The *New York Times* and the Market for Local Newspapers

Working Paper

August 9, 2004

Lisa George
Department of Economics
Hunter College

Joel Waldfogel
The Wharton School
University of Pennsylvania
and NBER

Abstract

Technological advances over the past century have dramatically lowered the cost of transmitting information over large distances. In the late 1990's, the *New York Times* implemented a national distribution strategy, establishing or expanding home delivery in more than 100 cities across the country. Using cross-sectional and longitudinal data on local newspaper circulation, *Times* penetration, and local newspaper characteristics, we find that as the *New York Times* circulation grows in a market, local newspaper circulation declines among college-educated readers. Local newspapers reposition toward local and away from national coverage, raising circulation among individuals without a college degree. Availability of national newspapers in local markets changes the relationship between local preferences and local products.

We are grateful to Rachel Croson, Felix Oberholzer-Gee, and Jeff Milyo for helpful comments on earlier drafts. Seminar participants at Harvard, Stanford, Dartmouth, Wharton, Michigan State, and Hunter provided helpful comments. We thank the referees and editor as well. All errors are our own.

[O]ur long-term strategy is to operate the leading news and advertising media in each of the markets in which we compete – both nationally and locally. The centerpiece of this strategy is extending the reach of The New York Times's high-quality journalism into homes and businesses in every city, town, village and hamlet of this country.

-New York Times Company Annual Report, 2003

Introduction

In differentiated product markets, the product options available to consumers can be limited by the number of individuals in a market with similar preferences. A growing body of literature documents the importance of shared preferences in media markets, where economies of scale and heterogeneous tastes are important. A highly educated consumer is more likely to have a local newspaper targeting his preferences if his locale has more, or proportionately more, educated residents. A consumer's welfare has thus traditionally been limited by his neighbors' tastes.[1]

Technological advances over the past century have dramatically lowered the cost of transmitting information over large distances, weakening the link between local preferences and local products in media markets. Modern technology allows media firms to seek a national audience, offering better, more specialized products even if they appeal to few individuals in any particular geographic area. Greater access to specialized national media makes many consumers better off. For example, a resident of Fargo with a preference for high quality national or international news may switch from the *Fargo Forum* to the *New York Times* if home delivery of the *Times* becomes available in that market. However, as some consumers are attracted to outside media, the local product may change as a result. With a smaller audience, the *Fargo Forum* may reduce coverage or cease to operate. Alternately, facing a loss of readers interested

[1] See George and Waldfogel (2003) for evidence on daily newspapers and Waldfogel (2003, 2004) for evidence on radio and television markets.

in national coverage, the local paper might add local coverage to attract additional readers interested in local affairs. If readers that switch to the *Times* tend to be the most educated, the *Forum* may simplify language and content to accommodate less highly educated readers. In short, the introduction of an outside product may benefit some local consumers and hurt others.

Concern about the consequences of national media expanding into local markets is not new. The effect of broadcasting on markets for local newspapers has been discussed since the invention of radio.[2] Today, a host of regulations such as the FCC "must carry" rules and the Newspaper Preservation Act seek to promote local content and local programming. Many foreign governments subsidize domestic media with the goal of promoting local customs and local culture.

Despite this concern, empirical evidence that national media affect local media markets is scarce. This paper estimates the effect of outside media on local media consumption and coverage by studying national expansion of the *New York Times.* Although the *Times* began publishing a national edition in 1980, the company initiated a major national expansion in 1996. Between 1996 and 2000, the company introduced or expanded home delivery in more than 100 cities, with a long-term goal of reaching homes everywhere in the nation. We use this expansion to ask two questions. First, does circulation of the *Times* outside of New York affect local newspaper circulation among its target audience? Second, does local newspaper targeting change as a result? Using cross-sectional and longitudinal data on local newspaper circulation, product characteristics, and *New York Times* penetration, we find that increased availability of the *Times* reduces circulation of local newspapers among targeted readers. There is also evidence that *Times* expansion increases local newspaper readership among individuals not targeted by the

[2] See Chester (1949) for an interesting history of newspaper efforts to limit competition from radio.

Times. We also provide evidence that local newspapers change their targeting, providing more local and less national coverage in response to *Times* expansion.

Our results are relevant to ongoing intellectual and policy debates on the desirability of localism in media. While regulations promoting local content are often defended as a means of protecting small, local firms against large national competitors, our results indicate that competition from national media can increase the availability of local coverage. However, outside media can also substantially affect who *consumes* local products. More generally, our results suggest that access to targeted national media might have consequences beyond local media markets. Individuals who switch from a local to an outside product might consume less local information, leading them to disengage from local affairs along the lines suggested by Robert Putnam in his well-known essay and book *Bowling Alone*. Information has also been linked to political participation.[3] If national media increase the cost to some groups of acquiring political information, these individuals may be less likely to vote in local elections.

The paper proceeds as follows. Section 1 outlines our approach and explains our focus on the *New York Times*. Section 2 describes the data used in the analysis. Sections 3 presents our empirical strategy and results. Section 4 concludes the paper.

I. *The New York Times* and Local Media Markets

We are interested in identifying the effect of national media on local media consumption and local media characteristics. We estimate these impacts by studying the effect of the *New York Times* national expansion on local newspaper circulation and local newspaper targeting.

[3] A large literature on campaign finance emphasizes the role of information in voter turnout. See Gerber, Green and Green (2000) and Gerber and Green (2000) for experimental evidence. Mondak (1995a, 1995b) provides empirical evidence that local media affect political knowledge by studying political awareness in Cleveland and Pittsburgh during the 1992 strike which silenced the *Pittsburgh Press* and *Pittsburgh Post-Gazette* for eight months surrounding the 1992 election.

Local newspapers are a particularly important source of information about local affairs, hence their circulation provides a good measure of citizens' intake of local information.

Many national media products have the potential to divert attention from local media and local affairs. An individual watching a fishing channel on cable television cannot, for example, simultaneously attend a political rally, read a local newspaper, or actually go fishing. We study the *Times* for several reasons. First, we seek a close substitute for local newspapers, making national newspapers a better choice than broadcast media. A general-interest newspaper such as the *Times* is also likely a better substitute for a local newspaper than a business newspaper such as the *Wall Street Journal* or *Financial Times.* Second, we seek a national product with substantial circulation and considerable variation in penetration across markets. Today the national edition of the *Times* accounts for more than 50% of total circulation.[4] National circulation of regional newspapers such as the *Los Angeles Times* or the *Washington Post* is far smaller than national *New York Times* circulation.[5] Third, it is useful to study a product that appeals to a distinct audience. Targeting allows the effects of outside media on local media consumption to be identified from differences between the target and non-target group. The *New York Times* targets readers with tastes for cultural and international coverage, a set of preferences for which college education seems a reasonable proxy. Company reports, marketing studies, and press releases provide substantial evidence of this targeting. Other national newspapers such as the *USA Today* attract a less distinct set of readers.[6]

---

[4] See annual reports posted at the *New York Times* web site, www.nytco.com.

[5] For example, data available from the Audit Bureau of Circulations show circulation of the *Washington Post* outside of the Washington, DC MSA to be about 10% of total circulation in 1998. Circulation of the *LA Times* outside of California represents less than a percent of the paper's total circulation.

[6] County-level circulation data for the *New York Times*, *New York Post* and *New York Daily News* in counties close to New York City provides additional evidence that education is a good proxy for *Times* targeting. The share of *Times* circulation to total circulation for the three New York dailies increases substantially with the fraction of individuals in a county with a college degree. Other variables such as income or race are much less

Finally, and perhaps most important, the *Times* undertook a strategy of national expansion during the period we study. Although the *Times* had substantial circulation outside of the New York area in the early 1990's, starting in 1996 the *Times* dramatically accelerated national distribution, initiating or expanding home delivery of the paper in over 200 cities by 2000. National expansion was accomplished through satellite transmission of the paper to printing plants across the county combined with a network of home delivery contracts with local newspapers.

The *New York Times* Company does not systematically report the timing and location of expansion markets, so we cannot construct precise measures of the *Times* national expansion. Instead, we take the national expansion strategy as a broad source of variation in *Times* penetration that is exogenous to interest in local media. While this is a strong assumption, we explore the effect of the *Times* using multiple empirical strategies robust to a variety of endogeneity concerns. Table 2 shows increases in *Times* circulation by census region along with a fragmentary measure of the supply expansion, the number of cities adding home delivery between 1996 and 2000.[7] The table generally reflects that that regions adding more home delivery sites experienced greater circulation growth. Particularly in the context of the *Times'* stated strategy, this growth in circulation provides evidence of a supply-driven expansion.

---

important. Circulation of *USA Today* is positively correlated with the fraction of individuals in a market with a college degree, but the correlation is much weaker than for the *New York Times.*

[7] New home delivery markets added 1996-2000 reflect our interpretation of a map published in *New York Times* Company Annual Report,1997, statements in subsequent annual reports, and a series of press releases available at the *New York Times* Company web site. We assign points on the published map to states or Census regions. The measure is incomplete in the sense that *Times* annual reports state the number of expansion markets in mid-2001 as exceeding 200, while published documents specifically identify the 93 we summarize here.

II. Data

Our analyses consider the effect of *New York Times* expansion on local newspaper sales and local newspaper targeting. The empirical work relies on two panel data sets constructed from longitudinal information on local newspaper circulation, *New York Times* circulation, and local newspaper content. The data sets and their sources are described below.

1. Newspaper Circulation

We analyze the effect of *New York Times* penetration on per capita circulation of about 600 local and regional newspapers in 11,612 zipcodes covering 247 MSA's in 1996, 1998 and 2000. We aggregate newspaper sales data to create zipcode and MSA totals each year. (Because some local newspapers do not report circulation every year, we average circulation in non-missing observations at each paper in each zipcode over 1996 & 1997, 1998 & 1999 and 2000 & 2001.) We link the local newspaper circulation data to MSA-level data on *New York Times* circulation in these years as well as zipcode demographics drawn from the 2000 Census. Both local newspaper and *Times* circulation are from the Audit Bureau of Circulations (ABC), an association that audits circulation statements for use by advertisers. *New York Times* circulation is only available at the market level, so we restrict attention to zipcodes situated within MSA's. We study *New York Times* circulation outside of the home market, hence the New York CMSA is not included in our analyses. We also consider only the 247 MSA's for which *New York Times* and local newspaper circulation data are available in each time period.

Table 2 reports summary statistics for circulation and demographic data. There is considerable variation in *Times* penetration across markets, with per capita sales outside of the New York market ranging from 0.01% at the 5^{th} percentile to 1% at the 95^{th} percentile. Moreover, there is variation across MSA's in the change in *Times* penetration between 1996 and

2000: in changes, the 25th and 75th percentile markets experience growth of -0.0001 (-25%) and 0.0003 (12.5%), respectively. There is also considerable variation in local newspaper circulation across zipcodes, with per capita sales ranging from about 5% at the 5th percentile to over 30% at the 95th percentile. Average per capita local newspaper sales across zipcodes is about 17%. The fraction of individuals in each zipcode with a college degree also ranges from about 6% to 56% in the 5th and 95th percentiles. The average fraction with a college degree is 24%.

2. Local Newspaper Targeting

We analyze the effect of *New York Times* penetration on local product positioning using a newspaper-level panel on the assignment of reporters and editors to topical beats, again in conjunction with MSA-level *Times* circulation. *Burrelle's Media Directory* maps the job title of more than 30,000 reporters and editors at U.S. daily newspapers to approximately 150 reporting beats in 1993 and 1999. We aggregate the beat data for the largest paper in each MSA to 12 general categories, then calculate the fraction of reporters and editors assigned to each topic in each market (beat shares). We link the beat shares for each market to *New York Times* circulation in order to characterize newspaper targeting decisions in markets with different levels of *Times* penetration.

We choose the paper with the largest circulation in each market as the competitor most likely to respond to *Times* expansion. We link Burrelle's 1993 beat data with *New York Times* circulation from March 1995, the earliest year for which we have usable data. Because beat data are not available both years for some papers, the sample of markets in the positioning regressions differs slightly from the sample in the circulation regressions.[8]

[8] Details on the nature of beat assignments at daily newspapers can be found in George (2000).

III. Empirical Strategy and Results

This section outlines our empirical strategy and presents results on local newspaper circulation and local paper targeting.

A. Local Newspaper Circulation

We adopt three approaches to documenting the effect of *New York Times* penetration on local newspaper circulation. We first estimate the overall relationship between *Times* penetration and local newspaper circulation in an MSA. If the *Times* operates as we hypothesize, inducing local papers to target less educated readers, then we have no clear prediction for this relationship. That is, the *Times* may reduce local reading among high-education persons while it promotes local paper reading among the less educated.

We then move toward attempts to test our hypotheses more specifically. Our second empirical approach asks whether *Times* penetration reduces local newspaper circulation among its target audience, while possibly increasing local paper circulation among non-targeted consumers. To do this, we divide MSA's into high and low education "zones," based on the percent of population that is college-educated in each zipcode. We define the high-education zone as all zipcodes where at least, say, 45 percent of the population is college-educated in the 2000 census. We then compare the cross-MSA relationship between *Times* penetration and local paper circulation in the high and low education zones, respectively. Our third approach is the continuous analogue of the second, using zipcode-level variation in the fraction college educated to consider the extent to which the *Times* affects local newspaper circulation among the target relative to the non-target audience. For each approach, we employ both cross-sectional and longitudinal strategies for estimating the effect of the *New York Times* on local newspaper consumption.

1. Overall Effect of the *New York Times*

As a first step, we aggregate local newspaper sales to the MSA level and measure the overall relationship between *Times* penetration and per capita local newspaper sales in a market, estimating the following cross-sectional relationship:

$$(1) \qquad \frac{L_M}{Pop_M} = a_0 + a_1 \frac{NYT_M}{Pop_M} + e_M$$

where L_M / Pop_M is per capita local newspaper sales in an MSA and NYT_M / Pop_M is per capita *New York Times* sales in that MSA. In this simple model, a_1 shows the relationship between *Times* penetration and local newspaper circulation $(\frac{\partial L_M}{\partial NYT_M})$, and e is an error term.

Table 3 presents results. The first three columns show the cross-sectional relationship between *Times* penetration and local newspaper circulation in an MSA for 1996, 1998, and 2000. The coefficient estimates for *Times* sales (a_1) are roughly 0.5, indicating that markets with an additional *Times* sale have an additional 0.5 local papers sold, although the coefficient estimates are not significant.

These purely cross sectional estimates are vulnerable to the concern that *New York Times* penetration is correlated with some unobservable determinant of local newspaper circulation. For example, a_1 might be positive because consumers in a market have high "tastes for newspapers," due to poor radio and television alternatives. Longitudinal data allow us to add a market fixed effect to equation (1), producing estimates that circumvent the problem of fixed unobservable market characteristics. That is, we can estimate:

$$(2) \qquad \frac{L_{Mt}}{Pop_M} = a_0 + a_1 \frac{NYT_{Mt}}{Pop_M} + f_t + m_M + e_{Mt}$$

where μ_M is an MSA fixed effect and f_t are time effects.[9] In column (4), a_1 is estimated to be 1.5 and significant, indicating that markets with a one-copy increase in *Times* circulation experience a 1.5 copy increase in local paper circulation. That is, overall local newspaper circulation is increasing more in markets with greater increases in *Times* circulation.

This result might seem strange in that a causal interpretation implies that *Times* growth raises local paper circulation and therefore benefits the local papers. Two comments are in order. First, local newspapers are not necessarily better off with greater *Times* penetration. Since advertisers value wealthier and better-educated individuals more than others, replacing high-value with lower-value readers may reduce advertising prices. Second, *Times* growth may be correlated with factors affecting the overall change in local newspaper circulation. If that is the case, we cannot identify the overall effect of *Times* penetration on local newspaper circulation from the aggregate regressions. We can, however, identify the effect of *Times* expansion from the changing gap between the tendency for targeted and non-targeted individuals to purchase a local newspaper. This identification strategy is valid as long as the endogenous change in local newspaper circulation correlated with *Times* expansion is the same for both targeted and non-targeted consumers. We turn next to this approach.

2. The *New York Times* Effect on Targeted and Non-Targeted Consumers

Aggregate estimates such as those in Table 3 obscure any possible differential impact of *Times* penetration on local paper circulation among targeted and non-targeted consumers. If we

[9] Our population data are from the 2000 census and do not vary over time, hence population variables are not time-subscripted.

had separate local newspaper circulation data for individuals with and without a college degree, we could estimate equations (1) and (2) separately for each group. Direct comparison of a_1 for each group would reveal any difference in the effect of *Times* penetration on targeted and non-targeted consumers. While we do not have data on local newspaper sales by education level or by any other direct measure of *Times* targeting, we do observe the fraction of individuals with a college degree by zipcode. We can define a set of zipcodes with a high fraction college educated as zones targeted by the *Times*. Aggregating local newspaper circulation in the high education and low education zones in each MSA allows us to estimate the relationship between per capita *Times* penetration and per capita local newspaper sales in each zone. We classify zipcodes as part of high education zones if the fraction of individuals with a college degree is greater than 45%, which represents about the top 12% of zipcodes.[10] Not all markets contain zips which meet this criteria, so we exclude those MSA's from consideration here. Specifically, we estimate separate equations of the form:

$$(3) \qquad \frac{L_{zone}}{Pop_{zone}} = a_0 + a_1 \frac{NYT_M}{Pop_M} + e_M$$

for the high and low education zones. Equation (3) is similar to equation (1), except that the dependent variable is the ratio L_{zone} / Pop_{zone}, where L_{zone} and Pop_{zone} are the numbers of papers sold and population in the high or low education zone of the MSA.

Table 4 presents estimates of the zone models. The first two columns show cross-sectional results in each zone for 1996. The results are striking: markets with higher per capita *Times* circulation have *lower* per-capita local newspaper circulation in their *high* education zone

[10] Results in table 4 are not sensitive to the cutoffs within about $\pm 5\%$. With very stringent cutoffs, the sample of MSA's shrinks considerably, which does affect estimates. With looser cutoffs approaching the average fraction highly educated of 25%, the distinction between high and low education markets begins to disappear.

and *higher* per capita local paper circulation in their *low* education zone. The third column presents a more concise but equivalent specification that directly tests the statistical significance of the gap between sales across high and low education zones. This specification combines data for both zones, adding a zone indicator variable and a zone-*New York Times* interaction term. In this specification, the relationship between *Times* penetration and local newspaper circulation in low education zones is given by the coefficient a_1, while the relationship for high education zones is given by the sum of a_1 and the coefficient on the interaction term (*1.325 -5.474 = -4.149).* Columns (4) and (5) present cross-sectional results for 1998 and 2000 using the concise specification, with very similar results. Markets with higher *Times* penetration have greater gaps in local newspaper circulation between high and low education zones.

Our results indicate that the *Times* has greater penetration in markets where local paper circulation is depressed in high education areas, relative to low education areas. This is consistent with our hypothesis that the *Times* attracts high-education consumers away from their local papers; but it could also arise from MSA unobservables positively correlated with both *New York Times* penetration and the gap in local newspaper circulation between high and low education zones. While we cannot identify any specific factors that might be correlated with the gap in interest, we can nevertheless construct longitudinal estimates robust to this concern.

That is, we can estimate $\frac{L_{zone,t}}{Pop_{zone}} = a_0 + a_1 \frac{NYT_{Mt}}{Pop_M} + m_M + f_t + e_{M,t}$ separately for high and low education zones, where μ_M is an MSA fixed effect (separate for each zone) and f_t is a time effect. This approach identifies displacement of local newspapers from the relationship between *changes* in *Times* penetration and *changes* in local newspaper sales separately for the target and non-target audience. Columns (6) and (7) of table 4 show that markets with increases in *Times*

circulation experience *reductions* in local newspaper circulation in their high education zones and *increases* in local newspaper circulation in their low education zones. The results are consistent with the cross-sectional findings. Column (8) stacks high and low education zones into the same specification, adding a zone-*New York Times* interaction term and an education-specific MSA fixed effects. The concise specification allows a direct test of the difference between the *Times* effect in high and low education zones. The estimated difference of -4.9 is significant at the 9% level in a two-sided test.

Column (9) conserves degrees of freedom by including an MSA fixed effect common to both groups, which is the correct specification if market unobservables are the same in high and low education areas. Column (10) includes an MSA-year fixed effect, allowing each MSA to have its own arbitrary time pattern of local newspaper circulation. This specification does not allow identification of the effect of *Times* penetration on each zone's local paper circulation separately. Instead, this approach identifies the effect of the *Times* from changes in the gap in local newspaper circulation between high and low education zones (over and above the MSA's changes over time that are common across zones). All of the longitudinal estimates produce similar results, indicating that an increase in *Times* circulation in a market reduces circulation in high education zones relative to low education zones.

How large is the effect of the *Times* on local markets? In 2000, per capita *Times* circulation was 0.0001 in the 5th percentile market and 0.0101 in the 95th percentile market. Using the 1996 cross sectional estimates, the difference of 0.01 *Times* circulation per capita across MSA's translates into a difference of 0.013 local papers per capita in low education zones and -0.041 local papers per capita in high education zones. Local paper circulation averages 0.18 in low education zones and 0.26 in high education zones, so the difference in Times penetration

among the 5th and 95th percentile markets implies that per capita local newspaper sales are 7% higher in low education zones and 16% lower in high education zones. The sample variation in *Times* penetration generates substantial variation in per capita local newspaper sales.

We can check the zone estimates for reasonableness by considering the number of local newspapers displaced per copy of the *New York Times* sold in a market, $\frac{\partial L_{zone}}{\partial NYT_M}$. Calculating displacement is slightly complicated because the dependent variable, L_{zone}/Pop_{zone}, and independent variable, NYT_M/Pop_M, of interest in the zone regressions are at different levels of geography. As a result, the coefficient on *Times* penetration does not necessarily reflect local newspaper displacement per copy of the *Times* sold. The derivative depends how per capita *Times* circulation in the zone (which we do not observe) relates to per capita *Times* circulation in the MSA. At one extreme, if the *Times* were distributed across zones in proportion to population, then $NYT_{zone}/Pop_{zone} = NYT_M/Pop_M$ and the regression coefficients would directly measure per-copy displacement. Thus, according to the cross sectional estimates, an additional copy of the *New York Times* would increase local paper circulation by 1.3 copies in the low-education zone and decreases circulation by 4.1 copies in the high-education zone. It seems more plausible, however, to assume that the *Times* is distributed in proportion to college-educated persons, or that $\frac{NYT_{zone}}{Pop_{zone}} = \frac{(NYT_M * (E_{zone}/E_M))}{Pop_{zone}}$. Here E_{zone} is the number of college-educated persons in the zone, and E_M is the number of college-educated persons in the MSA. This can be written as $\frac{NYT_{zone}}{Pop_{zone}} = \frac{NYT_M}{Pop_M}\frac{e_{zone}}{e_M}$, where e_{zone} and e_M are the shares of population that are college educated in the zone and MSA, respectively. If e_{zone}/e_M is a constant, then the

number of local newspapers displaced per copy of the *Times* sold is a multiple of the coefficient on per capita *Times* circulation (a_1) estimated in equations (3) and (4). In particular, $\frac{\partial L_{zone}}{\partial NYT_M} = \frac{e_M}{e_{zone}} a_1$. Since e_{zone} averages 0.54 for high education zones and 0.23 for low education zones, while e_M averages 0.28, the implied per-copy displacement from the 1996 cross sectional regression is –2.2 for the college educated zone and 1.6 for the less educated zone.

This pattern of estimated coefficients is consistent with the *Times* effect operating through both direct and indirect channels. First, readers switching to the *Times* are likely to drop the local paper, effecting at most one-for-one direct displacement. In addition, there can be an indirect effect as the local paper shifts its targeting toward less educated readers (we explore this explicitly below at III.B). Some educated readers who do not switch to the *Times* may drop the local paper, giving rise to displacement beyond the direct effect. At the same time, the changed targeting of the local paper attracts new readers from the population not targeted by the *Times*.

3. Zipcode-Level Data

The zone regressions indicate that the *New York Times* differentially attracts its target audience away from local papers. However, we can better exploit variation in the fraction highly educated across zipcodes to obtain a more precise estimate of the effect of *Times* penetration on highly educated readers. To see this, begin with the following regression of zipcode local paper circulation per capita on the zipcode fraction highly educated:

$$(4) \qquad \frac{L_z}{Pop_z} = g_0 + g_1 e_z + X_z b + e_z,$$

where e_z is the fraction of persons in each zipcode with college education and X contains zipcode characteristics. It is tempting to interpret $?_1$ as the differential between the tendency for college-

educated and others to buy a local paper. As the literature on ecological regression makes clear, this interpretation is justified only under the assumption that education does not reflect other factors associated with tastes for local newspapers.[11] Still, the coefficient γ_1 may be safely interpreted to reflect the education-readership gradient across zipcodes, even if the differential is not due exclusively to education. Whatever the cause of the gradient, if we assume it is the same, but for random variation, across MSA's, then we can construct an additional approach to measuring the effect of the *Times*. Our strategy is to ask whether the extent of *Times* penetration alters the relationship between education and local newspaper sales represented by γ_1. That is, we seek to estimate equations of the form:

$$(5) \qquad \frac{L_z}{Pop_z} = g_0 + g_1 e_z + g_2 \frac{NYT_M}{Pop_M} + g_3 e_z \frac{NYT_M}{Pop_M} + X_z b + m_M + n_z$$

where μ_M is an MSA fixed effect and other variables are as defined earlier. Here, γ_1 shows the slope of the education-local newspaper gradient implied for zipcodes with no college-educated persons, γ_2 is the coefficient on *Times* penetration, and γ_3 indicates how the education-local relationship differs in places with higher *Times* penetration. With MSA fixed effects, γ_2 cannot be estimated. If the *Times* attracts highly educated readers away from the local newspaper – and induces the local paper to seek less educated readers – then the local paper will be relatively less attractive in higher education zipcodes in markets with greater *Times* penetration. In this case, γ_3 will be negative.

The first three columns of table 5 show results from the cross-sectional fixed-effects model estimated in 1996, 1998 and 2000. The coefficient g_1 of 0.2 indicates greater local paper circulation in zipcodes with proportionally more educated persons The interaction between the

[11] Freedman, et. al (1991) discusses the assumptions implicit in ecological regression models.

fraction of college educated individuals in the zipcode and *New York Times* penetration in the market ($?_3$) is negative and significant in all three columns. In markets with lower *Times* penetration, there is a bigger difference between local newspaper circulation in high education relative to low education zipcodes. This is consistent with the *Times* attracting persons from high education zipcodes away from the local newspaper.

The cross-sectional zipcode regressions are vulnerable to the concern that *Times* penetration is correlated with the slope of the relationship between education and local newspaper circulation. We cannot think of a particular objection along these lines, but we can nevertheless make use of the longitudinal data to derive estimates robust to this concern. That is, we can estimate:

$$(6) \qquad \frac{L_{zt}}{Pop_z} = g_0 + g_1 e_z + g_2 \frac{NYT_{Mt}}{Pop_M} + g_3 e_z \frac{NYT_{Mt}}{Pop_M} + m_M + f_t + n_{zt}$$

where μ_M is a fixed effect for either the MSA or, in some specifications, the zipcode. Here we are asking whether the relationship between education and local newspaper circulation shifts as *Times* penetration increases. If we include an MSA fixed effect we can estimate e_z. If we instead include a zipcode fixed effect, e_z is not estimable.

Columns (4)-(7) of table 5 provide estimates of the longitudinal zipcode models. With longitudinal data we can separately estimate the effect of *Times* penetration on low and high education zipcodes. The positive and significant coefficients on $\frac{NYT_{Mt}}{Pop_M}$ in column (4) show that increases in *Times* penetration lead to increases in local newspaper circulation in low education zips. The negative coefficient on the interaction term $e_z \times \frac{NYT_{Mt}}{Pop_M}$ indicates that

markets with larger increase in *Times* penetration experience significantly smaller increases in local newspaper sales. Columns (5)-(7) perform robustness checks, including MSA-education fixed effects, MSA-year fixed effects and zipcode fixed effects, all with very similar results.

How large is the effect of the *Times* implied by these estimates? These models allow the *Times* to change the slope of the education-local paper relationship. The estimates of $?_1$ are roughly 0.2, indicating that each additional percentage point of educated share in a zip is associated with a 0.2 percentage point higher per capita local newspaper circulation. Comparing a market with *Times* penetration at the 95th percentile (per capita circulation = 0.0101) with a market at the 5th percentile (per capita circulation = 0.0001), we see a difference of about 0.05 in the relationship between the fraction highly educated and per capita local newspaper sales (~5*0.01). Higher *Times* penetration in a market appears to shift the gradient, narrowing the gap between high and low education readers.

B. Product Positioning

Results above suggest that the *New York Times* draws targeted readers away from local papers. There is also evidence that *Times* penetration increases sales of local papers among readers not targeted by the *Times*. This change in composition of the market for local newspapers suggests that local newspapers reposition products in response to competition from the *Times.* Since the *Times* targets readers with preferences for non-local content, we might expect local newspaper publishers to replace content heavily represented in the *Times*, such as national news or arts coverage, with content less readily available in the *Times,* such as local news or local sports coverage.

We use data from *Burrelle's Media Directory* to illustrate how *Times* penetration affects local newspaper positioning. Burrelle's identifies the assignment of reporters and editors at daily

newspapers to about 150 specific beats in 1993 and 1999. We aggregate the beat data at the largest paper in each market to 12 categories, then examine how the fraction of reporters and editors in each category (beat shares) varies with *New York Times* sales.

Table 6 presents results. The first column shows the average fraction of reporters and editors assigned to each of the 12 categories. Local news is the largest category, representing about 18% of reporters and editors across markets. Business, entertainment and special issues are also large categories, representing 14%, 12% and 12% of reporters and editors across markets, respectively. National & foreign news, sports, opinion, travel & leisure are smaller categories, representing 9%, 8%, 6% and 6%, respectively. Arts, home, style, and science & technology coverage each represent less than 5% of reporters and editors across markets.

The remaining columns illustrate the effect of *Times* penetration on local newspaper positioning. Column (2) reports results of 12 separate cross-sectional regressions of beat shares in each category on *New York Times* penetration in 1993. Column (3) repeats the 12 regressions for 1999. The final column uses the panel to estimate fixed effects regressions, identifying the relationships from changes in *Times* penetration and changes in the fraction of reporters assigned to each area. All regressions include a year dummy and a constant, although we report only the coefficient of interest to simplify the presentation of 36 separate regressions.

While only three of the cross sectional coefficients in table 6 are significant, the fixed effects specifications in column (4) show a number of interesting results. Changes in local news coverage are positively related to changes in *New York Times* penetration while changes in national and international coverage are negatively related to changes in *Times* penetration. An increase in *Times* penetration from the 5^{th} to 95^{th} percentiles (from 0.0001 to 0.01 papers per capita) increases the share of reporters and editors devoted to local news by 16 percentage points

and decreases the share dedicated to national & foreign news by 6 percentage points. The regression results suggest that newspapers facing increased competition from the *Times* increase their emphasis on topics not covered by the *Times* and de-emphasize topics extensively covered by the *Times*. Growth in opinion and special issues coverage, both heavily covered by the *Times*, are also negatively related to changes in *Times* penetration. One might suspect reverse causality, that the *Times* enters local markets with little national coverage. Yet, the absence of cross sectional results indicates this is not the case. Repositioning of local newspapers appears to respond to growth in *Times* circulation in a market.

IV. Conclusion

Technological change has reduced the cost of distributing national information products such as the *New York Times* in local markets around the country. Using a variety of cross-sectional and longitudinal approaches, we document that the spread and growth of the *New York Times* reduces interest in local papers among college-educated consumers and increases interest among less educated individuals. In areas with the highest *Times* penetration of about 1%, local newspaper circulation is 16% lower among highly educated readers and 7% higher among less educated readers than in markets with the lowest *Times* penetration of 0.01%. Local newspapers change their targeting as a result of the *Times* expansion, reducing national and international coverage and increasing local content.

Existing research on differentiated product markets indicates that people find more appealing products as more consumers share their preferences. When products cannot easily be traded across markets, the product options available to, and hence welfare of, heterogeneous consumers can be limited by the number of persons sharing their preferences locally. Our results here show that technology which enables trade can weaken the link between local preferences

and local products, altering who benefits whom in product markets. When the *New York Times* is available in local markets outside of New York, some consumers choose it over local options and are, by revealed preference, better off. The defection of *Times*-consumers from local dailies, however, induces changes in local newspaper coverage that may benefit some consumers while harming others.

Our results are relevant to the desirability of localism in media. Because the growth in *Times* circulation reduces local paper circulation among educated consumers – and because the *Times* contains little or no local information – there is some cause for concern that non-local media such as the *Times* fosters disengagement from the local community by educated consumers. Existing research documents an effect of local media products on local political participation (Oberholzer-Gee and Waldfogel, 2001; Gentzkow, 2003) and political outcomes Strömberg (1999). Disengagement fostered by the spread of national media has the capacity to change electoral outcomes as well. More research along these lines would be fruitful.

References

Audit Bureau of Circulations. *Circulation Data Bank*. New York: Audit Bureau of Circulations, 1999.

Burrelle's Information Services. *Burrelle's Media Directory.* Livingston: Burrelle's Information Services. 1994, 1996, 2000 editions.

Chester, Giraud. 1949. "The Press-Radio War: 1933-1935." *The Public Opinion Quarterly* 13: 252-64.

Freedman, David A., Stephen P. Klein, Jerome Sacks, Charles A. Smyth, and Charles G. Everett. 1991. "Ecological Regression and Voting Rights." *Evaluation Review 15:673-711.*

George, Lisa and Joel Waldfogel. 2003. "Who Affects Whom in Daily Newspaper Markets?" *Journal of Political Economy*, Vol. 11, pp. 765-85.

George, Lisa. 2000. "What's Fit to Print: The Effect of Ownership Concentration on Product Variety in Daily Newspaper Markets." Michigan State University, Mimeo.

Gerber, Alan S., Donald P. Green and Matthew Green. 2000. "Direct Mail and Voter Turnout: Results from Seven Randomized Field Experiments." Presented at the Annual Meeting of the American Political Science Association, Washington, DC.

Gerber, Alan S and Donald P. Green. 2000. "The Effects of Canvassing, Telephone Calls, and Direct Mail on Voter Turnout: A Field Experiment." *American Political Science Review* 94:653-63.

Gentzkow, Matthew A. 2003. "Television and Voter Turnout." Harvard University, Mimeo.

Mondak, Jeffrey J. 1995. "Media Exposure and Political Discussion in U.S. Elections." *Journal of Politics* 57:62-85.

Mondak, Jeffrey J. 1995. "Newspapers and Political Awareness." *American Journal of Political Science* 39:513-27.

Oberholzer-Gee, Felix and Joel Waldfogel. 2001. "Electoral Acceleration: The Effect of Minority Population on Minority Voter Turnout." NBER Working Paper W8252.

Putnam, Robert. 2000. *Bowling Alone: The Collapse and Revival of American Community.* New York: Simon and Schuster.

Strömberg, David. 1999. "Mass Media Competition, Political Competition, and Public Policy." Princeton University and Stockholm University, Mimeo.

Waldfogel, Joel. 2003."Preference Externalities: An Empirical Study of Who Benefits Whom in Differentiated-Product Markets" *RAND Journal of Economics* 34: 557-68.

Waldfogel, Joel. "Who Benefits Whom in Local Television Markets?" Brookings-Wharton Papers on Urban Affairs: 2004.

Table 1: Home Delivery Expansion and *New York Times* Circulation Growth, 1996-2000

Census Region	*New York Times* Sales Growth 1996-2000	Home Delivery Cities Added 1996-2000
Pacific	23,019	34
South Atlantic	8,457	16
Mountain	7,980	16
East North Central	6,507	11
West South Central	3,317	3
New England	2,410	4
West North Central	191	4
East South Central	-575	1
Middle Atlantic (Outside NY CMSA)	-4,243	3

Notes: Regions are the 9 Census regions, except that circulation in the New York CMSA is removed from the Middle Atlantic region. New home delivery markets added 1996-2000 reflect our interpretation of a map published in *New York Times Company Annual Report, 1997*, statements in subsequent annual reports, and a series of press releases available at the *New York Times Company* web site

Table 2: Sample Statistics

Per Capita Local Newspaper Sales	Year	N	Mean	SD	5%	25%	50%	75%	95%
Aggregate Zip Data	1996	11,612	0.170	0.085	0.046	0.109	0.163	0.221	0.323
Aggregate Zip Data	1998	11,612	0.168	0.081	0.047	0.110	0.162	0.217	0.313
Aggregate Zip Data	2000	11,612	0.166	0.079	0.047	0.109	0.160	0.213	0.307

Source: Audit Bureau of Circulations

MSA New York Times Sales	Year	N	Mean	SD	5%	25%	50%	75%	95%
Per Capita NYT Sales	1996	247	0.0024	0.0044	0.0001	0.0004	0.0008	0.0024	0.0098
Per Capita NYT Sales	1998	247	0.0023	0.0044	0.0001	0.0004	0.0008	0.0024	0.0096
Per Capita NYT Sales	2000	247	0.0025	0.0045	0.0001	0.0003	0.0010	0.0027	0.0101

Source: Audit Bureau of Circulations

Zip Code Demographics	Year	N	Mean	SD	5%	25%	50%	75%	95%
Zip Fraction College Degree	All	11,612	0.24	0.15	0.06	0.12	0.19	0.32	0.56
Zip Fraction Black	All	11,612	0.09	0.17	0.00	0.00	0.02	0.09	0.50
Zip Fraction Asian	All	11,612	0.03	0.05	0.00	0.00	0.01	0.03	0.11
Zip Fraction Indian	All	11,612	0.01	0.03	0.00	0.00	0.00	0.01	0.02
Zip Fraction Income > 75,000	All	11,612	0.24	0.15	0.06	0.13	0.20	0.32	0.54
Zip Fraction Age 65+	All	11,612	0.12	0.06	0.05	0.09	0.12	0.15	0.22
Zip Fraction Age <35	All	11,612	0.48	0.09	0.35	0.43	0.47	0.52	0.62

Source: 2000 Census

Table 3: The Effect of *New York Times* Penetration on Aggregate MSA Local Newspaper Sales

	Aggregate MSA Local Newspaper Sales Per Capita 1996, 1998 & 2000			
	1996	1998	2000	All Years
	(1)	(2)	(3)	(4)
Per Capita NYT Sales (MSA)	***0.489***	***0.475***	***0.473***	***1.569***
	(0.56)	***(0.66)***	***(0.71)***	***(3.25)*****
1998 Year Dummy	--	--	--	-0.005
	--	--	--	(5.70)**
2000 Year Dummy	--	--	--	-0.010
	--	--	--	(10.31)**
Constant	0.190	0.185	0.180	0.187
	(49.70)**	(53.02)**	(52.78)**	(145.50)**
Fixed Effects	None	None	None	MSA
MSA's	247	247	247	247

Notes: Dependent variable is aggregate per capita local newspaper circulation in the MSA. T-statistics in parentheses: * significant at 5% level; ** significant at 1% level. Constants in fixed effects regressions represent the average value of the fixed effects.

Table 4: The Effect of *New York Times* Penetration on Aggregate Local Newspaper Sales by Education Zone

	MSA Local Newspaper Sales Per Capita by Education Zone, 1996, 1998 & 2000									
	Cross-Sectional Results					Longitudinal Results				
	1996 Low Ed (1)	1996 High Ed (2)	1996 Combined (3)	1998 Combined (4)	2000 Combined (5)	All Years Low Ed (6)	All Years High Ed (7)	All Years Combined (8)	All Years Combined (9)	All Years Combined (10)
Per Capita NYT	***1.325***	***-4.149***	***1.325***	***1.111***	***1.007***	***2.234***	***-2.704***	***2.234***	***2.326***	**--**
	(1.05)	***(2.05)****	***(1.05)***	***(1.06)***	***(1.05)***	***(3.21)*****	***(0.53)***	***(3.19)*****	***(1.62)***	**--**
High Education Zone	--	--	0.099	0.096	0.093	--	--	--	0.098	0.098
	--	--	(3.80)**	(4.38)**	(4.15)**	--	--	--	(3.92)**	(3.04)**
High Ed Zone*NYT	**--**	**--**	***-5.474***	***-5.234***	***-4.662***	**--**	**--**	***-4.938***	***-5.122***	***-5.122***
	--	**--**	***(2.69)****	***(3.12)****	***(2.62)****	**--**	**--**	***(1.69)***	***(4.41)****	***(3.41)****
1998 Year Dummy	--	--	--	--	--	-0.004	-0.006	-0.004	-0.004	--
	--	--	--	--	--	(3.16)**	(0.70)	(3.38)**	(0.25)	--
2000 Year Dummy	--	--	--	--	--	-0.008	-0.011	-0.008	-0.009	--
	--	--	--	--	--	(7.34)**	(1.31)	(6.51)**	(0.59)	--
High Ed * 1998	--	--	--	--	--	--	--	-0.002	-0.002	-0.002
	--	--	--	--	--	--	--	(0.26)	(0.08)	(0.06)
High Ed * 2000	--	--	--	--	--	--	--	-0.003	-0.003	-0.003
	--	--	--	--	--	--	--	(0.30)	(0.09)	(0.07)
Constant	0.178	0.277	0.178	0.175	0.171	0.176	0.273	0.224	0.175	0.179
	(33.45)**	(10.24)**	(33.39)**	(35.29)**	(33.96)**	(74.35)**	(15.60)**	(30.12)**	(15.46)**	(22.95)**
Fixed Effects	None	None	None	None	None	MSA	MSA	MSAxZone	MSA	MSAxYear
MSA's	154	154	154	154	154	154	154	154	154	154

Notes: Dependent variable is aggregate per capita local newspaper circulation in each education zone in each MSA. Zipcode-level data is aggregated over zips with a high and low fraction college educated within each MSA. High education zips are those with a fraction college > 0.45. T-statistics in parentheses: * significant at 5% level; ** significant at 1% level. Constants in fixed effects regressions represent the average value of the fixed effects.

Table 5: The Effect of *New York Times* Penetration on Zipcode Local Newspaper Sales

	Zipcode Per Capita Local Newspaper Sales, 1996, 1998 & 2000						
	Cross Sectional Results			*Longitudinal Results*			
	1996	1998	2000	Pooled	Pooled	Pooled	Pooled
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Per Capita NYT	--	--	--	3.762	3.664	--	***3.632***
	--	--	--	(4.86)**	(4.15)**	--	***(3.44)***
1998 Year Dummy	--	--	--	-0.007	-0.007	-0.010	-0.007
	--	--	--	(1.46)	(7.34)**	(2.21)*	(5.99)**
2000 Year Dummy	--	--	--	-0.012	-0.012	-0.026	-0.012
	--	--	--	(2.36)*	(9.61)**	(5.33)**	(7.95)**
Zip Fraction High Ed	0.224	0.195	0.167	0.183	0.372	0.186	--
	(6.48)**	(6.47)**	(6.13)**	(8.69)**	(20.22)**	(8.29)**	--
Zip Fr High Ed*1998	--	--	--	0.016	0.017	0.017	0.017
	--	--	--	(0.87)	(5.05)**	(0.78)	(3.92)**
Zip Fr High Ed* 2000	--	--	--	0.020	0.021	0.020	0.020
	--	--	--	(1.05)	(5.54)**	(0.90)	(4.23)**
Zip Fr High Ed*NYT	***-3.828***	***-5.647***	***-5.839***	***-5.118***	***-4.944***	***-5.035***	***-4.585***
	(1.91)	***(3.44)****	***(4.35)****	***(5.27)****	***(1.47)***	***(5.11)****	***(1.11)***
Zip Fraction Black	-0.042	-0.039	-0.041	-0.041	-0.036	-0.041	--
	(5.14)**	(5.25)**	(5.30)**	(9.10)**	(7.46)**	(9.04)**	--
Zip Fraction Asian	-0.079	-0.089	-0.101	-0.090	-0.067	-0.088	--
	(3.05)**	(3.74)**	(4.22)**	(6.37)**	(4.60)**	(5.90)**	--
Zip Fraction Indian	-0.035	-0.035	-0.035	-0.035	-0.038	-0.033	--
	(0.97)	(1.08)	(1.11)	(1.80)	(2.01)*	(1.66)	--
Zip Fraction High Inc.	-0.132	-0.049	0.001	-0.060	-0.068	-0.066	--
	(3.45)**	(1.62)	(0.04)	(3.20)**	(3.95)**	(3.42)**	--
Zip Fraction Old (65+)	0.351	0.344	0.343	0.346	0.330	0.340	--
	(5.91)**	(6.65)**	(7.16)**	(11.46)**	(11.93)**	(10.92)**	--
Zip Fraction Young (<30)	-0.170	-0.160	-0.143	-0.157	-0.184	-0.161	--
	(3.12)**	(3.25)**	(3.16)**	(5.53)**	(10.24)**	(5.55)**	--
Constant	0.199	0.180	0.165	0.175	0.189	0.191	0.161
	(5.70)**	(5.90)**	(5.95)**	(9.55)**	(14.03)**	(10.28)**	(58.49)**
Fixed Effects	MSA	MSA	MSA	MSA	MSAxEd	MSAxYear	Zip
MSA's	247	247	247	247	247	247	247
Zips	11,612	11,612	11,612	11,612	11,612	11,612	11,612

Notes: Dependent variable is aggregate per capita local newspaper circulation in each zip code. T-statistics in parentheses: * significant at 5% level; ** significant at 1% level. Constants in fixed effects regressions represent the average value of the fixed effects. Standard errors clustered by MSA in cross-sectional specifications, MSA-year in longitudinal specifications.

Table 6: Do Local Newspapers Respond to *New York Times* Penetration?

Beat Category	Average Beat Share (1)	1993 (2)	1999 (3)	1993 & 1999 (4)
Art & Literature	0.02	0.625	0.705	2.158*
Business	0.14	-0.142	-1.579	-4.630
Entertainment	0.12	0.004	3.515**	0.363
Home	0.03	-0.900	-0.265	-0.580
Local News	0.18	-2.096	1.173	16.647***
National & Foreign News	0.09	1.426	0.497	-6.480**
Opinion	0.06	0.305	1.570	-3.888*
Science & Technology	0.03	0.911	0.294	0.014
Special Issues & Features	0.12	-0.731	-2.422	-5.468*
Sports	0.08	-1.201	-1.424	2.400
Style	0.04	2.044*	-0.781	-0.439
Travel & Leisure	0.06	0.095	-2.671**	1.214

Notes: Each row reports regressions of beat shares on per capita NYT sales, a year dummy and a constant in 252 MSA's in 1993 and 1999. Only the NYT coefficient shown. Significance levels: * significant at 10% level; ** significant at 5% level; *** significant at 1% level.