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# Economies of Scale and the New Technology of Daily Newspapers: A Survivor Analysis

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# Economies of Scale and the New Technology of Daily Newspapers: A Survivor Analysis

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The economics of the newspaper industry occupies a special place in industrial organization. Unlike the vast majority of enterprises, this business is intimately linked to the protection of freedom of expression. Constitutional democracies generally have monitored it with special care.[1] In the United States the Newspaper Preservation Act of 1970 provides some antitrust immunity for segments of the industry. Ignoring a captive regulation (pro-producer, wealth-maximizing) rationale for the act, we may presume that the United States Congress deems daily newspaper viability as an objective superior to the conventional reasons for antitrust. The received logic rests on the notion that newspapers are naturally monopolistic [13, 15, 17, 18, 20]. Logical analysis and statistical research support this notion, suggesting that first-copy costs reflect significant indivisibilities. In the absence of local market segmentation, city newspaper markets accordingly evolve to one major daily [20].

In the wake of dramatic technological changes in newspaper production during the last 20 years, however, an interesting question focuses on the validity of the substantial economies of scale conclusion. Informed speculation and casual empiricism suggest that absolutely smaller newspapers have gained in relative efficiency as a result of these changes. Our objective is to examine this question.

## TECHNOLOGICAL CHANGES

Newspaper production has historically been a prototype of mass production. High set-up or first-copy costs exist. These include the collection and organization of editorial and advertising copy and preparation of the printing mechanism. These costs are necessary to produce even one copy. Subsequent copies may be produced at very low marginal costs.

The new technology in the newspaper industry involves four major changes. The first is the use of offset lithography. Actually, this technology has been available for decades. However, until the 1960s only one daily newspaper, the *Opelousas* (Louisiana) *Daily World*, employed it. After numerous weekly newspapers successfully switched to offset lithography, the American Newspaper Publishers Association Research Institute researched the technology and found it adaptable to operations of daily newspapers that usually have larger circulations [26]. Rapid adoption followed.[2]

A second, related development was "the use of photographic methods to generate printed images on paper" [16, p. 196]. This process replaced pouring molten lead into molds to produce lines of type. A "cold typewriter" replaced the "hot" lead typesetting. In a third development, photocomposition was linked with computer technology. This technology had particular impact on advertising, as the computer could sort and file advertisements and perform accounting services. Finally, computer technology provided the video display terminal (VDT) or "front-end systems." Journalists now could type directly on a "typewriter" linked to a computer. Editorial content could be stored on the computer and edited and corrected. The traditional composing function was effectively eliminated. Proofreading, which had been performed by a skilled printer, could be done by a journalist. S. J. Prais [16, p. 197] summarizes the effects of these changes:

> Computer-operated photo-composition methods can produce plates ready for printing at a rate of several thousand lines a minute from text stored in the computer's memory, with an error rate of one in 250,000 lines. With the old hot-metal system, a man sets three to five lines a minute operating a linotype machine, and working from a typewritten text; his average error rate is one in every ten or twenty lines of type. The new technology is cleaner, produces fewer errors, needs less staff and less space; *it is in every way more productive than the old technology* (emphasis added).

The new technology followed a diffusion pattern starting with smaller papers and extending to the largest papers in the land. Hot metal machines declined in use by two-thirds from 1974 to 1980. Although organized labor vigorously opposed these innovations (with extended strikes against the *New York Times* in 1977 and the *Washington Post* in 1978), the adoption appears to be nearly universal (see Prais [16]).

Most researchers claim these innovations will reduce the relative advantages of large firms. As Prais [16, p. 197] states, "The new technology requires less fixed capital for a given rate of output, and probably also less working capital since fewer men need to be employed. It is not expected to increase concentration in the industry." John R. Malone [14] argues that the new technology will permit a minimum efficient scale (MES) for a new entrant at approximately 75,000 circulation — compared to the MES of approximately 250,000 circulation previously required.

## THE SURVIVOR METHOD

The study of the cost structure of an industry can be approached in several ways [1, 22]. The approach used here is the survivor method [2, 9, 21, 25, 27]. The method is straightforward. Researchers classify the enterprises in a market into size categories and measure the market shares of the respective size classes over time. Those size categories whose shares of the market grow are deemed efficient, while those that lose are deemed inefficient. Both inferences presume the changes exceed expectations given random fluctuations.

The method has several distinct advantages. First, it is convenient. Sufficient data are often readily available. It requires neither the extensive interviewing of the engineering method, nor the complicated output, factor, or expenditure measures of production or cost studies. Second, the method avoids myriad measurement problems involved in statistical studies. Such problems include the potentially misleading use of historical cost data [25] and especially the capitalization of excess profits into costs [2].[3]

Two other arguments hold *a fortiori* for newspapers. First, the survivor technique is particularly well suited to handle complicated multi-input/multi-output activities. Newspapers are heterogeneous with respect to the quality of their inputs and outputs: the existence of differential payments to columnists, the notion of an "elite press," and the existence of journalistic prizes all attest to heterogeneity. The survivor method avoids the problems of measuring these inputs and outputs since efficiency is measured simply by the size classes that survive. Second, the method is well equipped to handle the principal issue here: the dynamic aspect of efficiency in response to new technology in newspapers. Static measures such as the median plant would appear to be less appropriate in a dynamic context [1]. Roger D. Blair and Ronald J. Vogel [2, p. 523] indicate that the survivor method, "reflects trends and adaptive processes in the industry being studied. This is clearly superior to being confined to a purely static analysis."

On the other hand, the method also has some shortcomings in this context [1, 3, 22, 23]. First, the analysis yields measures of relative efficiency or a qualitative ranking of efficient sizes only; we have no precise estimate of the absolute cost differentials between efficient and inefficient classes of newspapers. A second limitation is that the analysis focuses only on private costs, not on social costs [23, 25]; and social and private costs in the newspaper business may diverge significantly.[4] If large papers attain more monopoly power, the survivor technique will overstate social efficiency [9].[5] Third, geographic market definition within the newspaper industry may pose problems for the survivor test [24]. Newspapers rarely are national in scope, and aggregate analysis, accordingly, may be somewhat suspect.

These limitations raise some qualifications. However, our purpose is strictly positive and restricted in scope. We wish to see if smaller-scale daily newspapers are more viable since the advent of the new technology, a question of profound interest to managers, investors, and lenders involved or contemplating involvement in the newspaper industry; and while it is true that large newspapers may produce an unobserved social loss, the existence of naturally monopolistic tendencies in daily newspapers biases against our alternative hypothesis. Moreover, it is not clear that other techniques could identify "true costs" from the capitalized monopoly rents. Finally, neither is it clear that the newspaper market is local in a meaningful economic sense. While competition between or among newspapers in the same city may be insignificant, substantial competition exists among newspapers in different cities [10]. James N. Rosse [19] had developed an "umbrella" model of newspaper competition. Typically, each metropolitan center has a large newspaper. Beneath that umbrella is a second level, newspapers in satellite cities, and a third level, local dailies. A fourth level consists of weeklies and other specialized media. Little competition exists among papers within level 2 or 3, but each paper competes with the papers in the levels above and below it. In short, Rosse's model suggests that newspaper competition may not be as local as casual empiricism would suggest, and Allen's [1] observation that the survivor technique requires competition should not disqualify its application to the newspaper industry.

## EMPIRICAL ANALYSIS

Our analysis proceeds on both an aggregate level, following the typical survivor study and on a disaggregate level on the chance that shifts in the size distribution of daily newspaper merely reflect demographic changes, which alter demand and costs.

## AGGREGATE TRENDS

We classify daily newspapers by circulation size, which is used as a proxy for a scale variable. We then compare the changes in market shares between 1964, 1973, and 1981 with the data stratified by morning and evening papers. We obtained the data from Editor and Publisher *International Yearbook.* The size classifications are the same as those used by Editor and Publisher.[6] Table 1 contains data on market shares and the number of newspapers for each size category for 1964, 1973, and 1981.

An examination of Table 1 reveals several distinct patterns. First, the smallest class, newspapers with less than 5,000 circulation, declined in terms of market share and the number of firms between 1964 and 1981. Second, the largest size class, daily newspapers with circulation in excess of 500,000, experienced modest gains in all categories during the 1964–1981 period. This latter result is consistent with the traditional (natural monopoly) view. On the other hand, the intermediate size classes reflect a mixed pattern. Moreover, there are clear differences between morning and evening newspapers. To get a clearer picture of these changes, we use the conventional survivor technique of comparing the ratio of market shares over time. These ratios are summarized in Table 2.

*Table 1*

**NATIONAL MARKET SHARES AND NUMBER OF NEWSPAPERS BY CIRCULATION SIZE, 1964, 1973, 1981**

| | A.M. | | | P.M. | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | 1964 | 1973 | 1981 | 1964 | 1973 | 1981 | 1964 | 1973 | 1981 |
| Circ. Size | | | | | | | | | |
| 500,001 + | 21.99 (6) | 22.28 (7) | 25.74 (11) | 5.51 (3) | 5.25 (3) | 5.93 (5) | 12.80 (9) | 11.23 (10) | 15.14 (12) |
| 250,001 to 500,000 | 17.85 (14) | 17.21 (12) | 12.62 (12) | 18.44 (21) | 15.68 (17) | 6.91 (9) | 19.49 (35) | 16.75 (29) | 9.65 (18) |
| 100,001 to 250,000 | 28.53 (39) | 26.24 (41) | 18.91 (49) | 18.91 (46) | 17.72 (44) | 19.14 (45) | 18.50 (85) | 19.77 (85) | 22.54 (87) |
| 50,001 to 100,000 | 15.06 (51) | 16.14 (61) | 18.24 (78) | 12.22 (60) | 13.09 (70) | 13.11 (62) | 13.06 (106) | 13.22 (129) | 15.57 (138) |
| 25,001 to 50,000 | 9.39 (66) | 9.67 (68) | 11.44 (94) | 16.94 (186) | 18.67 (197) | 20.66 (188) | 14.93 (248) | 16.84 (260) | 16.25 (272) |
| 10,001 to 25,000 | 5.48 (76) | 5.63 (82) | 4.65 (82) | 16.53 (389) | 19.14 (447) | 22.67 (453) | 13.01 (462) | 14.72 (519) | 14.03 (531) |
| 5,001 to 10,000 | 1.30 (41) | 1.33 (46) | 1.28 (49) | 7.67 (384) | 8.02 (400) | 9.29 (400) | 5.51 (425) | 5.62 (444) | 5.45 (449) |
| ≤5,000 | .38 (28) | .29 (23) | .37 (30) | 3.80 (362) | 2.46 (273) | 2.28 (190) | 2.62 (390) | 1.84 (295) | 1.36 (220) |
| Total Firms | 321 | 340 | 405 | 1,451 | 1,451 | 1,352 | 1,760 | 1,771 | 1,727 |
| Total Circulation | 23,504,943 | 25,015,696 | 28,450,028 | 35,881,602 | 36,680,910 | 30,878,420 | 55,483,482 | 61,696,606 | 59,328,457 |

Source: Editor ard Publisher, *International Yearbook*.

Note: The first number is the market share number for the respective year and size class. The second number, in parentheses, is the number of firms in the respective size category. The *Wall Street Journal*, *Christian Science Monitor*, and the *Journal of Commerce* have been excluded because these are designated as "national newspapers" by Editor and Publisher. The totals for market share are omitted. They are approximately 1.0; deviations are because of rounding. The number of newspapers in the A.M. and P.M. categories does not add up to the total class because 24 "all day" newspapers are included in both A.M. and P.M. columns, but only once in the total. Circulation for these papers is equally divided between A.M. and P.M. papers.

*Table 2*

**RATIOS OF DAILY NEWSPAPER MARKET SHARES BY CIRCULATION SIZE**

| | A.M. | | P.M. | | Total | |
|---|---|---|---|---|---|---|
| Year | 1973/1964 | 1981/1964 | 1973/1964 | 1981/1964 | 1973/1964 | 1981/1964 |
| Circ. Size | | | | | | |
| 500,001 + | 1.01 | 1.14 | .95 | 1.08 | .87 | 1.18 |
| 250,001 to 500,000 | .96 | .71 | .85 | .38 | .86 | .50 |
| 100,001 to 250,000 | .96 | .92 | .94 | 1.01 | 1.07 | 1.22 |
| 50,001 to 100,000 | 1.07 | 1.21 | 1.07 | 1.07 | 1.01 | 1.19 |
| 25,001 to 50,000 | 1.03 | 1.21 | 1.10 | 1.22 | 1.13 | 1.09 |
| 10,001 to 25,000 | 1.03 | .85 | 1.16 | 1.37 | 1.13 | 1.08 |
| 5,001 to 10,000 | 1.02 | .98 | 1.04 | 1.21 | 1.02 | .99 |
| ≤5,000 | .78 | .97 | .65 | .60 | .70 | .52 |

Note: See appendix for data sources. The market shares of the total column do not reflect a simple summation of the A.M. and P.M. column, because Editor and Publisher apportions circulation of "all day" newspapers between the two classes.

The data in Table 2 indicate that many of the intermediate size categories are relatively efficient in that the ratios of market shares are greater than 1.0.[7] The largest size category, newspapers with circulation greater than 500,000, also shows a sizeable increase in market share for the 1981/1964 period. At the other extreme, newspapers with less than 5,000 circulation exhibit ratios substantially less than 1.0. A more dramatic decline is evident for the second largest class, 250,001 to 500,000 circulation. Thus these two classes appear to be less efficient.

While important measurement problems exist for the morning and evening market shares, the data suggest that smaller evening papers — 5,001 to 50,000 circulation — made notably larger gains in market shares than comparable morning papers made. The ratios for the 50,001 to 250,000 circulation classes are roughly comparable for morning and evening papers. However, while market shares of both morning and evening papers in the 250,001 to 500,000 circulation size declined, the decline for evening newspapers is of a distinctly greater magnitude.

The data in Table 2 provide no basis on which to distinguish between changes induced by relative enterprise efficiency and by random fluctuations. A $\chi^2$ test of the changes in the size distribution of firms can be performed to draw such an inference (see, for example, Blair and Vogel

[2]; Frech and Ginsburg [9]). Our interest here is the changes in each separate size class. Accordingly, the $\chi^2$ analysis focuses on each class separately, treating all other classes as a single class. Given the ambiguity of a.m. and p.m. classifications and measurement, we ignore that distinction here. The results of the tests are shown in Table 3. The null hypothesis presumes no change in the size distribution. The critical $\chi^2$ value for statistical significance (.05 level) is 3.84. Thus Table 3 documents significant shifts in the size distribution of daily newspapers. Significant increases are observed for the intermediate classes — 10,001 to 25,001, 25,001 to 50,000, and 50,001 to 100,000, circulation size classes, and a significant decrease for large newspapers in the 20,001 to 500,000 size class.

To summarize, the data in Tables 2 and 3 leave some measure of ambiguity because the market share of the 100,000–250,000 and 500,000+ classes increases, although the changes in the distribution of those sizes are not statistically significant. Nevertheless, the performance of the three intermediate size classes — 10,001 to 100,000 — is consistent with the recent conjecture that the minimum efficient scale for daily newspaper is smaller since the advent of the new technology in daily newspapers. Our interpretation of the case for 100,001–250,000 and 500,000+ size classes is clouded. The lack of statistical significance for shifts in the size distribution suggests that their gains in market share may simply reflect additional patronage from shrinking competitors. This interpretation is consistent with a disequilibrium for these size classes. However, the data are also consistent with unique cost advantages unrelated to production and the new technology [4]. For example, these size classes might possess economies of size in distribution.

*Table 3*

**$\chi^2$ TEST OF SIGNIFICANCE FOR CHANGES IN SIZE DISTRIBUTION OF FIRMS BY CIRCULATION SIZE CATEGORY 1964 VS. 1981[a]**

| Circulation Size | Δ in Market Share | Δ in Number of Firms | $\chi^2$ |
|---|---|---|---|
| 500,000 + | +2.34 | +3 | 1.74 |
| 250,001 to 500,000 | −9.84 | −17 | 8.41 |
| 100,001 to 250,000 | +4.04 | +2 | 0.78 |
| 50,001 to 100,000 | +2.51 | +32 | 12.21 |
| 25,001 to 50,000 | +1.32 | +24 | 4.47 |
| 10,001 to 25,000 | +1.02 | +69 | 18.32 |
| 5,001 to 10,000 | −.06 | +24 | 3.78 |
| <5,000 | −1.26 | −170 | 87.80 |

See appendix for data sources.
[a] For 1 df, the critical $\chi^2$ value for statistical significance of .01 is 6.63 and that of .05 is 3.84.

### DISAGGREGATE TRENDS

While the previously cited results document a significant shift in the size distribution of daily newspapers towards intermediate-sized firms, the shifts in aggregate market share may simply reflect the demise of large newspapers in older, declining cities and either the entry of newspapers or the growth of small papers in younger, growing cities. New or growing small papers are unlikely to evolve to the optimal scale in the short run. Consequently, the observed aggregate market share shifts are explicable independent of any shifts in optimal newspaper size.

To determine whether the aggregate performance simply reflects intercity disequilibria, we can compare the aggregate performance of various sized daily newspapers with the performance within local markets. Presumably, demographic factors such as population shifts or shifts in retail sales level will strongly affect the probability that a specific newspaper gains national market share, while the same forces are less likely to affect the probability a paper gains local market share. Holding constant the relevant demographic forces that would tend to create a disequilibrium size distribution across cities, we can observe whether specific size classes of newspapers are more or less likely to gain or lose market share. Similar reasoning applies to the probability of entry and exit.

#### Independent Variables

The independent variables (in addition to newspaper size) that are used in this study are defined as follows:

*PDSPOP* = the percentage change in SMSA population from 1964 to 1981;

*DSPOP* = the same measure in absolute terms;

*DCHH* = the change in the number of city households between 1964 and 1981;

*DSINC* = the percentage in per capita income for an SMSA from 1964–1981;

*PDSRS* = the percentage change in SMSA retail sales from 1964 to 1981;

*DCRS* = the change in city retail sales from 1964 to 1981;

*SUB* = the change in SMSA population minus the change in central city population for the years 1964–1981. This variable attempts to capture the effects of suburbanization;

*DRAD* = the change in the number of radio stations in the SMSA between 1964 and 1981;

*DTV* = the change in the number of television stations between 1964 and 1981;

*SQMI* = the number of square miles for the city in 1981;

*EVE* = a dummy variable for an evening newspaper, zero otherwise.

The variables attempt to capture parametric shifts — for example, change in population, household, incomes, which shift demand away from older city newspapers as well as raise distribution costs. The radio and television variables attempt to capture the effects of substitutes or complements on demand. The evening variable reflects unique (presumably lower) demand for evening readership and higher distribution costs for evening papers due to urban congestion. The square miles variable is a proxy for urban density and the related distribution costs.

**Logit Models**

It is well known [11, 12] that ordinary least square regression is inappropriate with variables that range only from zero to one because the OLS residuals are heteroscedastic and the distribution of estimators is not normal. In our analysis firms are categorized as gaining market share (dependent variable equals 1) or not gaining market share (dependent variable equals zero). Consequently, we use logit analysis to transform the data so that all predictions lie on the unit interval. The dependent variable is the logarithm of the odds ratio that a particular newspaper gains market share. The estimating equation form is:

$$(1) \qquad \ln\left(\frac{P_i}{1 - P_i}\right) = \alpha_1 + \alpha_i \text{ Size Class} + \beta_i \text{ Other Variables} + \tilde{\mu},$$

where $\tilde{\mu}$ is a disturbance term. The estimates of Equation (1) for all daily newspapers in existence in 1964 and 1981 for the largest 50 cities (in 1984) are shown in Table 4.[8] The variables were estimated in numerous combinations, including the various demand and cost variables in both absolute and percentage form. The results for models with the highest $\chi^2$ values are shown in the table but the estimates for the firm size variables are approximately the same in all results. The first three columns represent the logit regression of the log-odds ratio that a given newspaper gained national market share, while the second three columns represent the log odds ratio that a given newspaper gained local market share, where the local market is defined as total daily newspaper circulation in the SMSA.[9]

An analysis of the data in Table 4 suggests three points. First, nonsize variables provide more explanatory power for the national market share estimates than for the local market share estimates. This result is consistent with our expectations because shifts in intercity population, retail sales, or other nonsize variables will certainly affect a local newspaper's share of the national market more than its share of the local market. Second, newspapers with circulation greater than 500,000 have a high log-odds ratio of increasing market share, and this result appears to be quite robust. Third, the smallest classes — 5,001–100,000 — all have substantially larger log-odds ratios for gains in market share than the larger papers in the 100,001–250,000 circulation range, and the results are even stronger for the local market estimates.

The interpretation of these results is straightforward. While some shifts in the national size distribution of daily newspapers can be attributed to demographic changes, firm size appears to play an independent and significant causal role. Moreover, size appears unambiguously significant in determining the likelihood that a firm gains local market share. The size classes in which existing papers are more likely to gain both local and national market share are the small papers — 5,001–100,000 circulation size — and the largest size class, 500,000 circulation and above. The performance of the 500,000+ category differs somewhat from the aggregate analysis in that it is quite robust. The survivorship may reflect a merger wave of declining newspapers, a natural market segmentation between central city and metropolitan dailies, or even large scale economies in distribution. On the other hand, the performance of the 5,001–100,000 circulation size classes is consistent with the hypothesis that the MES of daily newspapers has declined, although the unique MES of 75,000 circulation which Malone identifies is not evident.

Turning to the role of entry and exit, we ask to what extent do the observed shifts in national market shares reflect the demise of large urban dailies and the entry of small dailies. If both trends reflect demographic patterns, optimal size may be less important than intercity disequilibria. To pursue that query, we reestimate Equation (1) using the log-odds ratio that a firm existing in 1964 ceased operation by 1981 (exiting firms) and the log-odds ratio that a particular firm in operation in 1981 began operations since 1964 (entering firms). The results for the logistic regression estimates are shown in Table 5.[10]

The data in Table 5 suggest that neither size variables nor demographic variables are generally important determinants of newspaper exit. The circulation-size class coefficients are generally not significant and, if anything, document a greater log-odds ratio for daily newspapers in the 50,001–100,000 circulation size class. Thus the data suggest that the shifts in aggregate market share for the various size classes do not appear to stem from greater exit rates by larger papers.

The data in Table 5 also suggest that new entrants during the 1964–1981 period are unlikely to have been evening papers or above 100,000 circulation size. The latter result is hardly surprising because we presume entry usually occurs at a low scale. On the other hand, Table 5 does not provide robust support for the view that the increased national market share for the 5,001–100,000 circulation size papers is largely because of new entry. In short, little basis exists to infer that the shift away from large scale newspapers simply reflects the death of large papers in stagnating "rust belt" cities; and while new entrants do not appear to have swelled

*Table 4*

**ESTIMATE OF LOG ODDS OF INCREASED MARKET SHARE IN NATIONAL AND LOCAL MARKETS**

| | Dependent Variables | | | | | |
|---|---|---|---|---|---|---|
| Independent Variables | ln[P(SURN)/ 1 − P (SURN)] | ln[P(SURN)/ 1 − P (SURN)] | ln[P(SURN)/ 1 − P (SURN)] | ln[P(SURL)/ 1 − P (SURL)] | ln[P(SURL)/ 1 − P (SURL)] | ln[P(SURL)/ 1 − P(SURL)] |
| Intercept Circulation | −2.18 | −2.71 | −2..25 | −1.00 | −1.26 | −1.89 |
| | (−2.45) | (−3.67) | (−2.53) | (−1.06) | (−1.38) | (−2.22) |
| 5,001 to 10,000 | 3.57 | 3.57 | 3.38 | 4.13 | 4.14 | 4.15 |
| | (4.98) | (4.96) | (5.02) | (5.07) | (5.08) | (5.16) |
| 10,001 to 25,000 | 3.78 | 3.81 | 3.57 | 3.72 | 3.73 | 3.73 |
| | (5.33) | (5.35) | (5.36) | (4.07) | (4.70) | (4.73) |
| 25,001 to 50,000 | 4.35 | 4.34 | 3.98 | 4.42 | 4.60 | 4.55 |
| | (5.88) | (5.86) | (5.68) | (5.29) | (5.51) | (5.49) |
| 50,001 to 100,000 | 3.86 | 3.86 | 3.56 | 4.01 | 4.08 | 3.97 |
| | (4.84) | (4.84) | (4.71) | (4.61) | (4.65) | (4.58) |
| 100,001 to 250,000 | 2.68 | 2.74 | 2.54 | 2.49 | 2.50 | 2.50 |
| | (3.91) | (4.00) | (3.94) | (3.14) | (3.14) | (3.17) |
| 250,001 to 500,000 | 2.85 | 2.88 | 2.53 | 2.90 | 3.07 | 3.07 |
| | (3.61) | (3.62) | (3.38) | (3.35) | (3.56) | (3.59) |
| 500,000 + | 4.50 | 4.40 | 4.50 | 5.39 | 5.25 | 5.18 |
| | (5.60) | (4.53) | (4.49) | (4.70) | (4.71) | (4.67) |
| *PDSOP* | 3.68 | 3.22 | — | — | 1.81 | — |
| | (3.47) | (5.04) | | | (2.05) | |
| *DSPOP* | — | — | .77[a] | .86[a] | — | — |
| | | | (2.00) | (2.33) | | |
| *DSINC* | .10[a] | — | −.03[a] | −.02[a] | −.05[a] | −.05[a] |
| | (0.74) | | (1.46) | (−3.11) | (−2.74) | (−3.01) |

| | | | | | | |
|---|---|---|---|---|---|---|
| *PDSRS* | −.15<br>(−0.77) | — | .21<br>(1.32) | −.29<br>(−1.93) | −.36<br>(−1.91) | — |
| *DRAD* | .36[b]<br>(0.00) | .66[c]<br>(0.33) | −.01<br>(−0.54) | −.03<br>(−1.52) | −.02<br>(−.81) | −.14<br>(−0.72) |
| *DTV* | −.14<br>(1.50) | −.16<br>(1.71) | −.18<br>(−1.77) | −.25<br>(0.28) | .62<br>(0.00) | −.01<br>(−0.14) |
| *SQMI* | −.28[b]<br>(0.20) | −.63[b]<br>(−.47) | .12[c]<br>(0.89) | .16[c]<br>(1.27) | .37[b]<br>(0.30) | .63[b]<br>(0.62) |
| *EVE* | −.30<br>(0.85) | −.33<br>(.92) | −.24<br>(0.70) | −.47<br>(1.32) | −.50<br>(−2.11) | −.46<br>(−1.36) |
| $\chi^2$/df. | 123/14 | 121/14 | 113/14 | 106/14 | 105/14 | 101/12 |
| $R^2$ | .299 | .297 | .276 | .252 | .250 | .239 |
| − Log Likelihood Ratio | 287.35 | 288.43 | 296.70 | 314.93 | 316.26 | 320.70 |
| n = 1 | 186 | 186 | 186 | 168 | 168 | 168 |
| N = 0 | 120 | 120 | 120 | 138 | 138 | 138 |
| Total N | 306 | 306 | 306 | 306 | 306 | 306 |

Notes: *SURN* equals one if the newspaper gained in national market share between 1964 and 1981 and equals zero otherwise. *SURL* equals one if the newspaper gained in local market share between 1964 and 1981, and equals zero otherwise. The size class variables are dummy variables equal to 1 if the newspaper was in the respective circulation class in 1981, *PDSPOP* is the percentage change in SMSA population from 1964 to 1981. *DSPOP* is the same number in absolute terms. *DSINC* is SMSA income in 1981 minus SMSA income in 1964. *PDSRS* is the percentage change in SMSA retail sales between 1964 and 1981. *DRAD* is the number of radio stations in the SMSA in 1981 minus the number in 1964. *DTV* is the number of TV stations in 1981 minus the number in 1964. *SQMI* is the number of square miles for the city in 1981. All data are in original units except retail sales and income, which are in thousands. *EVE* is a dummy variable equal to 1 if the newspaper is an evening paper, equal to zero otherwise. $R^2$ is McFadden's "pseudo R square," $R^2 = [1 - (1/1_0)]$ where 1 and the −log of the likelihood ratio's for the full model and the model with only the intercept, respectively. Asymptotic "t" values are in parentheses.

[a] Multiply coefficient × $10^{-6}$.
[b] Multiply × $10^{-3}$.
[c] Multiply × $10^{-2}$.
See Table 1 for data sources.

*Table 5*

**ESTIMATE OF LOG ODDS OF EXIT AND ENTRY**

| Independent Variables | Dependent Variables | | | | | |
|---|---|---|---|---|---|---|
| | ln[*P*(*EXIT*)/ 1 − *P*(*EXIT*)] | ln[*P*(*EXIT*)/ 1 − *P*(*EXIT*)] | ln[*P*(*EXIT*)/ 1 − *P*(*EXIT*)] | ln[*P*(*ENTER*)/ 1 − *P*(*ENTER*)] | ln[*P*(*ENTER*)/ 1 − *P*(*ENTER*)] | ln[*P*(*ENTER*)/ 1 − *P*(*ENTER*)] |
| Intercept | −3.67 (−3.13) | −4.07 (−2.57) | −3.11 (−2.57) | −1.10 (−1.33) | −1.24 (−1.59) | −.52 (−0.75) |
| 5,001–10,000 Circulation | −.09 (−0.20) | 0.07 (0.00) | .12 (0.00) | .60 (0.92) | .60 (0.92) | .50 (0.76) |
| 10,001–25,000 Circulation | .08 (0.10) | .25 (0.27) | .27 (0.22) | .48 (0.75) | .47 (0.72) | .40 (−0.61) |
| 25,001–50,000 Circulation | .32 (0.26) | .51 (0.42) | .57 (0.48) | −.48 (−0.67) | −.52 (−0.73) | −.51 (−0.71) |
| 50,001–100,000 Circulation | 1.36 (1.18) | 1.51 (1.24) | 1.50 (1.23) | −.73 (0.92) | −.72 (−0.92) | −.76 (−0.96) |
| 100,001 + Circulation | .39 (0.33) | .55 (0.23) | .55 (0.48) | −3.68 (−3.10) | −3.70 (−3.13) | −3.79 (−3.20) |
| *DCHH* | −1.36[a] (−0.37) | — | — | 1.89[a] (0.81) | — | — |
| *DSINC* | .03[a] (0.98) | −.05[a] (−1.75) | — | .03[a] (1.40) | .04[a] (2.00) | — |
| *DCRS* | .24[a] (0.62) | — | .49[a] (1.49) | .01[a] (0.00) | — | −.22[a] (1.51) |
| *SUB* | −.44[a] (0.79) | −.59[a] (−1.62) | −.06[a] (−0.14) | .13[a] (0.40) | .08 (0.30) | .31 (1.05) |
| *DRAD* | −1.36[b] (0.33) | −.01 (0.33) | −.03 (−0.99) | .02 (1.02) | .02 (1.00) | .34 (0.17) |

| | | | | | | |
|---|---|---|---|---|---|---|
| *DTV* | .23 | .31 | .15 | −.02 | .00 | −.05 |
| | (1.22) | (2.08) | (0.86) | (−0.20) | (0.00) | (−0.48) |
| *SQMI* | −.33[b] | −.11[b] | −.68[b] | −.04[c] | .10[b] | −.12 |
| | (−0.61) | (−0.65) | (−1.45) | (−0.00) | (0.96) | (−0.58) |
| *EVE* | .02 | .02 | .04 | −1.55 | −1.53 | −1.51 |
| | (0.10) | (.10) | (.14) | (−4.17) | (−4.14) | (−4.13) |
| $\chi^2$/df | 28/13 | 28/11 | 27/11 | 63/13 | 62/11 | 60/11 |
| $R^2$ | .137 | .135 | .132 | .196 | .193 | .188 |
| −2 Log Likelihood Ratio | 176.9 | 177.5 | 177.9 | 258.4 | 259.2 | 260.9 |
| N = 1 | 32 | 32 | 32 | 62 | 62 | 62 |
| N = 0 | 274 | 274 | 274 | 274 | 274 | 274 |
| Total | 306 | 306 | 306 | 336 | 336 | 336 |

*Exit* equals one if a newspaper existing in 1964 ceased operations by 1981 and equals zero otherwise. *Enter* equals one if a firm in operation in 1981 began operation after 1964 and equals zero otherwise. The size class variables are dummy variables equal to 1 if the newspaper was in the respective size class. The appropriate year is 1964 for the exit estimates and 1981 for the enter estimates. *DCHH* is the change in the number of city households between 1964 and 1981. *DSINC* is the change in SMSA personal income between 1964 and 1981. *DCRS* is the change in city retail sales between 1964 and 1981. *SUB* is the change in SMSA population minus the change in city population between 1964 and 1981. *DRAD* and *DTV* are the changes in the number of radio and television stations respectively between 1964 and 1981. *SQMI* is the number of square miles of the primary city in the SMSA in 1981. All data are in original units except for retail sales which are in thousands. *EVE* is a dummy variable equal to 1 for evening newspapers. $R^2$ is McFadden's "pseudo R square," $R^2 = [1 - (l/l_0)]$ where l and $l_0$ − 2 are the log of the ratios for the full model and the model with only the intercept, respectively. Asymptotic "t" values are in parentheses.

[a] Multiply coefficient × $10^{-6}$.

[b] Multiply coefficient × $10^{-3}$.

[c] Multiply coefficient × $10^{-2}$.

See Table 1 for data sources.

the ranks of 100,000+ circulation papers, the 10,001–100,000 size papers do not appear to have increased their national market share via new entry either.

## CONCLUSION

A survivor analysis for daily newspapers from 1964 to 1981 indicates that papers with 5,000 or less circulation are withering away, while papers in the 100,000–500,000 circulation size range are less likely to have gained local or national market share, once intercity shifts in demographic variables are considered; no statistically significant increase in the distribution of firms in these ranges is evident. On the other hand, the 10,000–100,000 circulation size classes have experienced substantial increases in the number of firms and in market share. The increased number of firms in these classes represents a statistically significant shift in the size distribution of firms, and the log-odds ratio of increased national or local market share for existing papers in this size range substantially exceeds that for papers in the 100,001–500,000 size classes. Finally, the 500,000 plus circulation size class has experienced an increase in market share and an increase in the number of firms. While the shift in the size distribution of firms is not significant, the log odds ratio of increased national and local market share is greatest for this size class.

Except for the very largest class, these results are consistent with the conjecture that the new technology of daily newspapers has reduced first copy costs and lowered the minimum efficient scale. This conclusion is buttressed by the performance of firms in the 10,000–100,000 circulation size range in both national and local markets, and taking intercity shifts in demographic factors into account. Moreover, the second smallest size category, 5,001–10,000, while not experiencing a statistically significant increase in the number of firms, did demonstrate a high log odds ratio of increased market share when demographic variables are included in the analysis.

The performance of the 500,000 plus circulation size class is difficult to interpret. The robustness of the results suggests the results are not likely to be random. However, the data do not provide a clear picture whether the viability of this class merely reflects transitory shifts in patronage from the declining size classes, unique resources available to only the largest firms, failing firm induced mergers, or less obvious causes. The passage of time or alternative research strategies may permit a less ambiguous answer to the question of a bimodal industry structure. However, in view of the unambiguous trend toward local natural monopolies in the newspaper industry documented in previous research [for example, 20], the more impressive result is the clear viability of papers in the 10,000 to 100,000 circulation size range.

## APPENDIX

### DATA ITEMS AND SOURCES

| Item | Source |
|---|---|
| 1. Circulation — aggregate and per newspaper. | Editor and Publisher *International Yearbook*, various years. |
| 2. Evening or morning classification. | Editor and Publisher *International Yearbook*, various years. |
| 3. Population — SMSA and city. | Editor and Publisher, *Market Guide;* 1964; 1981. |
| 4. Households — SMSA and city. | Editor and Publishher, *Market Guide*, 1964; 1981. |
| 5. Retail Sales — SMSA and city. | Editor and Publisher, *Market Guide*, 1964; 1981. |
| 6. Personal Income — SMSA and city. | Editor and Publisher, *Market Guide*, 1964; 1981. |
| 7. City Square Miles. | *Encyclopedia of American Cities.* |
| 8. Standard Metropolitan Statistical Areas (SMSA). | 1980 *Census of Population, Special Report.* |

## NOTES

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1. In the United States the Hutchins Commission Report in 1947 focused on the public policy issues. Similar bodies occurred in the U.K. — Royal Commission on the Press 1961–1962 — and in West Germany with the German Monopolies Commission's report for 1976–1977. See Prais [16].

2. See Udell [26, p. 98].

3. Rosse [17, 18] has developed an ingenious procedure for estimating economies of scale in the newspaper industry. The motivation for his model also stems from the failure of econometric studies employing accounting data to reflect true costs. However, because of severe collinearity this approach may not be generally empirically tractable and may require extensive proprietary data. Accordingly, we eschew that approach here. See also Ferguson [8].

4. Some previous research focuses on the efficiency of newspaper chains. In particular, Dertouzos [6] and Dertouzos and Thorpe [7] emphasize the role of estate taxes in fostering newspaper mergers and chain ownership, as well as the absence of multi-plant economies of scale. Our study focuses on individual newspapers (that is, single plants). Therefore this issue is less relevant here.

5. We would not want to suggest that other techniques handle the monopoly problem adequately because of the capitalization of monopoly profits discussed above. Moreover, there is reason to believe that monopoly profits in the mass media industries are difficult to observe with any methodology because a significant part of the monopoly profits are distributed in the form of unobservable ownership consumption — the value of the right to propagandize public opinion. See Demsetz and Lehn [5].

6. We excluded three daily newspapers, *The Wall Street Journal, Journal of Commerce*, and *Christian Science Monitor.* While these papers are listed in the Editor

and Publisher circulation total, they are also identified as "national" newspapers. It seems appropriate to exclude these papers. The case for excluding *The Wall Street Journal* is particularly strong since it alone amounted to a multiplant operation for much of the sample period.

7. The data in Tables 1 and 2 reflect some bias for the circulation figures of a.m. and p.m. newspapers. During the sample time period, mergers and the death of newspapers led to the development of 24 hybrid, "all day" newspapers. Editor and Publisher apportions circulation figures equally between a.m. and p.m. categories and counts each paper in both groups. While this no doubt confounds the data, it is primarily a large newspaper phenomenon. This confounding impact can most readily be seen in Table 2: total ratios for the 100,001 to 250,000 class exceed the ratios for both the a.m. and p.m. newspapers. Because arbitrary apportionment and double counting do not exist for the total category, inferences for the category of largest newspapers will probably be more valid from the total column.

8. Four cities — St. Paul, Long Beach, Oakland, and Ft. Worth — are part of other SMSA's and, therefore, are included only once. Therefore the analysis is strictly speaking only for 46 SMSA's.

9. The estimates are not made separately for morning and evening papers because of the difficulty in apportioning the circulation for "all day" papers.

10. The size classes for all newspapers above 100,000 circulation are combined into a single size class because we could not obtain covergence for the nonlinear logit estimation procedures when the separate large classes were used for the exit and entry estimates.

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