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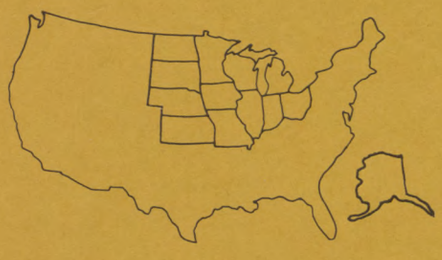
THE EFFECT OF MARKET SHARE DISTRIBUTION ON INDUSTRY PERFORMANCE-REEXAMINED

by

Willard F. Mueller and Douglas F. Greer*

WP-65 May 1982



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*University of Wisconsin-Madison and California State University, San Jose.
We wish to thank John E. Kwoka for making available to us the data he used in his paper. We also thank Thomas W. Paterson and David I. Rosenbaum, research assistants, University of Wisconsin and Bruce Marion. This research was supported by the College of Agriculture and Life Sciences, University of Wisconsin-Madison.

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I. INTRODUCTION

In a recent paper Kwoka presented empirical evidence on the impact of market share distribution on industry performance. He reported that whereas manufacturing price-cost margins rise with the share of the two leading firms in an industry, the size of "the third share emerges as a large, negative, and clearly significant force on industry price-cost margins" (Kwoka, 107). He interpreted his results as demonstrating that "industry margins when all three firms are large are much the same as when all are small. Equality of size among three large firms appears to breed a rivalry capable of simulating competitive performance levels" (Kwoka, 107). He further concluded that the often-used four-firm concentration ratio "is incapable of establishing exactly what features of industries are important, how important they are _in toto_, and what their relative importance is. The analysis...demonstrates that the four-firm concentration ratio contains one irrelevant firm share (S4) and another with the wrong sign (S3)" (Kwoka, 108).

If correct, Kwoka's finding that performance is the same in concentrated industries where the three leading firms hold equal shares as in unconcentrated industries is of theoretical and policy significance: It repudiates most theories of oligopoly and dismisses the public policy concern with many shared monopolies. It argues that even triopolists in highly concentrated industries may perform competitively. The implications for enforcing Section 7 of the Clayton Act are equally profound:

not only should mergers by the third largest firm in industries with high two-firm concentration ratios be tolerated, they should be encouraged.

These are heady findings and deserve careful attention. In this article we discuss four conceptual and empirical problems with Kwoka's analysis: (1) the effects of alternative hypotheses on the third firm hypothesis; (2) the effects of combining producer and consumer goods industries in a single restricted model; (3) the conceptual problem of market definition; and (4) the potential bias present in the data used.

II. Model

In Kwoka's model PCM= f (FSD, KO, DISP, GROW, CDUM, MID), where PCM measures industry price-cost margins; FSD refers to some feature of firm size distribution; KO is a capital-output ratio; DISP is a geographical dispersion index to correct for the geographical extent of the market; GROW measures industry growth; CDUM is a zero-one dummy identifying producer and consumer goods industries; and MID is a mid-point plant scale variable.

Our replication of Kwoka's equations are shown in equations 1a-1d in Table 1.[1/] These equations show that whereas the share of the largest two sellers, S1 and S2, have a positive effect on PCM, the share held by the third seller, S3, has a negative effect.

III. THE THIRD FIRM HYPOTHESIS

On first impression, Kwoka's findings support the hypothesis that the share held by the third firm in an industry holds the key to industry PCM performance: if S3 is large enough it may hold in check the power

TABLE 1
REGRESSIONS OF INDUSTRY PRICE-COST MARGINS ON CONTINUOUS MARKET SHARES
IN 314 MANUFACTURING INDUSTRIES

Eq.	S1	S2	S3	S4	S3-4	S3-5	S3-6	KO	DISP	GROW	CDUM	MID	Constant	$\bar{R}^2$
314 Producer and Consumer Goods Industries														
1a	0.0906 (1.93)							0.0813 (4.45)	-0.0426 (3.06)	0.0529 (2.75)	0.0394 (3.74)	0.6522 (2.91)	0.2128	.169
1b	0.0375 (0.68)	0.2016 (1.87)						0.0780 (4.27)	-0.0420 (3.04)	0.0521 (2.71)	0.0383 (3.64)	0.4979 (2.09)	0.2067	.176
1c	0.0410 (0.76)	0.3877 (2.98)	-0.4879 (2.52)					0.0843 (4.61)	-0.0444 (3.23)	0.0503 (2.64)	0.0381 (3.65)	0.6527 (2.68)	0.2176	.190
1d	0.0317 (0.58)	0.3757 (2.88)	-0.2970 (1.13)	-0.3162 (1.07)				0.0860 (4.69)	-0.0442 (3.21)	0.0516 (2.71)	0.0380 (3.65)	0.7184 (2.86)	0.2214	.190
1e	0.0239 (0.44)	0.3057 (2.66)		-0.5408 (2.49)				0.0851 (4.64)	-0.0434 (3.15)	0.0531 (2.79)	0.0380 (3.65)	0.7139 (2.84)	0.2206	.190
1f	0.0320 (0.59)	0.3772 (3.03)			-0.3059 (2.74)			0.0860 (4.69)	-0.0442 (3.22)	0.0516 (2.72)	0.0380 (3.65)	0.7171 (2.88)	0.2214	.193
1g	0.0284 (0.52)	0.3503 (2.90)				-0.2249 (2.63)		0.0860 (4.69)	-0.0435 (3.17)	0.0526 (2.77)	0.0378 (3.63)	0.7280 (2.90)	0.2234	.192
1h	0.0254 (0.47)	0.3306 (2.76)					-0.1759 (2.42)	0.0857 (4.66)	-0.0432 (3.14)	0.0525 (2.76)	0.0377 (3.61)	0.7101 (2.82)	0.2241	.189
206 Producer Goods Industries														
2a	0.0333 (0.67)							0.0772 (4.64)	-0.0532 (3.40)	0.0607 (3.02)		0.2894 (1.03)	0.2368	.141
2b	0.0203 (0.36)	0.0630 (0.51)						0.0764 (4.56)	-0.0533 (3.40)	0.0607 (3.02)		0.2183 (0.69)	0.2348	.138
2c	0.0211 (0.38)	0.2118 (1.37)	-0.3499 (1.62)					0.0806 (4.77)	-0.0541 (3.46)	0.0600 (2.99)		0.3494 (1.08)	0.2404	.145
2d	0.0146 (0.26)	0.2082 (1.35)	-0.1878 (0.63)	-0.2695 (0.80)				0.0821 (4.83)	-0.0541 (3.45)	0.0611 (3.04)		0.3803 (1.17)	0.2434	.143
2e	0.0108 (0.19)	0.1637 (1.19)		-0.4153 (1.69)				0.0816 (4.81)	-0.0539 (3.45)	0.0619 (3.09)		0.3594 (1.11)	0.2434	.146
2f	0.0157 (0.28)	0.2136 (1.43)			-0.2256 (1.80)			0.0819 (4.84)	-0.0541 (3.47)	0.0609 (3.04)		0.3795 (1.17)	0.2431	.148
2g	0.0137 (0.24)	0.1824 (1.25)				-0.1504 (1.55)		0.0814 (4.79)	-0.0533 (3.41)	0.0613 (3.06)		0.3656 (1.12)	0.2437	.144
2h	0.0126 (0.22)	0.1585 (1.10)					-0.1082 (1.32)	0.0808 (4.74)	-0.0530 (3.39)	0.0612 (3.05)		0.3437 (1.05)	0.2436	.141
108 Consumer Goods Industries														
3a	0.2661 (2.78)							0.2635 (3.23)	-0.0052 (0.20)	0.0028 (0.07)		0.3933 (1.04)	0.1766	.309
3b	0.1017 (0.86)	0.4508 (2.26)						0.2340 (2.89)	-0.0035 (0.14)	-0.0063 (0.15)		0.2860 (0.76)	0.1683	.336
3c	0.1059 (0.89)	0.5188 (2.28)	-0.2319 (0.62)					0.2363 (2.91)	-0.0066 (0.26)	-0.0067 (0.16)		0.3574 (0.91)	0.1764	.331
3d	0.0905 (0.74)	0.5026 (2.19)	-0.0253 (0.05)	-0.3398 (0.65)				0.2355 (2.89)	-0.0065 (0.25)	-0.0056 (0.14)		0.4607 (1.08)	0.1815	.328
3e	0.0095 (0.75)	0.4975 (2.41)		-0.3574 (0.90)				0.2353 (2.90)	-0.0063 (0.25)	-0.0055 (0.13)		0.4616 (1.09)	0.1813	.334
3f	0.0989 (0.83)	0.5255 (2.40)			-0.1761 (0.83)			0.2364 (2.91)	-0.0072 (0.28)	-0.0062 (0.15)		0.4267 (1.04)	0.1808	.334
3g	0.0962 (0.81)	0.5161 (2.44)				-0.1451 (0.92)		0.2374 (2.93)	-0.0074 (0.29)	-0.0053 (0.13)		0.4546 (1.09)	0.1834	.335
3h	0.0939 (0.79)	0.5049 (2.39)					-0.1088 (0.80)	0.2365 (2.91)	-0.0070 (0.27)	-0.0054 (0.13)		0.4362 (1.04)	0.1831	.333

of the top two sellers. But the key role Kwoka assigned the third firm may merely reflect the way he tested his hypothesis. He did not test the alternative hypotheses that firms S4, S5 and S6 or the summation of these firms, plus the third firm, taken independently, provide such power as well. Kwoka found that S3 is negative and significant only when the shares below S3 are held out of the regression. When these are added, S3 drops in explanatory power because S3 and subsequent shares are very highly correlated. Since Kwoka proceeded in a fixed sequence of always entering S3 first, he always concluded that S3 is significant but the others are not. There is no theoretical or other justification for following this sequence.

To test whether Kwoka's findings are influenced by the entry sequence of S3 to S6, we have entered these variables in the sequences shown in equations 1e-1h in Table 1. As shown in equation 1e, when S4 is entered and S3 is omitted, the S4 coefficient is negative, statistically significant and larger than the S3 coefficient in equation 1c. Likewise, when firms below the top 2 are entered in groups, a procedure that does have a theoretical foundation, these coefficients also are statistically significant. This illustrates that the order in which firms are entered has an important effect on the significance of the coefficients. Accordingly, Kwoka's conclusion that firm size distribution is completely captured by S1, S2, and S3 is not warranted. Although the present findings suggest that, at best, Kwoka claimed too much for his findings, further analysis indicates that his entire analysis is fatally flawed for three other reasons.

IV. Producer-Consumer Goods Industry Dummy Variable

Kwoka's data included 314 manufacturing industries consisting of 206 producer goods industries and 108 consumer goods industries. To reflect the structural difference between producer and consumer industries, Kwoka introduced a zero-one dummy variable. Because such a variable may not adequately capture the differences between these industries, it is preferable to run separate regressions on unrestricted models of producer and consumer goods. The results of separate producer and consumer goods regressions are shown in equations 2 and 3 in Table 1.

The S1 and S2 coefficients are not significant in any of the producer goods equations, suggesting that Kwoka's findings have no relevance to this large segment of manufacturing. These results are particularly surprising because Kwoka reported that his findings regarding the negative effect of the third firm "were based on only five industries for which $S3 > 0.16$" (Kwoka, 107). Because all five of these industries were producer goods industries, one would expect his third firm hypothesis to be confirmed by the producer goods subsample. Since it is not, the reasons for his findings must lie elsewhere.

The regressions using the consumer goods industries, equations 3a-h, differ from Kwoka's original regressions, equations 1a-1d, and the producer goods regressions 2a-2h. The coefficient S1 is positive and significant when introduced alone in equation 3a, and the S2 coefficient is the only significant seller share in all other equations. This is an anomalous result. These regressions demonstrate that Kwoka's results depend on improper pooling, or on an improper specification to handle subsample differences, namely, the producer-consumer dummy alone. 2/

V. MARKET DEFINITION PROBLEMS

The above examination is sufficient reason to dismiss Kwoka's findings. However, there is also a conceptual error in his analysis that deserves mention, especially because other researchers have been similarly guilty. Following the practice of Collins and Preston, Kwoka used a geographic dispersion index (DISP) "to reflect the discrepancy between the national data compiled in the Census and the geographical extent of true economic markets" (Kwoka, 102). Not only are such indexes crude at best (Weiss, 1972), but they are conceptually inappropriate when individual seller's shares are constructed by Kwoka's methods. He used the national sales in 1972 of the various leading sellers as reported by EIS. [3/] This procedure accurately captures the true relative sizes of sellers only in national markets. [4/] In local or regional markets it leads to varying degrees of error. For example, according to Weiss, mattress manufacturers sell in 24 regional markets, (Weiss, 1972, 255). EIS data used by Kwoka show the following market shares for the top four sellers: S1 = 18.5; S2 = 5.3; S3 = 3.5; and S4 = 3.5. In 1972 only the top mattress manufacturer, Simmons, sold in all states. However, about 18 percent of all mattresses were sold under the Sealy brand, although they were manufactured by 26 Sealy manufacturing franchisees, which usually ranked first or second in their regional markets. The third largest brand measured by national sales was Serta, which also was manufactured and sold by over 20 individual Serta franchisees, most of which were among the leaders in their regional markets. As a result, the market shares in various marketing areas were much greater and the size distribution more equal than the national market shares; there also was substantial variation among regions. (See Technical Appendix.)

Although mattresses may be an extreme example, it indicates the magnitude of possible error resulting when local or regional markets are included in the kind of analysis undertaken by Kwoka. In many industries with less than national markets not all leading sellers operate nationally. For example, in 1972 only Anheuser-Busch, Schlitz, and Miller operated nationally. But whereas Miller sold nationally, it ranked eighth in total national beer sales. On the other hand, the third largest seller, Pabst, was often the first or second largest seller in its main markets; this also was true of the fourth largest seller, Coors.

These errors tend to result in a consistent overstatement of the size disparity among sellers in industries with smaller than national markets. Nor can the inclusion of a geographic dispersion variable correct this problem. Indeed, national sales of sellers accurately reflect their relative share in regional markets in only one very special case: when all leading firms operate nationally and hold the same relative shares of national sales as they hold in each regional market. There probably are relatively few such industries. The implication is clear: Kwoka's analysis, as well as that of others, is most appropriately applied only with samples consisting of industries in which the true market is national in scope.

Any classification of the market size of a large number of industries is necessarily arbitrary. Fortunately, Weiss has classified 4-digit SIC manufacturing industries by the number of markets in the United States, ranging from one to many. Although his classification is for 1963 and Kwoka's data are for 1972, this should not create a problem since the geographic scope of markets does not change rapidly.

Table 2 shows the regression results for 64 industries which Weiss classified as national in scope and for which Kwoka calculated data. The results differ from those in Table 1 in several respects.[5/] In equation 1d neither the S3 nor the S4 coefficient is significant. The non-significance of the S1 through S4 coefficients in equations 2a-2e again indicate that the results shown in equations 1a-1e depend upon the consumer goods industries in the sample. However, in the consumer goods sample only the leading seller's share is statistically significant.

VI. CONCLUSION

We have presented four conceptual and empirical problems with Kwoka's analysis. (1) The method Kwoka used to test his third firm hypothesis is biased in his favor. When the order of introducing sellers is changed the fourth firm as well as groups of firms below the top two possess characteristics similar to that of the third firm.

(2) The use of a dummy variable to discriminate between producer and consumer goods industries results in a relationship that disappears when the regressions are run separately on producer and consumer industries. These unrestricted models, using national and adjusted regional markets, reveal no relationship between sellers' shares and PCM in producer goods industries and only S2 is significant in consumer goods industries.

(3) When Kwoka's model is tested with a sample consisting only of national market industries, only S1 is statistically significant in the consumer goods industries.

(4) There appear to be serious deficiencies in some (perhaps many) market share estimates made by EIS. This point is made to caution researchers not to attempt to draw fine lines when using crude data.

TABLE 2
REGRESSIONS OF INDUSTRY PRICE-COST MARGINS ON CONTINUOUS MARKET SHARES
IN 65 NATIONAL MARKET INDUSTRIES

Eq.	S1	S2	S3	S4	KO	GROW	CDUM	MID	Constant	$\bar{R}^2$
					65 Producer and Consumer Goods Industries					
1a	0.4751 (3.13)				-0.1886 (2.25)	0.0003 (0.01)	-0.0424 (1.63)	-0.0684 (0.12)	0.2617	.190
1b	0.5695 (3.20)	-0.2952 (1.01)			-0.2004 (2.37)	0.0111 (0.23)	0.0468 (1.77)	0.2897 (0.42)	0.2709	.191
1c	0.5280 (2.85)	-0.2099 (0.68)	-0.3648 (0.84)		-0.1841 (2.12)	0.0167 (0.35)	-0.0474 (1.79)	0.5441 (0.72)	0.2828	.187
1d	0.5139 (2.72)	-0.2599 (0.79)	-0.0695 (0.09)	-0.4241 (0.45)	-0.1849 (2.11)	0.0176 (0.37)	-0.0478 (1.79)	0.7258 (0.84)	9.2886	.175
1e	0.5140 (2.74)	-0.2730 (0.93)		-0.4937 (0.95)	-0.1859 (2.16)	0.0174 (0.37)	0.0479 (1.81)	0.7410 (0.89)	0.2889	.190
					40 Producer Goods Industries					
2a	0.0929 (0.50)				-0.2296 (2.48)	0.0225 (0.34)		-0.0685 (0.10)	0.3412	.131
2b	0.1534 (0.72)	-0.2230 (0.60)			-0.2298 (2.46)	0.0352 (0.51)		0.2688 (0.30)	0.3440	.115
2c	0.1280 (0.58)	-0.1689 (0.42)	-0.3424 (0.43)		-0.2023 (1.77)	0.0441 (0.60)		0.6356 (0.50)	0.3471	.093
2d	0.1269 (0.56)	-0.2040 (0.47)	-0.1413 (0.12)	-0.2693 (0.23)	-0.2055 (1.76)	0.0424 (0.57)		0.7093 (0.54)	0.3513	.066
2e	0.1312 (0.60)	-0.2275 (0.60)		-0.3721 (0.47)	-0.2119 (2.08)	0.0401 (0.56)		0.6683 (0.53)	0.3523	.094
					25 Consumer Goods Industries					
3a	0.9313 (4.66)				0.2064 (1.14)	-0.0758 (1.37)		-1.9711 (2.20)	0.1305	.590
3b	1.0380 (4.10)	-0.2635 (0.70)			0.1713 (0.90)	-0.0691 (1.21)		-1.7160 (1.76)	0.1386	.600
3c	1.0888 (4.24)	-0.3665 (0.95)	0.5314 (1.07)		0.2301 (1.16)	-0.0828 (1.42)		-2.1697 (2.04)	0.1079	.582
3d	1.1742 (4.09)	-0.2848 (0.70)	-0.1150 (0.11)	0.9658 (0.71)	0.2523 (1.24)	-0.0958 (1.55)		-2.8172 (2.00)	0.0931	.571
3e	1.1652 (4.36)	-0.3012 (0.81)		0.8345 (1.30)	0.2523 (1.28)	-0.0947 (1.60)		-2.7522 (2.21)	0.0935	.594

What are we to make of these findings? First, the third point must be interpreted cautiously because the consumer sample is quite small. Second, if this finding is correct, we suggest that it reflects the fact that leading consumer goods firms have higher PCMs than lesser firms. When a leading firm holds a large market share its PCM is a larger component of industry PCM and its share does a better job than the shares of others in explaining its industry's PCM. The results may also be influenced by an apparent tendency of EIS (Kwoka's data source) to overstate the leading firm's share relative to lesser firms (see Technical Appendix).

When differing degrees of advertising-created product differentation exist among industries, both a firm market share variable and a concentration variable should be used in explaining an individual seller's PCM. In models using relative firm market shares (the firm's share relative to the top four firms' share) [6/] and a concentration ratio, each has a positive, independent influence on profits and/or prices (Federal Trade Commission, Connor and Mueller, Marion, et. al.). It is not possible, of course, to use such models in explaining industry PCMs.

In sum, the bold policy implications that some have drawn from Kwoka's work are totally unwarranted. There may well be substance to the third firm hypothesis, but that substance has not yet been demonstrated.

TECHNICAL APPENDIX

Firm Market Share Data

Kwoka used market share data for 1972 developed by Economic Information Systems, Inc. (EIS) of New York City, which is the only readily available source of such data. Although these data are valuable for many purposes, they are far less accurate than Kwoka implied in his Technical Appendix (Kwoka, 109). He based his conclusion on the fact that 4-digit CR4s derived from EIS data are quite closely correlated with those of the Census; the 1972 Census CR4 has a mean of .409 and its EIS counterpart has a mean of .398. The simple correlation coefficient of .922 "indicates [to Kwoka] that although they are not completely identical, they do capture much of the same property of firm size distribution" (Kwoka, 109).

This close correlation is misleading as to the accuracy of the EIS data for individual firms. Based on extensive examination of EIS data, especially in the food and kindred product industries, it is apparent that EIS contains numerous errors in firm estimates. Indeed, in every instance where the Food Systems Research Group at the University of Wisconsin-Madison has been able to compare EIS data with more precise data significant errors were found in the EIS data, often very substantial ones. These errors are especially great for the 1972 data used by Kwoka since this was the first year for which EIS developed data. Tables A-1-A-3 provide examples of the kinds of errors found in industries where more reliable data for individual firm shares were available from other sources. Even these comparisons overstate the accuracy of EIS in estimating the shares of <u>particular</u> firms. For example, whereas both

the FTC and EIS ranked Borden as the largest seller of fluid milk, for all other ranks the two sources did not agree, and two of the top eight sellers in the FTC's list were not included in the EIS list. (This comparison is based on EIS data purchased in 1974, which reportedly was for 1973. Thus, these data differ somewhat from Kwoka's.)

Not only does the EIS data for these industries differ substantially from those reported by more reliable sources, but in each case the share of the largest firm is overstated relative to that of other firms. This may reflect the manner in which EIS develops its data. If so, EIS data may contain a consistent bias toward overstating the shares of the largest firm.

As discussed in the text, the market share data for mattresses present special problems for researchers. Whereas EIS data are for individual manufacturers of mattresses, two of the leading brands, Sealy and Serta, are manufactured and sold in each regional market by franchisee manufacturers, which EIS and the Census treat as separate manufacturing firms. Thus, the size inequality of sellers in particular regional markets is much smaller than is indicated by the national share data shown by EIS. For example, Sealy franchisees' sales in their markets average about the same as their share of national sales, although the shares of individual franchisees varied from 5 percent to 50 percent in their individual markets. The top four sellers' shares in 21 regions varied from 48 percent to 85 percent. Clearly, a geographic dispersion index applied to national data does not correct for the proper scope of the market of either individual sellers or groups of sellers. Although mattress manufacturing presents special problems, these problems are

common to all manufacturing franchises, e.g., soft drinks and bakery products. Similar problems occur when agricultural cooperatives are organized as "federated" organizations; each such member cooperative is treated as a separate entity by EIS (and in the Census) although all member cooperatives market through a single sales outlet. This source of error may be important in only a few manufacturing industries, e.g., butter and cheese.

TABLE A-1 FLUID MILK: SIC 2026

Seller Rank	EIS	Other*	EIS/Other
1	10.4%	6.3%	165%
2	7.0	6.3	111
3	3.8	3.2	119
4	3.1	2.6	119
5	2.1	2.2	95
6	1.9	2.2	86
7	1.8	2.0	90
8	1.3	1.9	68
CR8	31.4%	26.7%	117%

* Federal Trade Commission, Economic Report on the Dairy Industry (Washington, D.C. 1973), p. 61.

TABLE A-2 MALT LIQUOR: SIC 2082

Seller Rank	EIS	Other*	EIS/Other
1	21.3%	19.9%	107%
2	12.0	14.2	85
3	8.7	9.4	93
4	6.7	7.3	92
5	5.5	6.1	90
6	4.3	4.7	91
7	3.3	4.1	80
8	3.3	4.0	83
CR8	65.1%	69.7%	93%

* These shares are from Modern Brewery Age Blue Book, 1973.

TABLE A-3 MATTRESSES & SPRINGS: SIC 2515

Seller Rank	EIS	Other*	EIS/Other
1	18.5%	22.0%	84%
2	5.3	18.3	29
3	3.5	10.0	35
4	2.3	8.4	27
5	2.3	5.2	44
6	2.3	5.2	44
7	1.6	3.9	41
8	1.5	3.9	38
CR8	37.3%	80.8%	46%

* Ohio-Sealy Mfg. Co. v. Sealy, Inc., 585 F 2nd 821 (1978), PTX 419 (top 3 sellers' shares in 1972) and PTX 1154 (4th-8th sellers in 1976.

FOOTNOTES

* University of Wisconsin-Madison and California State University, San Jose. We wish to thank John E. Kwoka for making available to us the data he used in his paper. We also thank Thomas W. Paterson and David I. Rosenbaum, research assistants, University of Wisconsin and Bruce Marion. This research was supported by the College of Agriculture and Life Sciences, University of Wisconsin-Madison.

1/ The results are identical to Kwoka's published results. Kwoka used two measures of scale in an industry, MID and MCDR. MID, midpoint plant scale, is the size of the plant producing the fiftieth percentile of output in the industry. MCDR is the interaction of MID with a cost disadvantage ratio (Kwoka, 102). The data set supplied the authors by Kwoka included only his MID plant scale variable. Although Kwoka indicated that MCDR generally yielded slightly stronger results than MID, we do not believe the results shown below are affected significantly by the use of MID, especially since MID yielded a larger t-value on S3 in his most significant equations (Kwoka, 105, equations 3b and 3c) than when he used MCDR.

2/ The hypothesis that the independent variables in the producer and in the consumer goods industries exert the same influence on the dependent variable, PCM, was tested for all corresponding equations. At the 99 percent confidence level, this hypothesis was rejected for all equations.

3/ Economic Information Systems, New York City, provides estimates of individual firms market shares of Census 4-digit SIC products.

4/ This possible source of error was first suggested to one of the authors by Dr. Russell C. Parker of the Federal Trade Commission.

5/ We replicated Kwoka's original equation solely to permit comparisons with his results, not because we believe it is appropriate to combine consumer and producer goods industries in the same sample.

6/ One reason relative firm market share is preferable to firm market share is that the former is less closely correlated with the industry concentration ratio than is firm market share.

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