Targeted Advertising in Magazine Markets and the Advent of the Internet¶

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Abstract

This paper examines how the ability of media firms to engage in targeted advertising has changed with increased competition from online channels. We find that the use of the Internet by magazine readers, as well as the availability of companion websites, increase the value of targeted advertising. This indicates a complementarity between offline and online media with respect to targeting. We provide supporting evidence for this result and argue that multi-homing consumers can enhance the value of targeted advertising, in contrast to the usual assumption that multiple advertising messages are redundant.

JEL-classification: L11, L82, M37

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1 Introduction

The media industry has been in a state of upheaval over the past decade. On the one hand, traditional media firms, especially newspapers, are facing challenges from declining readership and an associated loss of advertising revenue. At the same time new media entities — particularly those that are online — are generating excitement through their ability to attract large numbers of users. These events are, of course, related. Recent newspaper closings and layoffs in the United States, for example, have occurred as users migrate towards free and up-to-the-minute content provided by electronic media.[1]

Besides the migration of consumers, another reason cited for the decline of traditional media is their relatively inefficient targeting capabilities as compared to online media.[2] Targeted advertising is the ability to show advertising to the most receptive audiences; online advertisers can use sophisticated methods, such as information on the browsing habits of consumers or their recent online transactions, to target them.[3] By contrast, traditional media achieve most of their targeting through content. Advertisers would certainly value more efficient targeting mechanisms, and there appears to be considerable potential for increasing the efficiency of advertising. In 2006, worldwide advertising expenditures totaled $428 Billion. According to one calculation, around $220 Billion, or just over half, was "spent on messages that reach the wrong audience or none at all."[4] While these sorts of calculations may be unreliable, there seems little doubt that accurately targeted advertising can be of considerable value to advertisers, for which they may be willing to pay a large premium.

This paper asks the following question: How has increased Internet penetration, and the growing number of companion websites for print publications, affected the value of targeted advertising in traditional print media? On the one hand, the more sophisticated targeting capabilities of online media may have induced advertisers to switch away from targeting via traditional channels. On the other hand, there may be complementarities between targeting consumers via both online and offline media. Our results support the latter effect. In particular, we show that targeting in print magazines becomes more valuable when a greater proportion of readers are likely to *multi-home*, i.e. consume more than one media source.

[1] "Newspaper Closings Raise Fears About Industry," *USA Today*, March 19, 2009.

[2] For example, Bergemann and Bonatti (2011, p. 2) point out that "It has been argued that the distinguishing feature of Internet advertising is its ability to convey information to a targeted audience."

[3] See Plummer et al. (2007) for a summary of various techniques available to online advertisers for identifying and targeting consumers.

[4] "The Ultimate Marketing Machine, *The Economist*," July 8th, 2006.

Our paper relates to three lines of research. First, there is a theoretical literature that models competition across media channels for consumers. Two recent papers conclude that increased online competition can either raise or lower advertising prices offline, but neither study allows for the possibility of advertising complementarity across channels. Bergemann and Bonatti (2011) explicitly model multiple advertising messages as being redundant. They assume that online media can target better than offline media, and show that increased competition from online sources has ambiguous effects on advertising prices. Athey et al. (2011) also assume that multi-homing by consumers will lead to an increase in wasted impressions by advertisers. The effects of consumer multi-homing in their model also has uncertain effects on the price of advertising; in this case, the reason is that the effects depend crucially on technology and the extent to which advertisers can utilize tracking tools to reduce duplication.

A second line of research has empirically measured the effects of targeted advertising online; however it is mostly focused on how targeting impacts the decision to purchase the advertised product, as opposed to our focus on the outcomes for media firms. Goldfarb and Tucker (2011a) show that online targeting increases ad effectiveness. Goldfarb and Tucker (2011b) confirm this result, but also show that if consumers find the ad to be obtrusive then online targeting can actually decrease the likelihood of purchasing the product.

Another set of studies empirically examine the interaction between the Internet and print media, but have generally focused on the circulation side of the industry and, in particular, on the cannibalization of print circulation by the presence of online companions. These studies usually find that online and offline channels are substitutes; however, the most recent study, by Liebowitz and Zentner (2012), finds that the substitution effect of the Internet is moderate.[5]

Only a few studies have examined the effects of the Internet on advertising in traditional media. Zentner (2011) shows that advertising budgets in traditional media have decreased in countries with higher rates of Internet use. In addition, two recent papers by Goldfarb and Tucker (2011c and 2011d) conclude that the Internet is a substitute to offline advertising, although they do not specifically examine targeted advertising. Their results suggest that online advertising for certain goods is either more effective or higher priced in those jurisdictions where offline advertising is not permitted; thereby indicating that offline and online channels for these goods are substitutes.

Our paper makes three distinct contributions to the literature. First, this is, to the best of our knowledge, the first study to empirically show that online and of-

[5]See also Filistrucchi (2005), Gentzkow (2007), Simon and Kadiyali (2007), and Kaiser and Kongsted (2012).

fline channels may be complements with regard to targeted advertising. This is an especially important finding because most recent theoretical work models them as being substitutes, because of the assumption that multiple advertising messages are redundant. Second, the existing empirical studies of possible online complementarities examine the demand for online advertising when the offline option is either unavailable or restricted to advertisers (Goldfarb and Tucker, 2011c and 2011d). By contrast, we examine the question of advertising complementarity for all goods, with no specific focus on those that face advertising bans. Since the vast majority of goods can be freely advertised in all media, our results provide a more general estimate of the extent to which offline and online channels may complement or substitute for each other.

Third, we make an important distinction regarding the question of substitution in media. The literature cited in Footnote 5 establishes that online media substitute for traditional media from the point of view of subscribers. We argue that the effect from the point of view of advertisers depends on the behavior of subscribers: If subscribers view offline and online media as substitutes, *and* subscribers always single-home, then advertisers must necessarily view these different channels as substitutes too. However, if some consumers multi-home then there remains the possibility that, for this particular group of consumers, advertisers view different media channels as complements rather than substitutes. Our results suggest that this is indeed the case.

The setting for our analysis is the German magazine industry, one of the largest magazine markets in the world.[6] This industry provides externally audited data on the characteristics of readers at individual magazines, as well as magazine-level data on the extent to which readers use the Internet. We measure the importance of targeted advertising by determining whether demographically homogeneous readers are more valuable to advertisers than diverse audiences are. We then examine whether magazines' ability to target advertising has become more or less valuable as their readers increasingly consume online content, and as magazines themselves launch companion websites to retain readers.

We first confirm the finding by Chandra (2009) that demographically similar audiences raise advertising prices due to the potential for targeting advertising. More importantly, we establish that the advent of the Internet has increased the value of targeted advertising in print magazines, as measured by implied advertising revenue on a per-reader basis. In particular, the premium for demographically homogenous

[6]The German consumer magazine market consists of about 2,200 titles (including consumer and professional magazines) with an average quarterly circulation of 173 million copies in 2008. This compares to a total of 3,187 titles in the US, 2,794 in the UK and 2,449 in Japan (Magforum 2009). The German market also has the second highest advertising revenues among the EU25 countries. Source: European Commission, 2005.

audiences increases in the degree of Internet use of a magazine's readers, as well as in magazines' decisions to launch companion websites. This result is consistent with the hypothesis that offline and online methods of targeting consumers are complements, rather than substitutes. Moreover, both increased Internet use and website presence have a positive effect on advertising rates of their own accord, as long as readers are similar enough to make targeting valuable. Therefore, increased Internet use by readers may not harm traditional media to the extent suggested by media market observers.[7] Even though magazines do lose readers to online rivals, the audiences they retain may actually be more valuable from the point of view of advertisers.

What is the mechanism by which online and offline channels are in fact complements? We argue that being exposed to ad campaigns for the same brand or product across multiple channels can reinforce the message in the minds of consumers. For this reason, advertisers can find it more valuable to reach consumers through a diverse number of channels than through just a single channel, leading to advertisers preferring consumers who multi-home across different media. This is especially the case if advertising is persuasive in nature, requiring multiple contacts with consumers in order to have an appreciable impact, instead of being purely informative, in which case a single message may suffice.[8] To establish this hypothesis, and to rule out other explanations, we provide additional evidence which indicates that the potential for cross-channel advertising is indeed what drives the complementarity effect. In particular, we show that a magazine's advertising prices are higher when its readers are more likely to consume other media in general, not just online media.

Our results appear to contrast with those of Goldfarb and Tucker (2011c, 2011d). Both of those studies conclude that the Internet is a substitute to offline advertising. Our results can be reconciled with theirs in at least two ways. First, the offline channels that Goldfarb and Tucker consider are either out-of-home channels such as billboards and transit, or direct channels such as email. By contrast, the offline industry that we examine is a traditional media channel: print magazines. Second, Goldfarb and Tucker (2011c, 2011d) show that when offline advertising for specific products — alcohol and law services respectively — is not permitted, firms increase online advertising instead. As described above, our study focuses on the overall level of advertising, rather than on the effects for certain products. But more importantly, our results hinge on the behavior of consumers, rather than on legal restrictions. To

[7]For example: "Newspapers are cannibalizing themselves", Frederick W. Searby of J.P. Morgan in The New York Times, March 14, 2005.

[8]This explanation focuses on the supply-side effect, whereby advertisers choose to place messages via different channels. But our results also fit with demand-side search behavior, as documented by Zigmund and Stipp (2010), and Joo et al. (2012). They report that television advertising impacts consumer search behavior online, and in particular, that viewing an advertisement on TV makes consumers more likely to search for the advertised product or brand online.

the extent that subscribers consume multiple media, advertisers tend to value them more, not less, on a per-reader basis.

Our results support previous findings of advertising complementarities across media, even though these studies tend to focus on individual goods for which sales or consumption data are available, and therefore use different methods from ours. For example, Naik and Raman (2003) report 'synergies' between print and television advertising for a particular clothing brand. More recently, Naik and Peters (2009) show that such complementarities exist among offline media advertising — television, radio and print — for a particular car model. Moreover, they also exist between online and offline media advertising for the same product.

An interesting feature of the magazine industry is that it has not been affected as severely by the advent of the Internet, or by recent economic volatility, as has the newspaper industry. Magazine advertising revenue in the United States grew by 3.1% in 2010, compared with a decline of 8.2% in the same year for US print newspapers. Magazine readership in the US has grown by 4.3% in the past five years, while newspaper circulation has declined by more than 10% over the same period.[9] We argue that the relative success of the magazine industry, especially compared with print newspapers, can be attributed in part to the greater scope for targeted advertising in magazines.

In the next section we present the data used in our analysis. The empirical specification is discussed in Section 3. Section 4 contains our main results as well as supporting evidence to explain the mechanism that drives the results. We conclude in Section 5.

2 Data

We use data on the German magazine industry, obtained from IVW, which is the German equivalent to the Audit Bureau of Circulation in North America.[10] IVW

[9]Sources: MediaMark Research; Publishers Information Bureau; Newspaper Association of America. The German magazine industry is not as healthy as the US market, as it has seen recent circulation declines. Nevertheless, there is still net entry into this market; the total number of magazine titles in Germany has increased by 3.2% over the period 2004–2009 (VDZ 2010). German newspapers, by contrast, have had even greater circulation declines, and a 7.4% decrease in the number of titles (KEK–Online, 2009).

[10]The original data source is the "Information Association for the Determination of the Spread of Advertising Media" ("Informationsgemeinschaft zur Feststellung der Verbreitung von Werbeträgern e.V.", IVW). It has been updated quarterly since 1972 and is continuously recorded. The core data are publicly available and downloadable from http://www.medialine.de/deutsch/wissen/zeitschriftendatenbank.html

ascertains, monitors and publishes information on magazine circulation and total readership. Our core data set consists of information on the total number of copies sold, advertising and content pages, market reach (the number of people who read — but do not necessarily buy — the magazine), advertising rates and copy prices. Advertising rates are broken down by black and white, two-color, and four-color advertisements.

We supplement our core data with information on readership characteristics that was made available to us by "Arbeitsgemeinschaft Media–Analyse" (AG.MA), an association of the German advertising industry for the research of mass communication. These data span the period 1998 to 2010 and contain information on each magazine's composition of readers with respect to gender, age and household income.

AG.MA also collects data on Internet use at each magazine, which is a key variable of interest for us. We obtained data on the fraction of readers at each magazine who used the Internet in the past three months.[11] Finally, we obtained data for each magazine on whether the publication also had an online version in the corresponding quarter. These data were first used by Kaiser (2006) and were obtained by documenting the existence of magazines' companion websites. The respective launch dates were obtained from press releases or by directly contacting the publisher. We have since updated the website data for use in this paper.

The AG.MA data are not available for, depending on the period, between 7.1% and 39.4% of the magazines in our core data set. Magazines need to pay AG.MA in order to have their readership characteristics recorded. Magazines that are tracked by AG.MA contain on average 20 advertising pages more than those not covered by AG.MA, a difference that is statistically significant. In terms of advertising pages, the AG.MA data cover between 64.6 and 72.3% of all advertising pages; in terms of copy sales they cover between 72.9 and 78.3%.

Table 1 contains information on magazine characteristics such as sales, the number of pages, advertising and copy prices for the years 1998-2010. The data are provided quarterly; we use information on the periodicity of each magazine to convert the quarterly data on market reach and the number of pages to per–issue data.

As Table 1 shows, the average magazine had sales of almost half a million in each quarter during the time period that we study; the average sales per issue were approximately 76,000. Over 25% of the pages in the average magazine are devoted to advertising, of which 88% are four–color ads, with the rest being two-color, black and

[11] While we do have information on readers' Internet use within more narrow time spans for recent years, only quarterly use data are available for the entire time span of 1998 to 2010 that we consider. Based on the data that we have, the correlation of Internet use across various time spans is very high.

Table 1: Summary Statistics on Magazine Characteristics

	Mean	SD	Min	5%	95%	Max
Total Sales per Quarter (1000s)	426	450	13	98	1463	2869
Total Reach (1000s)	1484	1479	130	330	5250	8010
Total Pages per Quarter	821	543	104	244	1778	4740
Ad Pages per Quarter	218	234	4	39	640	2336
Fraction of Ad Pages:						
Black/White	0.09	0.14	0	0	0.41	0.98
Two color	0.03	0.05	0	0	0.12	0.48
Four Color	0.88	0.16	0.02	0.50	1	1
Black/White Ad rate (1000 Euro)	14.80	9.51	2.00	3.40	33.80	54.00
Color Ad rate (1000 Euro)	17.78	11.19	2.20	4.30	43.10	54.50
Companion Website	0.30	0.46	0	0	1	1
Dependent Variable: $\log(adrate/1000readers)$	2.63	0.62	0.59	1.68	3.62	4.85

Each observation is a magazine-quarter-year. N=6002

white, or supplemental advertisements. The table also shows data on total market reach for each magazine which is, on average, over three times the magazine's paid circulation. Approximately 30% of the magazines in our sample had a companion website in a given quarter. Finally, the last line of the table summarizes data on our constructed dependent variable, of which more details are provided in the next section.

Table 2 contains summary statistics on reader characteristics. On average, 40% of readers are men, although the extreme values show considerable divergence, with some magazines being read almost exclusively by either gender. Most readers are "prime age readers" as advertisers call people aged 30–49 years. They constitute almost 40% of all readers. The smallest age group are individuals younger than 20 years. They constitute 10% of all readers on average. Over a third of all readers enjoy a monthly household income of over 2,500 Euros across magazines, which is well above the average household income in Germany of 1,363 Euros in 2002 (BDP, 2004).

Table 2 also provides data on constructed variables which we use to measure homogeneity of magazine readers. These are values of the Herfindahl Hirschmann Index (HHI) for each demographic. The HHI is the sum, across categories, of squared values of each demographic variable. HHI values closer to 1 indicate greater homogeneity, while values closer to 0 indicate greater diversity of characteristics. Gender appears to have the highest concentration on average, but concentration by gender also varies the most of all three demographic variables.

Table 2 indicates that 41% of readers at the average magazine were Internet users.

Table 2: Summary Statistics on Demographic Data

	Mean	SD	Min	5%	95%	Max
Male	0.39	0.27	0.02	0.07	0.87	0.97
Age:						
14–19	0.10	0.15	0	0.01	0.50	0.78
20–29	0.15	0.09	0	0.04	0.33	0.52
30–49	0.38	0.11	0.1	0.19	0.54	0.71
50–59	0.14	0.06	0	0.03	0.22	0.31
60+	0.22	0.16	0	0.02	0.53	0.72
Household Income (Euro per month):						
2000 or less	0.45	0.12	0.13	0.27	0.67	0.80
2000–2500	0.21	0.03	0.09	0.15	0.26	0.34
2500 or more	0.34	0.12	0.06	0.16	0.54	0.78
Constructed HHIs:						
Gender	0.67	0.13	0.50	0.50	0.88	0.96
Age	0.43	0.09	0.33	0.35	0.63	0.82
Income	0.58	0.07	0.50	0.50	0.73	0.88
Internet use	0.41	0.27	0.00	0.03	0.86	0.96

Each observation is a magazine-quarter-year. N=6002

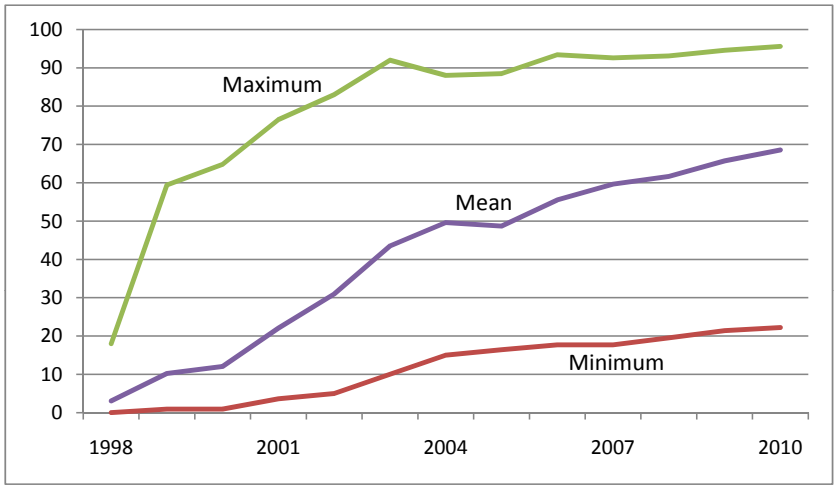

Figure 1: Variation in Internet penetration across magazine readers.

The Internet use data are a critical component of our empirical analysis. We rely on this variable to measure the likelihood that readers of print magazines also consume content online, which will then identify whether various media are substitutes or complements from the point of view of advertisers. Given its importance to our study, we present evidence that Internet use has sufficient variation to identify the main effects. Figure 1 shows the extent of variation in the data. We plot the maximum, minimum and mean Internet use across the entire sample of magazines for each year. Internet use was quite low in the early years of the sample, but has increased steadily over the twelve-year period that we consider. There is considerable variation in Internet use, both cross-sectionally as well as over time.

3 Empirical Approach

3.1 Regression Specification

Our goal is to estimate the relationship between the characteristics of magazine readers — and in particular, the potential for targeted advertising given these characteristics — and the value provided to advertisers. The latter is represented by the equilibrium advertising rate at each magazine.[12] Instead of directly modeling the

[12]Of course, the equilibrium rate does not measure advertisers' true willingness-to-pay, but is only a lower bound on it. Our assumption is that magazines that provide greater value to advertisers will command higher advertising rates. This is reasonable given that the magazine advertising industry is by no means perfectly competitive; each magazine provides a niche audience to potential advertisers. See Chandra (2009) for a similar argument in the newspaper industry.

advertising rate, we empirically examine the advertising rate *per reader*. A larger market reach will naturally increase advertising rates; our goal here is to measure how the value of the average reader depends on the characteristics of the reader base. Advertising rates in media industries are commonly quoted as the rate per thousand readers (ad rate relative to market reach), which implies that the total value from advertising is proportional to the number of readers.[13]

We use the homogeneity of readers at each magazine to measure the potential for targeted advertising. These measures are the constructed HHI variables that were described in the previous section. We also include the demographic characteristics of readers, measured in levels, as control variables. The logic is that magazines with more similar readers should be able to charge higher advertising prices, holding constant other characteristics such as the mean demographics of these readers.[14]

Our base regression specification takes the following form:

$$R_{kt} = \alpha + \mathbf{\Theta H}_{kt} + \mathbf{\Gamma D}_{kt} + \epsilon_{kt} \tag{1}$$

where R_{kt} is the advertising rate per reader at magazine k in time period t, $\mathbf{H}$ is a vector capturing the homogeneity of readers, $\mathbf{D}$ is a vector representing the mean demographics of the magazine's readers, and $\mathbf{\Theta}$ and $\mathbf{\Gamma}$ are coefficient vectors. Unobserved factors that may affect equilibrium advertising rates are contained in ϵ_{kt}. Note that this specification is very similar to the one used by Chandra (2009). As argued in that paper, a regression of advertising rates on the characteristics of media subscribers will yield consistent estimates, since the right hand side variables represent demand shifters and are not endogenous from an econometric standpoint. Moreover, this reduced form estimating equation can be derived regardless of the competitive nature of the industry.

To ease interpretation, we define the dependent variable as the log of the advertising rate per 1,000 readers; see Table 1 for summary data on this variable.[15] The advertising rate is calculated as the weighted average of the black and white, two-color and four-color advertising rates. The weights are generated from the share of the respective advertisements in the total number of advertisements for each magazine

[13]Previous research has shown that advertising profits or prices are directly proportional to the size of the audience. See, for example, Gabszewicz et al. (2004). Empirical studies commonly model advertising rates per subscriber; see Rysman (2004).

[14]Another way to measure reader homogeneity is simply to include a second degree polynomial in each demographic. Results using this measure were presented in an earlier version of this paper, and are consistent with the HHI measures of homogeneity.

[15]We also estimated regressions where we normalized advertising rates by the number of copies sold, rather than by the number of readers of the magazine. The two measures are, of course, highly correlated and the results do not differ much.

and time period.[16] The distribution of advertising rates per reader is heavily skewed so we employ its natural logarithm as our dependent variable.

The German magazine market is an "up–front" market where advertising rates are published and fixed in advance every Fall for the upcoming year. This up-front price disclosure is also a feature of large US media companies. For example, CBS, ABC, NBC and Fox set advertising rates in the Spring for advertisements appearing in the fall (Gal-Or and Dukes, 2003; Goettler, 1999). We take this specific feature of the German magazine market into account by leading our dependent variable by one year.[17]

It is important to note that we do not include magazine characteristics such as content, quality or copy prices as regressors in Equation 1. These variables should only affect advertising rates per reader through their effect on market reach. We have already conditioned on market reach by using it to normalize advertising rates as the dependent variable. When we do include measures of content or quality on the right hand side, the estimated coefficients did not turn out to be statistically or economically significant. This confirms a similar finding by Koschat and Putsis (2002).

One concern regarding our dependent variable may be that we rely on the list price of advertisements, rather than the transaction price. Advertisers may receive discounts from the list price (sometimes referred to as the "rate card price") and these may be bigger for frequent advertisers, or those who buy bulk advertising space across various media. According to industry participants, advertising rates almost never deviated from list prices during the period we consider, an observation that is in accordance with Koschat and Putsis (2002) who find a correlation between transaction prices and list prices of 0.975 in their data for the US. As a practical matter, there is no direct solution to this in our analysis, as transaction prices are rarely revealed.[18] Nevertheless, the results of our analysis will not be affected as long as transaction prices are generally proportional to list prices. In fact, we require an

[16]Koschat and Putsis (2002) use the price for a full color advertisement instead of weighted prices. We use weighted advertising rates because the average share of full color ads across time and magazines is 88 percent in our data, and lower in the earlier years. The correlation coefficient between our weighted prices and the prices for full color ads is, however, 0.99, and so the results are similar if we use the price of color ads alone.

[17]We could have alternatively lagged the explanatory variables, which leads to identical results. Koschat and Putsis (2002) lag the explanatory variables by only half a year, partly because their data cover a shorter time period. As a side note, all our results hold, and in fact are strengthened, if we use contemporaneous data instead of leading values.

[18]Moreover, even for the transacting parties, the actual transaction price is often hard to determine until well after the transaction, since there are cases where the media firm provides free or discounted advertising space to make up for a shortfall in the estimated number of readers at the time the contract was written.

even weaker assumption: that deviations of transaction prices from list prices are not systematically correlated with the demographics of subscribers.

Equation 1 estimates the extent to which targeted advertising is valuable in magazine markets. However our primary empirical exercise is to examine whether the advent of the Internet has *changed* the value of targeted advertising in traditional media markets. Accordingly, we estimate a modified version of Equation 1 where we interact reader homogeneity with our measure of how likely readers are to consume content online. Adding these interaction terms along with the standalone Internet variable, and suppressing the time subscripts, our main regression specification is:

$$\begin{aligned} R_k = \alpha + \beta_1 \text{HHIGender}_k * \text{Internet}_k + \beta_2 \text{HHIIncome}_k * \text{Internet}_k \\ + \beta_3 \text{HHIAge}_k * \text{Internet}_k + \mathbf{\Theta H}_k + \mathbf{\Gamma D}_k + \delta \text{Internet}_k + \epsilon_k \end{aligned} \tag{2}$$

The estimated β_i coefficients indicate the extent to which targeted advertising in print magazines is affected by the Internet use of magazine readers. Positive coefficients will indicate a complementarity between online and offline channels of advertising, while negative coefficients will suggest that these channels are substitutes.

3.2 Estimation

Given that our data set is a panel of magazines, it may seem desirable to cluster standard errors by magazines, as there would otherwise be downward bias in the standard errors if the true variance–covariance structure implied correlated errors within clusters. Such clustering may, however, lead to biased estimates of the standard errors if the panel is very unbalanced (Kézdi, 2004). This is precisely the case in our data— we observe magazines between one and 49 times over the entire period (note that there are 49 quarters over this period). The average magazine is observed 41 times, but a quarter of magazines are observed less than 21 times, another quarter is observed between 20 and 40 times, and half of all magazines appear more than 40 times in our data. Moreover, the bias, if any, in the estimation of standard errors decreases as the number of clusters, i.e. magazines, increases. Rogers (1993) shows that there will be little bias in standard errors if no cluster contains more than five percent of the total sample and Cameron et al. (2008) as well as Kézdi (2004) show that the bias is negligible if the number of clusters is larger than 50. There are 179 clusters in our data, with 72 magazines observed in every period. These arguments suggest that clustering standard errors by magazines may actually lead to more biased standard errors than not doing so.

Alternatives to OLS estimation with clustering are random effects and fixed effects models which more fully explore the time series dimension of the data. Using fixed-

effects for each magazine, however, greatly reduces the variation available for identification, since reader demographics tend to change only a little within each magazine over time. Instead, we estimate our regressions with and without fixed-effects for magazine categories, which are groupings of magazines by AG.MA to reflect the content and appeal of various publications. We also estimate specifications using random-effects for magazines and for categories. In our setting, random effects models assume that the error term has a structure that consists of a magazine–specific random component and a mean–zero magazine–level error component. Results using random effects turn out to be very similar to those using fixed-effects.

In some specifications we allow for three-way interactions between Internet use, the concentration indices, and an indicator for whether the magazine has a companion website. As we shall discuss below, both the share of readers online and the dummy variable for companion website presence are likely to be endogenous variables and need to be instrumented. Treating all the interactions of the heterogeneity measures with the Internet and companion website variables as endogenous would constitute an impossible exercise. For this reason, we collapse the three heterogeneity measure into one, namely the simple mean of the three separate HHIs. This reduces the number of endogenous variables to five: companion website, Internet as well as the interactions between the mean HHI and either or both variables.

3.3 Identification

The introduction of the Internet variable in Equation 2, and its interaction with the HHI measures, creates an identification problem. Internet use may not be exogenous from an econometric standpoint since it may be correlated with ϵ, i.e. with unobserved factors that influence ad prices, beyond the other controls in the regression. In other specifications of Equation 2, we will replace the Internet use variable with a dummy for whether the magazine has a companion website. This website indicator may be endogenous as well, for similar reasons.

It seems quite probable that there are factors that simultaneously affect either readers' Internet use or the launch of a companion website, as well as unobserved magazine quality characteristics ϵ_{kt}. One factor may be if the launching of a companion website for a reader's favorite magazine triggers Internet adoption. More generally, readers with an interest in information may be more inclined to use the Internet as a source to supplement their magazine reading and other media consumption. Such an inclination may be valued by advertisers, which would lead to a correlation between Internet adoption and the unobserved quality components of magazine k, ϵ_{kt}.

In order to properly identify causal effects we require instrumental variables. We

use the share of individuals in the entire German population who regularly use the Internet as an instrument for the share of readers of a specific magazine that do so. This information is collected by TNS Emnid, a leading German social research institute, on behalf of the Federal Ministry of Economics and Technology, and published in an annual "(N)onliner Atlas".[19]

The TNS Emnid data are age–, income– and gender–specific. This allows us to map the data to each magazine by first defining each magazine's primary reader groups in terms of age, income and gender and then linking these to Internet use in the German population in the respective category. Therefore, our instruments for the share of magazine readers that use the Internet vary across magazines and time. Our instruments are unlikely to be correlated with unobserved magazine–specific factors but should constitute strong predictors for Internet use by readers; we provide formal tests of these assumptions below.

We instrument the dummy variable for companion website presence using (i) the number of companion websites of magazines published by the other publishers in the same segment relative to the total number of magazines in that segment and (ii) the number of companion websites that the same publisher maintains relative to the total number of magazines that firm publishes.

The intuition behind the first instrument is that an important driver of the decision to launch a website may be "bandwagon effects"; publishers may feel pressured to launch own websites because competitors do so. The intuition behind the second instrument is that the publisher's costs of launching an additional website will decrease the higher the fraction of its magazines that have companion websites already. At the same time, it does not appear likely that either instrument will be correlated with unobserved magazine–specific effects.

Our specifications also include interactions between the "mean" concentration index and our endogenous variables. We consider the mean of the three concentration indices instead of all three indices separately in order to keep the estimation tractable. Otherwise the estimation equation will have at least four endogenous variables, and more in certain specifications. The mean is constructed as the unweighted average of the three HHI values. We interact both the dummy for companion websites and the share of readers that use the Internet with the mean index and also consider three-way interactions between companion websites, the share of readers online and the mean index.

To instrument the interactions we follow Wooldridge (2001, Ch. 9.2.5) and interact the instruments with the exogenous variables. We estimate our equations of interest by GMM. This means that we apply a linear instrumental variables technique despite

[19]These publications are available from http://www.nonlineratlas.de/

the companion website presence being measured as a dummy variable. We do so in order to avoid problems associated with mis-specification that are particularly prevalent in non-linear IV models compared with linear ones (Angrist and Krueger 2001; Angrist and Pischke 2009).

For an instrument to be valid it needs to have two properties. It first needs to be highly correlated with the endogenous variable and it secondly needs to be orthogonal to the error term of the equation of interest. The first property is usually informally tested by F–tests for joint significance of the instruments in "first stage" regressions. The corresponding test statistics should exceed 10 (Stock et al. 2002). There of course is no "first stage" regression in GMM so we run simple OLS regressions of our endogenous variables on our exogenous variables as well our instruments. Our smallest F–statistic is 34 for the interaction between the HHI for gender and the website dummy which means that our instruments are very highly correlated with the endogenous variables.[20]

We test the second property using the Sargan test for over–identification. Doing so indicates that we cannot reject orthogonality for any of our specifications. Indeed, the smallest associated p–value is 0.19 (for the specification where we include companion website presence and its interaction with the mean HHI) and the largest is 0.94 (for the specification that includes the share of readers being online and its interaction with mean HHI). The p–values of our tests for over–identification are therefore all well above the critical value of 0.1.

4 Results

We now present our empirical results. We first present parameter estimates for the regressions in Equations 1 and 2. Our results show a positive interaction between Internet use and the potential for targeted advertising in price magazines. We then discuss the implications of this result, as well as present corroborating evidence to support our hypothesis.

4.1 Main results

Table 3 contains coefficient estimates for the variables of interest in Equations 1 and 2. We do not report coefficients on the mean demographic variables that are contained in $\mathbf{D}$, or on fixed effects for time periods or magazine categories, for the

[20]Note that our reduced form regression for the share of readers being online is essentially an Internet adoption equation similar to the one used in Goldfarb and Prince (2008).

sake of brevity. The first two columns present the results of the base regression, specified in Equation 1, where we do not include Internet use or its interaction with the HHI variables. The estimated coefficients are positive and highly significant. This indicates that magazines which reach homogeneous audiences have higher equilibrium advertising prices, indicating that targeted advertising is valuable in the magazine industry. This result confirms the finding of Chandra (2009) in the US newspaper industry and Koschat and Putsis (2000) in the US magazine industry.

Table 3: Base Regressions of Log(Ad Rate/Reader)

	(1)	(2)	(3)	(4)	(5)	(6)
HHI Age	0.40^a	0.57^a	0.12	0.35^a	0.42^a	0.56^a
	(0.08)	(0.08)	(0.11)	(0.11)	(0.08)	(0.08)
HHI Income	0.46^a	0.92^a	0.21	0.54^b	1.34^a	2.02^a
	(0.14)	(0.16)	(0.21)	(0.21)	(0.21)	(0.25)
HHI Gender	0.25^a	0.30^a	-0.42^a	-0.37^a	0.25^a	0.22^a
	(0.05)	(0.05)	(0.08)	(0.08)	(0.05)	(0.05)
Internet			-3.12^a	-3.24^a	-3.12^a	-3.24^a
			(0.29)	(0.30)	(0.29)	(0.30)
HHI Age*Internet			0.74^a	0.51^b	0.74^a	0.51^b
			(0.22)	(0.21)	(0.22)	(0.21)
HHI Income*Internet			2.80^a	3.64^a	2.80^a	3.64^a
			(0.58)	(0.62)	(0.58)	(0.62)
HHI Gender*Internet			1.65^a	1.46^a	1.65^a	1.46^a
			(0.16)	(0.16)	(0.16)	(0.16)
Category Fixed-Effects	No	Yes	No	Yes	No	Yes
Constant	18.43^a	17.73^a	19.45^a	18.76^a	18.19^a	17.44^a
	(0.09)	(0.12)	(0.12)	(0.14)	(0.11)	(0.14)
R^2	0.48	0.51	0.50	0.52	0.50	0.52

Robust SEs in parentheses. The Internet variable is demeaned in Columns 5 and 6. All regressions include mean demographics and quarter-year FEs.
^{c} p<0.1, ^{b} p<0.05, ^{a} p<0.01. $N = 6002$

Columns 3 and 4 introduce the interaction of the HHI variables with Internet use, and include the Internet variable as a separate regressor as well; this is the specifi-

cation in Equation 2. The main variables of interest here are the interaction terms, and the estimated coefficients on these are positive and significant. This indicates that homogeneous audiences become even more valuable to advertisers when these readers are also Internet users — this indicates a complementarity between audience targeting and Internet use. The coefficients on the base HHI variables in columns 3 and 4 are smaller than in the first two columns, and in the case of Gender the estimate is negative. This is because these coefficients reflect marginal effects when Internet use is zero, which is hardly ever the case in our sample. To ease interpretation, we demean the Internet variable in columns 5 and 6, and in all specifications from now on. When we do so, the base HHI effects, as well as their interactions with Internet use, are positive and statistically significant.

The regressions in columns 2, 4 and 6 use fixed-effects for magazine categories, as opposed to the other columns where we pool together all observations, while still maintaining quarter-year fixed-effects. The results with category fixed-effects are qualitatively the same as without them. Moreover, the fit using fixed-effects is better, and an F-test rejects the hypothesis that category fixed effects are zero in each of the three comparisons. For this reason, we treat the regression with category fixed-effects as our preferred specification.[21]

We now address the possibility that Internet use may be endogenous, for the reasons suggested above. Table 4 presents the results of Instrumental Variables regressions. The estimates in columns 1 and 2 correspond to those of columns 5 and 6 respectively in Table 3. We treat the Internet variable, as well as its interactions with the three HHI variables, as endogenous. When we instrument, the base HHIs and their interactions generally remain positive and significant. In general, the estimated coefficients on the interaction terms are larger than in the OLS specifications of Table 3, suggesting that omitted variable bias may have been biasing the estimates downwards.

Columns 3 and 4 of Table 4 presents coefficient estimates using the mean HHI instead of each HHI measure individually. The coefficient on the mean HHI variable is positive and significant; its interaction with Internet use is statistically insignificant in column 3, but positive and significant in column 4, which is our preferred specification. Once again the fit is considerably better using category fixed-effects, as in Column 4.

We illustrate the interaction of targeted advertising and Internet use in Figures 2 and 3, where we plot the elasticities of advertising rates per reader with respect to individual demographics: the share of young readers in Figures 2 and the effect of

[21] We also tried specifications with fixed-effects for each magazine. As argued in Section 3, doing so reduces the variation available for identification. The estimated coefficients remain positive but are not always significant.

Table 4: Instruments for Internet

	(1)	(2)	(3)	(4)
HHI Age	0.65^a	1.03^a		
	(0.14)	(0.17)		
HHI Income	3.13^a	3.57^a		
	(1.06)	(0.93)		
HHI Gender	0.19^a	0.26^a		
	(0.07)	(0.08)		
Internet	-4.45^c	-7.97^a	-0.14	-1.49^a
	(2.51)	(1.84)	(0.38)	(0.40)
HHI Age*Internet	-7.36^a	4.23^a		
	(2.17)	(1.56)		
HHI Income*Internet	18.86^a	14.43^a		
	(4.89)	(4.04)		
HHI Gender*Internet	1.11^a	1.32^a		
	(0.24)	(0.22)		
Mean HHI			0.89^a	1.44^a
			(0.13)	(0.17)
Mean HHI*Internet			0.59	2.95^a
			(0.87)	(0.65)
Category Fixed-Effects	No	Yes	No	Yes
Constant	16.39^a	15.89^a	18.40^a	17.36^a
	(0.63)	(0.49)	(0.15)	(0.14)
R^2	0.31	0.59	0.48	0.63

Robust SEs in parentheses. All regressions include mean demographics and quarter-year FEs. ^{c} p<0.1, ^{b} p<0.05, ^{a} p<0.01. $N = 6002$

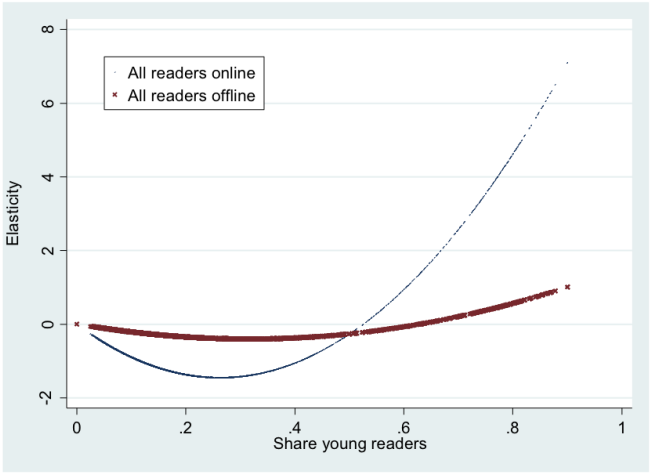

Figure 2: The interaction effect of Age and Internet use on the returns to Targeting

male readers in Figures 3; we do not present the figure corresponding to income because it is similar to the other two. The red line in each figure is the elasticity calculated by setting Internet use to zero for all observations, while the blue line is the elasticity when Internet use is 1. These figures were plotted using the coefficients in column 2 of Table 4.

The figures show that the returns to targeted advertising are low, if any, in the counterfactual case where readers do not use the Internet at all. This is because the relationship is flat, and in the case of gender, it is actually concave. By contrast, the relationship has a much more pronounced U-shape for the other extreme case where all consumers use the Internet, thereby showing that targeted advertising is more valuable in this latter case. Note that these counterfactual cases never actually occur in the data, because it is never the case that Internet use is either 0 or 100%. Nevertheless, plotting the relationship at extreme values helps to understand the effects captured by the interaction of Internet and the HHI measures.

The results also imply that the marginal effect of Internet use on advertising rates is positive, as long as readers are sufficiently similar to each other. Even though the coefficient on the standalone Internet variable is negative throughout Table 4, the marginal effect must take into account the positive interactions with the HHI variables. Using the coefficients in Column 4 of Table 4, we calculate that the top 70% of magazines with respect to the mean HHI all have a positive marginal effect of the Internet on advertising rates. In other words, the net effect of Internet use on magazine advertising revenues per reader is positive for most magazines, to the extent that their readers' demographics make targeted advertising feasible.

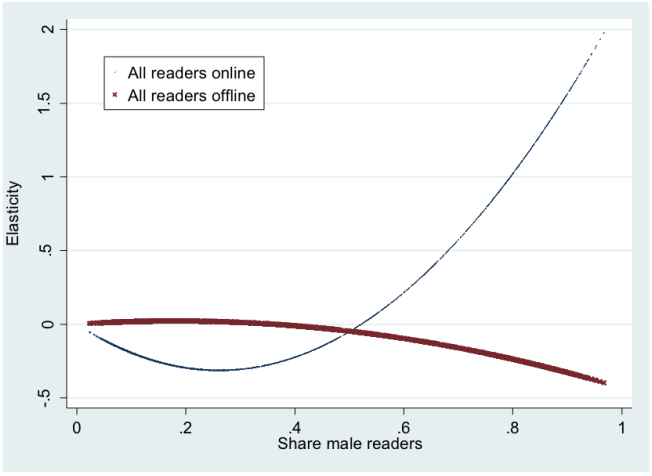

Figure 3: The interaction effect of Gender and Internet use on the returns to Targeting

4.2 Implications of the results and supporting evidence

So far, our results indicate a positive effect on advertising rates of the interaction between Internet use and the degree of homogeneity of a magazine's subscribers. This result suggests that advertisers not only value reaching more homogeneous subscribers, but that doing so becomes more valuable as these subscribers consume online content as well. In other words, offline and online channels appear to be complements from the point of view of advertisers.

At first glance, this result appears surprising. It seems to violate the basic assumption of recent theoretical work that advertisers do not want their message to be transmitted multiple times to the same readers. For this reason, papers such as Athey et al (2011) and Bergemann and Bonatti (2011) take as given that multiple advertising messages are redundant. However, this presumes a very particular model of advertising: that consumers only require a single exposure to an advertising message in order to increase their likelihood of purchasing the good, beyond which further exposures are wasted. In other words, this assumes that advertising is purely informative.

By contrast, if advertising is more persuasive in nature, at least for certain goods, then multiple messages may not be a waste for advertisers. Moreover, if viewing an advertiser's message in different forms — such as audio, video and print — helps to reinforce the message to consumers, then there may well be complementarities from the good being advertised not just multiple times, but also across multiple media.

Prior research has shown that being exposed to the same brand or ad campaigns

across multiple channels can indeed help consumers to retain information about characteristics of the advertised good. Naik and Raman (2003), and Naik and Peters (2009) are two examples of studies which find synergies in advertising the same good across print, radio and television. We argue that a similar phenomenon can explain our finding of complementarities between targeting in print magazines and Internet use.

In order to establish this more conclusively, and to rule out alternative explanations, we require more evidence. It may well be the case, for example, that advertisers value Internet users more highly for some unobserved characteristic of theirs that we have been unable to control for, rather than for the specific fact that they multi-home. We provide three pieces of evidence to support our claim that it is specifically multi-homing behavior that drives the observed complementarity across channels.

To do this, we try to identify groups of consumers in our data who are more likely to multi-home in general, rather than only those who consume content online. Although we have no direct data on the propensity to consume multiple media, we make assumptions and use additional data in order to identify such consumers. First, we have data on advertising prices at TV magazines in Germany, which are publications that focus on detailed listings and reviews of shows on television. We make the assumption that those who subscribe to TV magazines consume more television content than the average magazine reader.

Second, we use supplementary data to identify another group of consumers that are likely to multi-home. We obtained data on multiple media use from a consortium of Germany's two main public service broadcasters: ARD and ZDF. The study on multiple media use tracks the number of minutes that test subjects spend each day consuming various types of media. The study breaks down these numbers by three major age categories: 14–29, 30–49 and over 50.[22] Among the three major age groups in our sample, consumers aged 30 to 49 are the most likely to consume multiple media. In particular, they are the most likely to divide their time between the major categories of television, radio, Internet and print, in contrast to younger and older consumers whose time is more concentrated among one or two of these categories. While this is not definitive evidence, it does fit well with data from other countries. The Statistical Abstract of the United States, 2010, shows very similar behavior among US audiences.[23] In particular, audiences under 25 are overwhelmingly likely to use the Internet, but the least likely to consume content on television and, especially, in newspapers. This trend is reversed for audiences above 55, who are less likely to be Internet users. Consumers with ages in between have high consumption figures across all media. Similar behavior is seen in a Europe-wide study,

[22]The study is available at www.ard-zdf-onlinestudie.de/.

[23]See Table 1133, "Multimedia Audiences".

published by IAB Europe in 2012.[24]

In Table 5 we present results from examining these groups of consumers, whom we label multi-homers. In columns 1 and 2, the indicator for multi-homers is equal to 1 if the magazine's share of readers aged 30–49 is greater than the median.[25] In columns 3 and 4, the multi-homer indicator is equal to 1 for television magazines, which make up about 11% of the observations in our sample. The coefficient of interest is on the two-way and three-way interactions between the multi-homer indicator, the Internet variable, and the mean HHI of a magazine's readers.

Table 5: Multi-homers

	(1)	(2)	(3)	(4)
Multi-homers	-1.48^a	-1.44^a	-4.59^a	-4.96^a
	(0.12)	(0.14)	(0.24)	(0.24)
Multi-homers*Mean HHI	2.49^a	2.40^a	9.40^a	10.25^a
	(0.23)	(0.26)	(0.44)	(0.46)
Mean HHI	0.38^b	0.51^b	0.66^a	1.00^a
	(0.19)	(0.21)	(0.16)	(0.16)
Internet		-2.31^a		-3.19^a
		(0.35)		(0.23)
Mean HHI*Internet		1.20^c		5.28^a
		(0.73)		(0.44)
Multi-homers*Mean HHI*Internet		0.52^a		1.22^a
		(0.13)		(0.21)
Constant	18.04^a	18.23^a	17.61^a	17.47^a
	(0.14)	(0.16)	(0.12)	(0.13)
R^2	0.63	0.59	0.65	0.65

Robust SEs in parentheses. Multi-homers are measured as prime-age readers in Columns 1 and 2, and as TV magazine readers in Columns 3 and 4. All regressions include mean demographics, and quarter-year and category FEs. ^{c} p<0.1, ^{b} p<0.05, ^{a} p<0.01. $N = 6002$

Columns 1 and 3 of Table 5 present results without the Internet variable. In both cases there is a positive interaction between the degree of homogeneity of a maga-

[24]See "MediaScope Europe", available at www.iabeurope.eu.

[25]We can define this in alternative ways, such as magazines in the top quartile of readers aged 30 to 49, with similar results.

zine's readers and an indicator for the magazine having a high proportion of multi-homing readers. This constitutes corroborating evidence for our hypothesis that readers who consume multiple media are particularly valuable for targeted advertising. In columns 2 and 4 we introduce the Internet variable, and also use instruments for the endogenous variables: the three terms that include Internet use. The three-way interactions are also positive and significant, which provides further confidence in our explanation regarding multi-homing.

We now turn to a third piece of evidence. The advent of the Internet has posed challenges to traditional print media, not just because they may lose audiences to online competitors, but in some cases because these print media end up cannibalizing their own sales. There has been tremendous pressure on traditional media in the last few years to launch their own web versions, in order to retain audiences and compete with the up-to-the-minute news and content of online rivals. In our sample of magazines in Germany, the fraction that launched online companions went from 17% in 1998 to 48% in 2010.

As described in Section 2, we have obtained data on whether magazines have companion websites and, if they do, the exact launch date of the website. Using these data, we construct an indicator variable for website presence for each magazine-quarter-year in our sample. We use this indicator variable to analyze targeted advertising for those magazines that had online editions. Since launching a website is an endogenous decision made by the publisher, it is important to instrument for the website variable. We do so using the instruments described in Section 3.1. This exercise reduces the number of available observations to 5823 from the original 6002, due to using lagged data as instruments.

In Table 6 we present results from analyzing the website indicator variable. In the first two columns we simply replace the Internet variable in Equation 2 with the website indicator. The first column presents OLS results, while the second uses instruments for website and its interaction terms. The results suggest that magazines that had companion websites tended to have greater returns from targeted advertising in their print editions, even after accounting for the endogenous choice of launching a web edition.

These positive interactions may be spurious, since they may simply reflect the fact that magazines that have websites also have many readers who use the Internet, because the two variables are highly correlated in our dataset. In other words, having a website may represent a proxy for the website's readers being likely to multi-home, which would be valuable to advertisers for the reasons described above. Therefore, it is important to control for the Internet use of a magazine's readers. Columns 3 and 4 of Table 6 present results from doing so. The OLS estimate is presented first, in column 3, and the IV regressions in column 4. We use the mean

Table 6: The Effect of a Companion Website on Targeted Advertising

	(1)	(2)	(3)	(4)
HHI Age	0.49^a	0.90^a		
	(0.12)	(0.30)		
HHI Income	0.58^a	1.84^a		
	(0.17)	(0.55)		
HHI Gender	0.20^a	0.20^c		
	(0.07)	(0.11)		
Website	-2.19^a	-7.90^a	-2.27^a	-2.03^a
	(0.15)	(2.46)	(0.13)	(0.76)
HHI Age*Website	1.30^a	4.26^b		
	(0.16)	(1.72)		
HHI Income*Website	0.65^a	7.93^a		
	(0.21)	(2.62)		
HHI Gender*Website	1.67^a	2.19^b		
	(0.09)	(1.11)		
Mean HHI			-1.11^a	-1.92^a
			(0.21)	(0.30)
Internet			-0.78^a	-2.69^a
			(0.22)	(0.75)
Mean HHI*Website			3.71^a	2.65^c
			(0.24)	(1.46)
Mean HHI*Internet			2.38^a	4.10^a
			(0.39)	(1.23)
Mean HHI*Internet*Website			0.31^a	1.18^a
			(0.08)	(0.44)
Constant	17.58^a	17.38^a	18.27^a	19.69^a
	(0.13)	(0.24)	(0.14)	(0.25)
N	6002	5823	6002	5823
R^2	0.66	0.56	0.66	0.65

Robust SEs in parentheses. All regressions include mean demographics, and quarter-year and category FEs. Columns 2 and 4 use instruments for the endogenous variables. ^{c} p<0.1, ^{b} p<0.05, ^{a} p<0.01.

HHI since the interactions with the individual HHI variables would create too many endogenous variables. The positive coefficient estimates on the three-way interaction in both columns suggest that, even after controlling for Internet use, magazines with websites tend to have higher returns from targeted advertising.

We interpret this result as evidence in favor of the multi-homing hypothesis. Readers of the print edition are usually provided with free access to the online edition. We make the assumption that those readers of a magazine who are also Internet users are more likely to visit the magazine's website. Some industry research in the newspaper market indicates a large degree of overlap among readers of the print and online editions; the reasons include readers of the print edition wanting to stay ahead of breaking news, and wanting to complete reading or re-read articles later in the day that they began in the morning.[26] Nevertheless, no such study appears to exist for the magazine industry, and therefore our results on this matter should be interpreted with caution.

Taken together, the results on magazines with websites have implications that are similar to those of the results using TV magazines and prime age readers. They suggest that targeted advertising is more valuable in those magazines whose readers are more likely to multi-home, consistent with our main finding of a complementarity between Internet use and the potential for targeted advertising in magazine markets. Overall, these results indicate that the advent of the Internet has had beneficial effects for magazine advertising revenues. Note that our results do not suggest that print media see a net benefit from online competition. Rather they suggest that, conditional on the number of readers that they retain and their characteristics, advertisers are willing to pay more for readers that also consume content on the Internet.

Similar to our earlier results on Internet use, we find that magazines with websites have higher advertising rates as long as readers are similar enough to make targeted advertising profitable. The website variable has a negative coefficient, but after taking into account the positive interaction effects, we calculate that magazines with a mean HHI above the median will see a positive association between launching a website and advertising rates.

We illustrate the effects of the Internet on targeted advertising in Figure 4. In this figure we decompose the effects of the three-way interaction between Internet use, website presence, and the potential for targeted advertising. We use the coefficients from Column 4 of Table 6 and graph the effects of the Internet and website variables on the relationship between reader homogeneity and advertising prices per reader.

[26]See the following report by Scarborough Research: http://www.nnnlp.com/in-the-news/2007-07-17-cmr.

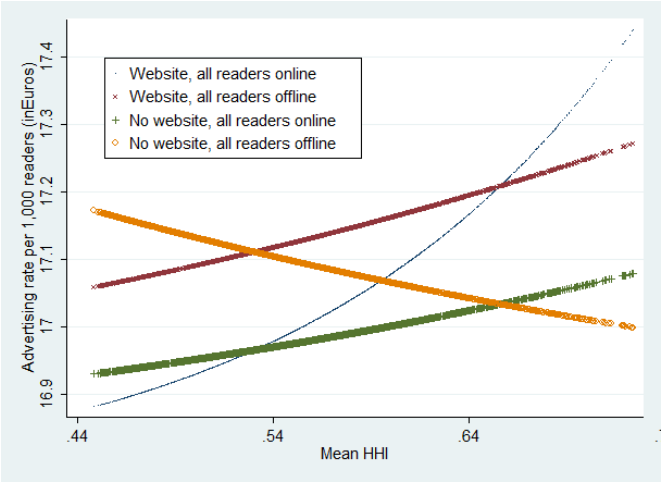

Figure 4: Effect of Internet use and Website presence on the returns to Targeting

The figure shows four extreme cases, corresponding to when either all or no readers use the Internet, and the magazine either does or does not have a website. Note again, that these events do not occur in the data. However, in the counterfactual case that users do not use the Internet *and* the magazine does not have an online companion, the relationship between the mean HHI and ad rates is downward sloping. In all the other cases the relationships are upward sloping, and especially so when both Internet use is maximized and a companion website exists. These relationships graphically depict how both Internet use and website presence enhance the value of targeted advertising.

5 Conclusion

In this paper we have established the importance of targeted advertising in magazine markets. Targeted advertising is an important phenomenon, with rapidly growing potential, due to the evolving nature of media. Previous research has acknowledged the importance of this practice, but has paid little attention to analyzing the intermediary role of the media, to empirically determining the value of targeted advertising, or to studying the role of increased Internet penetration among print media consumers on the value of targeting.

We first show that the potential for targeted advertising raises equilibrium advertising rates in the magazine industry, which confirms previous findings in other contexts. We then use data on the extent of magazine readers' Internet use to estimate how targeted advertising has changed with the advent of the Internet. Our results suggest a complementarity between the share of a magazine's readers that

are online and the value it can generate from targeted advertising. These results are consistent with the notion that targeted advertising becomes more valuable when advertisers know that consumers multi-home across different media, and can therefore be reached by advertisements in other forms as well.

This is an important finding, because it goes against the traditional assumption that advertisers prefer media consumers who do not multi-home, due to the potential for wasted impressions in different media. We draw on existing research to argue that multiple exposures to the same message, especially across different media, may actually increase brand awareness and the likelihood of being persuaded to purchase the product. We provide supporting evidence to show that targeted advertising is more valuable when audiences are more likely to multi-home in general, not just on the Internet. We also show that magazines which launch companion websites generate a greater return from targeted advertising in their print editions.

We emphasize again that our claim is not that traditional print media have been made better off by the arrival of the Internet. There is no doubt that print audiences — and correspondingly, ad revenues — have shrunk in recent years, although this is more the case for newspapers than for magazines. Our claim is that, among the audiences that traditional media have retained, the effects of the Internet have not been particularly pernicious, and may in fact have increased revenues on a per-reader basis.

Thus, our results suggest ways by which print media may actually benefit from the advent of the Internet. When audiences are similar enough, and therefore create sufficient returns from targeted advertising, an increase in Internet use by readers or in the competing content on a companion website ends up raising advertising rates. This may explain why the magazine industry has done considerably better than newspapers in recent years, due to the greater ability of magazines to create audiences that are demographically similar. It also suggests that print media publishers possess the tools to weather the rise of the Internet, by striving towards delivering well tailored audiences to their advertisers.

Our results have implications for the evolving nature of media industries and, particularly, the role of advertising in generating change in these industries. The high value that advertisers place on reaching their preferred target audience requires media companies to be vigilant in adopting new technologies that better serve their clients. This explains strenuous attempts by media firms to retain their existing audiences — as well as generate new ones — when moving online. The possibilities of targeting with online media are vast, and this is likely to create challenges for traditional media which do not have the same ability to deliver precisely constructed audiences that advertisers value.

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