella" effect of higher large-firm margins, it does not extend to the increase in such margins accompanying increases in concentration. The only variable showing a strong association with remaining-firm margins in the multivariate analysis is the capital-output ratio.

It may be important to emphasize that these results are not necessary consequences of our classification system, nor are they due to lack of dimension in the data for the high-difference industries. It would be entirely possible for the concentration-margins association to be observed

within each group of industries, or, on the other hand, for it not to be observed in the high-difference industries. Certainly, there is no purely statistical reason for a large and highly significant regression coefficient to be found in this group of industries alone.

Our conclusion from all of this is that the importance of concentration as a determinant of industry-wide profit experience depends heavily on the existence of substantial margin advantages for the largest firms. Although it is not possible on the basis of these data to discriminate between cost and demand as sources of these advantages, it is worth noting that to the extent these advantages arise from lower costs our data indicate that lower costs are not being passed along in lower prices, but rather are being absorbed in profit margins.

Market Orientation and Demand Characteristics

An analysis of industries classified by their primary orientation toward consumer goods or producer goods markets suggests the importance of buyer characteristics and other factors on the demand side as sources of margin differences. In general, we would expect that producer goods markets might be characterized by greater concentration on the buying side, greater use of quality specifications and other "objective" purchasing criteria, and lesser emphasis on product differentiation by source and brand than consumer goods markets. Of course, there are ample exceptions to these general characteristics--due, for example, to the importance of patents, availability of supplies and services, special product features, and other sources of differential advantage in industrial markets. However, to the extent there are

differences between the two types of markets, producer goods markets would appear to be distinguished by greater knowledge and bargaining power on the side of buyers, and therefore by a narrower range of price discretion on the side of sellers, as compared to consumer goods markets with equivalent levels of concentration.

Our separation of industries into producer and consumer goods categories is based upon an unpublished classification of 415 four-digit industries for 1963 made available by the Federal Trade Commission.¹ In this classification, 274 industries are classed as primarily involved in producer goods, and 141 in consumer goods. We recognize that all such classifications are somewhat arbitrary, and some industries--particularly, for example, those in the chemicals group--are substantially mixed. We have repeated our regression analysis for these two groups of industries, with the following results:

<u>Producer Goods</u> <u>Industries</u> (N = 274)	$Y = 20.71 + .05 X_1 - .03 X_2 + .14 X_3 - .16 X_4$ $(2.32) \quad (2.39) \quad (8.83) \quad (2.40)$ $R^2 = .28$
---	---

<u>Consumer Goods</u> <u>Industries</u> (N = 141)	$Y = 18.76 + .21 X_1 - .02 X_2 + .11 X_3 - .17 X_4$ $(5.71) \quad (1.05) \quad (1.65) \quad (1.14)$ $R^2 = .29$
---	---

The differences between these two sets of results are striking. The producer goods industries show a slightly higher intercept value,

¹Of the total of 417 four-digit industries, two have been excluded: 2711, Newspapers and 2721, Periodicals.

but the coefficient for four-firm concentration (X_1) is relatively small, although significant at the 5 percent level. The other three explanatory variables are also significant at the 5 percent level or higher for the producer goods industries. By contrast, in the consumer goods industries the coefficient for four-firm concentration is relatively large and is the only significant result obtained.¹ Read directly, the results indicate that differences of 10 percentage points in four-firm concentration in consumer goods industries are accompanied by differences of about 2 points in the industry price-cost margin, whereas in producer goods industries they are accompanied by differences of only one-half of one percentage point.

These results are particularly important because concentration increases have been much more prevalent in consumer goods industries than in producer goods industries in recent years. In an analysis of concentration changes in the 1947-1963 period for 213 comparable industries, Mueller found that four-firm concentration had increased for 47 percent of the consumer goods industries, as compared to 27 percent of the producer goods industries. For the 1958-1963 period, analyzing concentration changes in 369 comparable industries, concentration increased in 45 percent of the consumer goods industries and only 25 percent of the producer goods industries [7:487]. Although the causes of concentration are many and varied, it is striking that concentration

¹The coefficient is significant at the 1 percent level. Simple r^2 values for margins and concentration are .26 in consumer goods industries and .04 in producer goods industries.

appeared to increase much more frequently in those types of industries in which increases in concentration are most strongly associated with increases in price-cost margins.

It might be suspected that the difference in the strength of the concentration-margins association between consumer and producer goods industries would imply a similar difference among consumer goods industries classified by degree of product differentiation. Our analysis, however, shows that this is not the case. Again using Federal Trade Commission data, partially unpublished, we have segregated the 141 consumer goods industries into two groups based on the level of product differentiation and repeated our regression analysis for each group.¹ The results were as follows:

<u>Undifferentiated</u>	$Y = 16.35 + .20 X_1 - .002 X_2 + .17 X_3 - .30 X_4$
(N = 48)	(2.80) (.10) (2.77) (1.44)
	$R^2 = .35$
<u>Moderately and Highly Differentiated</u>	$Y = 21.44 + .20 X_1 - .03 X_2 + .06 X_3 - .15 X_4$
(N = 93)	(4.08) (.89) (.60) (.82)
	$R^2 = .21$

¹The classification procedure used is closely associated with the level of advertising expenditures. "Generally speaking, industries classified as undifferentiated made advertising expenditures of less than 1 percent of sales and those classified as highly differentiated made substantial expenditures for advertising, often in excess of 10 percent of sales and usually were heavy users of television advertising media." Federal Trade Commission Statistical Report, Industry Classification and Concentration, March, 1967. Of the 141 consumer goods industries, 48 were classified as undifferentiated and 93 as moderately or highly differentiated.

Although the intercept values differ substantially between the two sets of results, regression coefficients for four-firm concentration (X_1) are the same, and both are significant at the 1 percent level. The capital-output ratio (X_3) is also significant in explaining margin behavior in undifferentiated products industries, so that the overall level of explanation provided by the regression equation is substantially higher for this group. None of the other variables is statistically significant in either set of data. From these results we conclude that the association between concentration and margins in consumer goods industries is quite general, regardless of more detailed industry characteristics. Further, these results may suggest that the difference observed between consumer and producer goods industries is due more largely to differences in the balance of bargaining power and in market organization than to differences in product differentiation between these two groups of industries.

Conclusions

Our analysis has revealed a clear tendency for increases in four-firm concentration to be associated with increases in price-cost margins in cross-sectional samples of manufacturing industries in both 1958 and 1963. Other variables also found to be significant in explaining inter-industry differences in margins in the latter year were the geographic scope of markets, capital-output ratio, and "marginal" concentration of the fifth to eighth largest firms.

In subsequent analysis we attempted to identify industry characteristics that would discriminate among groups of industries in which

the concentration-margins association was present or absent, or substantially different in character. With respect to both of the new hypotheses put forward here, meaningful results were obtained. The association between concentration and margins was shown to be strongly affected by the presence of distinct cost or demand advantages for the largest firms, resulting in higher margins for them. Further, the orientation of industries toward producer goods or consumer goods markets was also shown to be of substantial importance, with a much greater impact of concentration on margins in consumer goods industries. The level of product differentiation in the consumer goods industries, however, did not affect the extent to which margins rise in association with increasing levels of concentration, although margin levels averaged higher in differentiated products industries.

These results appear to be of intrinsic interest. They also suggest some implications for further analysis and public policy development. Our findings indicate the value of the available concentration data as descriptive of important structural features of the economy; they also indicate the importance of refining the concentration statistics and combining them with additional information compiled on a comparable classification basis for analytical purposes. Our analysis has discriminated very sharply between industry characteristics that are conducive to a strong concentration-profits relationship and those that are not. Our understanding of the impact of industry structure is substantially increased by an identification of situations in which primary structural features do not have important explanatory or predictive significance,

as well as those where close associations are found. On the public policy side, our results suggest that policies aimed at deconcentration and curbing increased concentration can be expected to have substantial impact on price and margin levels. In particular, the prevention of increased concentration both in industries where large firms already have substantial margin advantages and in consumer goods industries seems particularly desirable. Finally, the association between concentration and margins suggests the need for continued surveillance of industry structure as an element of an economy-wide program aimed at price stability.

REFERENCES

- [1] Collins, N. R. and L. E. Preston. "Concentration and Price-Cost Margins in Food Manufacturing Industries," Journal of Industrial Economics, XIV, 3 (July 1966), 226-242.
- [2] _____. Concentration and Price-Cost Margins in Manufacturing Industries. Berkeley: University of California Press, 1968.
- [3] _____. "Industry Structure and Price-Cost Margins." Paper presented at Antitrust Policy Seminar, University of California at Los Angeles, March 1968 (to be published in Conference volume).
- [4] Comanor, W. S. and T. A. Wilson. "Advertising, Market Structure and Performance," Review of Economics and Statistics, XLIX (November 1967), 423-440.
- [5] Mann, H. Michael. "Seller Concentration, Barriers to Entry, and Rates of Return in Thirty Industries, 1950-60," Review of Economics and Statistics, XLVIII (August 1966), 296-307.
- [6] Miller, Richard A. "Marginal Concentration Ratios and Industrial Profit Rates," Southern Economic Journal, XXXIV (October 1967), 259-267.
- [7] Mueller, W. F., Director, Bureau of Economics, Federal Trade Commission. Statement Before the Select Committee on Small

Business, Status and Future of Small Business, Part 2,
March 15, 1967, Appendix A.

- [8] Stigler, George J. "A Theory of Oligopoly," Journal of Political Economy, LXXII, 1 (February 1964), 44-61.
- [9] Telser, Lester G. "Cutthroat Competition and the Long Purse," Journal of Law and Economics, IX (1966), 259-277.
- [10] Weiss, Leonard W. "Average Concentration Ratios and Industrial Performance," Journal of Industrial Economics, XI, 3 (July 1963), 237-254.

APPENDIX

DATA EMPLOYED IN STATISTICAL ANALYSIS, EXPLANATORY NOTES

1. Four-digit industries included in 1958 analysis. Census data for 1958 are available on the basis of the revised 1957 Standard Industrial Classification. The 1958 concentration data are available for industries as defined for the 1954 Census of Manufactures. Therefore, only those four-digit industries were selected for which the 1957 SIC definitions were wholly or substantially unchanged from the pre-1957 definitions. In some cases, Census data from two or more four-digit industries could be combined to obtain comparability with an industry for which concentration data were available. A total of 288 four-digit industries was included in the cross-section analysis.
2. Four-digit industries included in 1963 analysis. Census data for 1963 are available on the same industry classification basis as that employed in the presentation of concentration statistics. A larger number of four-digit industries could be used, therefore, in the cross-section analysis of 1963 data than was possible for 1958. A total of 417 four-digit industries was included.
3. Computation of the 1958 price-cost margin. The price-cost margin is defined as:

$$\frac{\text{value added (adjusted)} - \text{payroll} - \text{other costs}}{\text{value of shipments (including resales)}}$$

The numerator is an estimate of the margin between total receipts and total direct costs for each four-digit industry. Value added is obtained by the Census by subtracting from the value of shipments the following costs: materials, supplies and containers, fuel, purchased electric energy, and contract work. From value added is then deducted total payroll costs. Also, subtraction is made of estimates of selected supplementary employee costs, maintenance and repair costs (other than salaries and wages to own employees), insurance premiums, rental payments, and property taxes. Data on these latter costs were obtained from the special sample survey, "Supplementary Inquiries for 1957," conducted by the Census as part of the 1958 Census of Manufactures program. Data were estimated on the basis of three-digit totals when not available for four-digit industries. The total of these costs in 1957 was related

to the total 1957 payroll figure. This factor was then applied to the total 1958 payroll to obtain an estimate of these costs in 1958. Dividing the total margin figure by the 1958 total value of shipments gives the price-cost margin used in the 1958 analysis.

It should be pointed out that this margin figure does include certain additional expenditures. Among the items remaining in the aggregate are advertising, developmental and research services provided by other establishments, and services of outside consultants. (For a detailed explanation, see U.S. Bureau of the Census, U.S. Census of Manufactures: 1958. Vol. II, Industry Statistics, Part 1, Major Groups 20 to 28, 1961, Appendix D, p. D-12.) Although the inclusion of some of the latter items in the total may be arguable, three points, at least, may be adduced to justify this procedure: (1) many of the items (e.g. services of outside consultants) are extremely small in relation to the totals involved, (2) others (e.g. advertising expenditures) are likely to be profit determined to an important degree, and (3) finally, a more refined measure of margins suitable for comparison with sales and concentration figures seems impossible to obtain on an interindustry basis from available data.

Source of data for value added, payroll, and value of shipments: U.S. Bureau of the Census, U.S. Census of Manufactures: 1958. Vol. II, Industry Statistics, 1961.

Source of data for estimating other costs: U.S. Bureau of the Census, U.S. Census of Manufactures: 1958, Vol. I, Summary Statistics, 1961, pp. 9-3 to 9-23.

4. Computation of the 1963 price-cost margin. The price-cost margin is defined as:

$$\frac{\text{value added (adjusted) - payroll}}{\text{value of shipments (including resales)}}$$

The computation procedure for the 1963 price-cost margin differs from that used in determining the 1958 statistic in that data are not available in 1963 for the "other cost" component (selected supplementary employee costs, maintenance and repair costs, insurance premiums, rental payments, and property taxes).

Source of data for value added, payroll, and value of shipments: U.S. Bureau of the Census, U.S. Census of Manufactures: 1963. Vol. II, Industry Statistics, 1966.

5. Concentration.

Source of data on 1958 four-firm concentration: U.S. Congress, Senate, Subcommittee on Antitrust and Monopoly, Committee

on the Judiciary, Concentration Ratios in Manufacturing Industry, 1958, Part I, 87th Congress, 2d Session, 1962, Table 2.

Source of data on 1963 four-firm concentration and marginal concentration of the fifth through the eighth largest firms: U.S. Congress, Senate, Subcommittee on Antitrust and Monopoly, Committee on the Judiciary, Concentration Ratios in Manufacturing, 1963, Part I, 89th Congress, 2d Session, 1966, Table 2.

6. Computation of the 1958 Index of Geographic Dispersion. The index of geographic dispersion is computed as follows: The percentage of each four-digit industry's 1958 value of shipments accounted for by establishments in each of the four Census regions was computed; also, the percentage of United States population in each Census region. The index of geographic dispersion for each industry is the sum of the absolute differences between the percentage of value of shipments accounted for by establishments in each region and the percentage of population in that region. The greater the geographic dispersion, the smaller the numerical value of this index.

Source of data on geographic distribution of value of shipments: U.S. Bureau of the Census, U.S. Census of Manufactures: 1958. Vol. II, Industry Statistics, 1961. (Estimates were made where Census regional totals were not published.)

7. Computation of the 1963 Index of Geographic Dispersion. In the 1963 analysis, the index of geographic dispersion was computed in a slightly different manner: The percentage of each four-digit industry's 1963 value added accounted for by establishments in each of the four Census regions was computed; also, the percentage of total manufacturing value added accounted for by each Census region. The index of geographic dispersion for each industry is the sum of the absolute differences between the percentage of value added accounted for by establishments in each region and the percentage of total manufacturing value added accounted for by that region. Again, the greater the geographic dispersion, the smaller the numerical value of this index.

Source of data on geographic distribution of total manufacturing value added: U.S. Bureau of the Census, U.S. Census of Manufactures: 1963. Vol. I, Summary and Subject Statistics, 1966, Table E, p. 10.

Source of data on geographic distribution of four-digit industry value of shipments: U.S. Bureau of the Census, U.S. Census of Manufactures: 1963. Vol. II, Industry Statistics, 1966.

8. Computation of 1958 capital-output ratio. The capital-output ratio is computed by dividing the gross book value of assets as of December 31, 1957, by the total 1958 value of shipments.

Source of data on gross book value of assets: U. S. Bureau of the Census, U.S. Census of Manufactures: 1958. Vol. I, Summary Statistics, 1961, pp. 9-3 to 9-23. (Data were estimated on the basis of three-digit totals when not available for four-digit industries.)

Source of data on value of shipments: U. S. Congress, Senate, Subcommittee on Antitrust and Monopoly, Committee on the Judiciary, Concentration Ratios in Manufacturing Industry, 1958, Part I, 87th Congress, 2d Session, 1962, Table 2.

9. Computation of 1963 capital-output ratio. The capital-output ratio is computed by dividing the gross book value of assets as of December 31, 1963, by the total 1963 value of shipments.

Source of data on gross book value of assets: U. S. Bureau of the Census, Annual Survey of Manufactures: 1964, Book Value of Fixed Assets and Rental Payments for Buildings and Equipment, M64(AS)-6, 1967.

Source of data on value of shipments: U. S. Bureau of the Census, U. S. Census of Manufactures: 1963, Vol. II, Industry Statistics, 1966.

10. Computation of 1963 average price-cost margins for the four largest firms and the remaining firms for each four-digit industry.

Source of data: U. S. Congress, Senate, Subcommittee on Antitrust and Monopoly, Committee on the Judiciary, Concentration Ratios in Manufacturing, 1963, Part II, 90th Congress, 1st Session, 1967, Table 27. Data are available to make this computation for 408 four-digit industries.