



Do media consumers really dislike advertising? An empirical assessment of the role of advertising in print media markets[☆]

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ABSTRACT

This paper uses data on German consumer magazines observed between 1992 and 2004 to analyze the extent to which consumers (dis-)like advertising. We estimate logit demand models separately for the six most important magazine segments in terms of circulation. We find little evidence for readers disliking advertising. On the contrary, we show that readers in many magazine segments appreciate advertising. Readers of Women's magazines, Business and politics magazines as well as Car magazines – market segments where advertisements are relatively more informative – appreciate advertising while advertising is nuisance to readers of Adult magazines, a segment where advertisements are particularly uninformative. Demand for interior design magazines is not well identified. Our logit demand estimates are confirmed by logit demand models with random coefficients and by magazine-specific monopoly demand models.

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1. Introduction

The economics of two-sided markets have recently caught the attention of many economists. Such markets have the property that there are two distinct types of users, each of which wishes to interact on a common platform.

A prototypical example for a two-sided market is the media industry, as first explicitly noticed by [Sonnac \(2000\)](#). Media content producers need to attract two types of consumers: advertisers who value the medium more the more consumers it reaches and consumers who have a (dis-) taste for advertising.

This interdependency creates network effects whose consequences for pricing, efficiency and information supply is in the focus

of a rapidly growing body of theoretical papers. Most contributions – for example [Anderson \(2005\)](#), [Anderson and Coate \(2005\)](#), [Ambrus and Reisinger \(2005\)](#), [Choi \(2006\)](#), [Crampes et al. \(2004\)](#), [Gabszewicz et al. \(2004\)](#), [Kind et al. \(2003\)](#), [Kohlschein \(2004\)](#), [Kremhelmer and Zenger \(2004\)](#), [Peitz and Valetti \(2008\)](#), [Nilssen and Sørsgard \(2003\)](#) and [Reisinger \(2004\)](#) – assume that consumers dislike advertising. Exceptions are [Häckner and Nyberg \(2000\)](#), who assume that readers like advertising in a print media context, and [Sonnac \(2000\)](#), who considers feedbacks from advertising to circulation under the two alternative assumptions of consumer advertising aversion and advertising appreciation.

Whether consumers appreciate advertising or not has important implications for the pricing structure on two-sided markets. In markets where readers are advertising-neutral, the market collapses into a one-sided market with a network externality running from readers to advertisers. Market structure is truly two-sided when readers are not advertising-neutral (and advertisers appreciate more readers). Compared to a one-sided market setting, magazines charge lower advertising rates when readers appreciate advertising and higher advertising rates when readers dislike advertising. Independently of whether consumers like or dislike advertising, magazines always have incentives to charge copy prices that are lower than in

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a one-sided market to enhance advertising demand (as long as advertisers value readers). If advertisers have no appreciation for readers and readers are advertising neutral, media markets constitute a standard one-sided market.

The present paper estimates readers' taste for advertising. We use quarterly data on magazine circulation in Germany, the second largest print media market in the world (FIPP, 2004). We estimate consumer demand for the six most relevant magazine segments in terms of circulation and advertising revenue using a discrete choice demand model.

Since we estimate a consumer utility function, we can draw inference about consumer preferences based on the sign and magnitude of the corresponding characteristics coefficients. We treat both price and advertising as endogenous variables in our estimations, thereby recognizing that advertising share, defined as the ratio of advertising pages to content (non-advertising) pages, may be correlated with demand shocks or unobserved quality shocks.

Our main result is that there is little evidence for readers disliking advertising. On the contrary, we show that readers in most magazine segments actually appreciate advertising. Consumers of TV and Women's magazines appreciate advertising most, followed by consumers of Car and Business and politics magazines. Consumers of Adult magazines are indifferent with respect to advertisements. Demand for Interior design magazines is not well identified.

A supply side explanation is that each magazine segment carries advertisements that come with different degrees of informativeness. In order to explore this explanation further, we purchased samples of magazines from each segment and measured the degree to which advertising is informative, thereby using a methodology developed by Resnik and Stern (1977). We find that the degree to which advertising is informative is above average in the Women's, Car and TV magazine segments. This finding, combined with our estimation results, suggests that consumers appear to appreciate advertisements in segments with a high degree of advertising informativeness. We interpret this as consumers liking informative advertising.

These findings can be explained by both demand side and supply side factors. A demand side explanation is that consumers in different segments are heterogeneous with respect to their advertising preferences. For example, a typical TV magazine consumer may appreciate advertising more than a typical Car or Business and politics magazine consumer.

Our results suggest that assuming consumers dislike advertising may not be an appropriate assumption. Kaiser and Wright (2006) consider eight German duopoly markets for magazines and find positive effects of advertising on circulation as well. Bogart (1989) and Rosse (1980) consider US newspapers and provide a similar conclusion using simple linear (monopoly) demand models that do not account for potential endogeneity.

The rest of the paper is organized as follows: Section 2 presents our empirical model. Section 3 describes our data. Section 4 presents our empirical results. Specification tests follow in Section 5. Section 6 concludes.

2. Empirical approach

2.1. Empirical model

Our main empirical model maps the magazine characteristics such as copy price, the number of content pages and our variable of main interest, the number of advertising pages relative to the number of content pages, to magazine market shares. We estimate logit demand models separately for the six segments Women's, Business and politics, Car, Interior design, TV and Adult magazines.

The model assumes that magazines in the same segment are potential substitutes to one another. This assumption is substantiated by Dewenter and Kaiser (2006) who use second choice data from a

consumer survey to show that a magazine's best substitutes is a magazine from the same segment. We test this assumption in Section 5 by estimating cross elasticities using a log-linear demand model. However, we ignore possible complementarity between different segments.

We are aware of that the logit model we use has limited substitution patterns. That is, the own- and cross-price elasticities are solely determined by the price coefficient and market shares. Moreover, consumer heterogeneity is independent of magazine characteristics. Using random coefficients mitigates these limitations, but we are skeptical about identifying the random coefficient with our data set. Consumer distributions from multiple markets or micro choice data are commonly used to identify the random coefficient logit model (Nevo, 2001; Petrin, 2002). We do not, however, have micro choice data or even multimarket data at our disposal. Moreover, we observe the same market repeatedly over time so we would need to fix the consumer distribution for all periods. Despite our data restrictions we estimate the random coefficient logit model and report the corresponding estimation results in Section 5 to support the evidence generated by our logit model without random coefficients.

Our demand model defines indirect consumer utility as

$$u_{ijt} = x_{jt}\beta - \alpha p_{jt} + \gamma_t + \eta_j + \xi_{jt} + \varepsilon_{ijt}, \quad (1)$$

where x_{jt} denotes product j 's observed characteristics at time t , p_{jt} product j 's price at time t , γ_t time dummy variables, η_j a magazine-specific dummy variable, ξ_{jt} magazine-specific unobserved characteristics at time t and ε_{ijt} an idiosyncratic logit error term. The observed characteristics include a constant term, the number of content pages, advertising share and a dummy variable for magazines not published quarterly. The term η_j controls for magazine specific quality that does not vary over time. We include this dummy variable for magazines we observe for at least ten periods.

Our model requires the definition of "market size" which implicitly defines the demand for the "outside good". For Women's magazines we use the number of women above 14 years of age with German residency. For Adult magazines and Business and politics magazines we use the number of males above 14 years of age with Germany residency. For the other segments we use the number of German residents above 14 years of age.

2.2. Identification

We allow for two endogenous variables in our estimation. One is price and the other is advertising share. These two variables are likely to be correlated with demand shocks or unobserved magazine characteristics, the term ξ_{jt} in Eq. (1). We interpret ξ_{jt} as a content-related quality shock that consumers observe but the econometrician does not. All other things being equal, a positive quality shock is likely to increase price but decrease advertising share. So we expect an unobserved quality shock to be positively correlated with price and negatively correlated with advertising share. However, this unobserved quality shock is unlikely to be correlated across magazine segments.

We therefore use observed characteristics in other segments as instrumental variables. Our identifying assumption is that a magazine's unobserved quality shock in a given period is not correlated with observed magazine characteristics in the other segments in the same period. For example, a quality shock in the Women's magazine segment should not affect prices in the Adult magazine segment. For each magazine in a given period we compute its own publisher's average price and advertising share in the other five segments in the same period. We also compute the other publishers' average prices and advertising shares in the other five segments. This produces five own publisher's average prices, five own publisher's advertising

Table 1
F-tests for joint significance of the instruments for price and advertising ratio

	Price	Advertising
Women's magazines	669.37	163.75
Business/politics magazines	137.75	12.25
Car magazines	92.64	30.78
Interior design magazines	241.92	3.88
TV magazines	423.13	63.77
Adult magazines	326.70	39.28

Table 1 displays F-test results for joint significance of our instruments for price and advertising share in "first stage" regressions.

shares, five other publishers' average prices and five other publishers' advertising shares for each magazine in each period.

In order for our instruments not to be weak, observed characteristics should be correlated across segments. We argue that the same publisher's observed characteristics are correlated due to common cost factors. Magazine characteristics of different segments are also correlated across publishers because of an oligopolistic market structure.

We formally test if our instruments are valid. We first test if our instruments are highly correlated with the endogenous variables by running auxiliary regressions of the endogenous variables on the instruments and the exogenous variables. Test results reported in Table 1 show that our instruments are jointly statistically highly significantly different from zero. Many instruments are also separately highly significant (not shown in the table). We also test if our instruments are uncorrelated with the error terms by running Sargan tests for orthogonality. These tests confirm that orthogonality cannot be rejected for any specification.

We use the Generalized Method of Moments (GMM) with the moment conditions

$$E[Z_j \xi_j] = 0$$

where Z_j is a matrix of instrumental variables for magazine j and ξ_j is a vector of unobservable characteristics. We use $(Z'Z)^{-1}$ as the weighting matrix and allow for heteroskedasticity and serial correlation in computing standard errors. In particular, the asymptotic variance is

$$\text{Asy. Var.}(\theta) = [(X'Z)W(Z'X)]^{-1}(X'Z)W\Lambda W(Z'X)[(X'Z)W(Z'X)]^{-1}$$

where $W = (Z'Z)^{-1}$ and $\Lambda = (Z'\xi\xi'Z)$.

3. Data

We use publicly available data on magazine circulation, cover prices, content pages and advertising pages from <http://medialine.focus.de>. The

data spans 52 quarters from the first quarter of 1992 to the fourth quarter of 2004. This data has been originally collected by "Informationsgemeinschaft zur Feststellung der Verbreitung von Werbeträgern e.V.", the German equivalent to the US Audit Bureau of Circulation.

Table 2 displays descriptive statistics of the dependent and explanatory variables involved in the estimations for each segment. The "between" standard deviation is the variation in the same segment across magazines and the "within" standard deviation is the variation across time for a specific magazine. The "between" variation is considerably larger than the "within" variation for almost all variables and magazine segments. This helps us identifying the discrete choice demand model as the model is identified by variation across magazines in the same segment and time period.

The table shows that the average circulation across all magazines is 313,770. TV magazines have by far the largest circulation and Interior design magazines have the smallest. Women's magazines is the segment with most titles, 51, while there are only ten titles in the Adult magazine segment.

The average copy price is 0.94 Euro across all segments. Prices are highest in the Business and politics segment, followed by the Adult and the Interior design segments. It is lowest in the TV segment, followed by the Women's segment. However, the number of content pages does not seem to be reflected in price differences. TV magazines have 953 content pages on average while Business and politics magazines have 708 content pages on average. Adult magazines have 325 content pages on average, while Women's magazines have 480 content pages on average. Thus, it is important to control the magazine specific unobserved quality, η_j in Eq. (1).

The advertising share is 0.41 on average but varies considerably across magazines. It is lowest in the TV magazine segment where it is 0.21 and highest in the Business and politics segment where it is 0.66. Note that we calculate the advertising share by dividing advertising pages by content pages. An advertising share of 0.40 hence means that the number of advertising pages is 40 given a total page count of 140. The Interior design segment is the only segment where the "within" variation is larger than the "between" variation. It may therefore be hard to identify advertising preference for this segment.

4. Empirical findings

4.1. Estimation results

We report demand estimates in Table 3. In the logit specification without instruments demand is inelastic in all segments except for Adult magazines, and the price coefficient is even positive in the Interior design segment. In the Adult segment the price coefficient is smaller

Table 2
Descriptive statistics

		All mag.		Women		Adult		Busi. & pol.		Car		Int. Des.		TV	
		Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Circulation (in 1,000)	Overall	313.77	458.40	370.78	414.61	160.00	157.91	292.45	397.47	134.78	222.40	101.22	108.16	1,085.49	698.96
	Between		398.37		368.72		114.81		361.43		216.79		95.18		661.23
	Within		113.55		103.03		109.10		44.41		25.08		13.57		289.18
Price (real, in Euros)	Overall	0.94	0.54	0.73	0.45	1.06	0.54	1.28	0.52	0.96	0.35	0.98	0.25	0.40	0.13
	Between		0.53		0.42		0.51		0.51		0.35		0.26		0.18
	Within		0.08		0.08		0.11		0.12		0.11		0.04		0.02
Content pages	Overall	401.42	441.35	480.14	317.85	325.24	266.55	708.23	704.45	217.45	196.85	60.41	20.50	953.64	333.08
	Between		418.20		312.92		261.05		651.22		196.06		19.41		395.57
	Within		66.61		36.00		55.63		162.94		33.18		9.56		94.16
Advertising share	Overall	0.41	0.32	0.41	0.28	0.27	0.17	0.66	0.41	0.46	0.22	0.55	0.71	0.21	0.15
	Between		0.23		0.25		0.18		0.29		0.19		0.27		0.13
	Within		0.22		0.12		0.08		0.31		0.11		0.66		0.08
# obs.		7,708		1,996		359		682		583		495		753	
# magazines		204		51		10		20		13		14		18	

Table 2 displays descriptive statistics of the dependent and explanatory variables involved in the IV logit estimations.

Table 3
Logit demand estimation results

	IV Logit			Logit w/o instruments		
	Price	Content	Adshare	Price	Cont.	Ads.
<i>Women's magazines</i>						
Coeff.	-1.917***	0.043***	1.518***	-0.601***	-0.009	0.241***
Std. err.	0.309	0.017	0.331	0.044	0.009	0.037
<i>Business/politics magazines</i>						
Coeff.	-1.023***	0.109***	0.890***	-0.508***	0.083***	0.265***
Std. err.	0.163	0.017	0.250	0.083	0.008	0.045
<i>Car magazines</i>						
Coeff.	-0.854***	0.007	0.913***	-0.898***	0.000	0.374***
Std. err.	0.107	0.018	0.297	0.052	0.017	0.058
<i>Interior design magazines</i>						
Coeff.	-0.048	0.155*	0.032	0.231***	-0.003	-0.004
Std. err.	0.148	0.110	0.028	0.104	0.068	0.010
<i>TV magazines</i>						
Coeff.	-2.153***	0.059***	1.686***	-0.559	0.057***	1.313***
Std. err.	1.123	0.013	0.274	0.346	0.010	0.119
<i>Adult magazines</i>						
Coeff.	-2.369***	0.032	0.077	-3.035***	0.033	0.511***
Std. err.	0.263	0.031	0.257	0.150	0.032	0.160

Table 3 displays Logit demand estimates with instruments ("IV Logit") and without instruments ("Logit") for the six largest magazine groups in our data. The dependent variable is market share relative to the "outside" good. The explanatory variables are real copy price, the natural logarithm of the number of content pages and the ratio of advertising pages to content pages. The specification additionally contains a constant term, a linear time trend and three quarter dummies variables.

than -3 and statistically significant. The advertising share coefficient is positive and statistically significant in all segments other than Interior design. Advertising elasticities range from 0.098 in the Women's segment to 0.272 in the TV magazine segment. An advertising elasticity of 0.1 means that the market share increases by 0.1% when the advertising share increases by 1%. In the Interior design segment, the advertising share coefficient is negative and statistically insignificant.

In the IV logit specification the price coefficient is statistically significant in all segments except for Interior design where it is positive and significant without instruments but negative and insignificant with instruments. Its absolute magnitude significantly increases in the Women's, the Business and politics as well as the TV magazines segments such that demand is now elastic. In the Adult magazine segment it is lower than in the previous specification but demand is still elastic. In the Car segment it goes down slightly and demand is still inelastic.

The advertising share coefficient increases in all segments once advertising share is instrumented with the exception of Adult magazines where it goes down from 0.511 to 0.077. In the Interior design segment it changes signs from negative to positive but remains statistically insignificant. The advertising elasticity increases significantly in all other segments. It is 0.617 in the Women's segment, 0.583 in the Business and politics segment, 0.419 in the car segment and 0.349 in the TV segment.

These results indicate that the price and the advertising share variables are endogenous and that our instruments mitigate the endogeneity problem. In most magazine segments we identify consumer demand reasonably well, and changes in signs and magnitudes after instrumentation are consistent with our expectations. However, we are not able to identify demand for the Interior design segment and for Adult magazines the advertising share coefficient is statistically not significant.

Our IV estimates show that consumers appreciate advertising in most magazine segments. The advertising elasticity is less than one in

all segments, but its magnitude is economically significant. For example, consumers in the Women's magazines segment are willing to pay two (Euro-) Cents more to have ten more advertising pages in a magazine with 400 content pages. In the TV magazine segment consumers are willing to pay about 1.3 cents more for the same increase in the number of advertising pages of similarly sized magazines.

4.2. Supply side and demand side explanations

These results may show that consumers are heterogenous across segments with respect to advertising appreciation. Consumers in the TV and the Women's magazine segments appreciate advertising most, followed by consumers in the Car and the Business and politics magazine segments. However, the order changes with respect to the willingness to pay for more advertising pages because of differences in the price elasticity across segments. Consumers in the Car segment have the highest willingness to pay because of their low price elasticity. Consumers in the Women's and the Business and politics segments have a similar willingness to pay.

We also consider a supply side factor to explain the difference in the degree of advertising appreciation across segments: each magazine segment may carry different types of advertising. For example, if magazines in one segment carry more informative advertising than the others and consumers like informative advertising, we may observe this differences in advertising appreciation across segments.

Our data do not, however, contain information on whether advertisements are "informative" or "persuasive". We therefore purchased 26 copies of magazines from each of our six segments and tracked the informational content of the advertisements in these magazines. We followed a methodology introduced by Resnik and Stern (1977) and lately applied by Franke et al. (2004).

Resnik and Stern (1977) identify fourteen "evaluative criteria" that indicate if an advertisement is informative or not. In their methodology, an advertisement is to be regarded as "informative" if it contains at least one piece of information regarding (1) price or value, (2) quality, (3) performance, (4) components or contents, (5) availability, (6) special offers, (7) taste, (8) packaging or shape, (9) guarantees or warranties, (10) safety, (11) nutrition, (12) independent research, (13) company sponsored research and (14) new ideas.

We count how many of these information contents each advertisement in the 26 magazines contains. The results are displayed in Appendix A. Advertisements contain 1.89 pieces of information on average. Segments with above average informational content are TV (with a information count of 2.29 per advertisement), Car (2.28) and Women's magazines (2.13). Segments with slightly less than on average information counts include Business and politics (1.72) and Interior design (1.76). Adult magazines contain the least informative advertisements. The count here is 1.33 per advertisement.

We interpret advertisements in TV, car and women magazine as relatively informative whereas advertisements in adult magazines as relatively uninformative and perhaps persuasive. Advertisements in Business and politics as well as Interior design magazines are considered as intermediate cases. This result combined with our estimates suggests that consumers appreciate advertisement with informative contents and we interpret this as consumers liking informative advertising.

4.3. Implications

What do these findings imply for the pricing on print media markets? In market segments where readers are advertising-neutral the two-sided market collapses into a one-sided market with externalities – the feedback of circulation on advertising pricing. In

such a market, magazines have incentives to subsidize advertising revenue by setting copy prices lower than in a market setting without feedback. Such a market is considered by [Argentesi and Filistrucchi \(2007\)](#) as well as [Kaiser \(2007\)](#).

In segments where advertisers value readers and readers value advertising, the market structure is truly two-sided and network externalities are positive on both market sides. [Kaiser and Wright \(2006\)](#) calculate the size of the (positive) network externalities on both market sides. Based on a Hotelling-type demand model, they predict that advertising rates would increase by 5059 Euros if readers were advertising-neutral instead of appreciating advertising. This corresponds to a 50% increase in average advertising rates.

5. Other specifications

We consider two alternative models: a monopoly model that generates magazine-specific estimates and a random coefficients logit model.

5.1. Monopoly model

In our monopoly model we adopt a log-linear demand model and estimate magazine demand for each magazine separately. We use data from the first quarter of 1973 to the fourth quarter of 2004 to extend the time series dimension of our data. This allows us to identify model parameters without imposing any homogeneity restrictions across magazines. The dependent variable is the natural logarithm of circulation for each magazine and the explanatory variables are the same as in the logit demand model except that they are in natural logarithms. We estimate the model in fourth differences to account for seasonality and unit roots. This means that we remove all time-invariant magazine-specific effects and that the constant term in each magazine-specific equation constitutes the coefficient of a linear time trend.

We use Mean Group Estimation as suggested by [Pesaran and Smith \(1995\)](#) to aggregate our magazine-specific estimates across segments.

Appendix B presents our magazine-specific estimation results and discusses identification issues with a summary of results. Our mean group estimates are qualitatively identical to our IV logit findings: readers from the Women's, the Business and politics and the TV magazine segments appreciate advertising while adult magazine readers are advertising neutral. Our Mean Group Estimates are insignificant for the Interior design magazine segment.

While allowing for full heterogeneity across magazines appears appealing, a major drawback of the monopoly model is that it does not allow for substitution across magazines within the same segment. In order to test if our monopoly model is appropriate, we add prices of magazines in the same segment as additional regressors. Our monopoly model is rejected if the cross-price effects are statistically significant.

Introducing cross-price effects does, however, substantially increase the number of parameters to be estimated. We therefore impose symmetry conditions in order to keep estimation tractable. We hence assume that e.g. the cross-price effect of magazine A on magazine B is the same as the cross-price effect of magazine B on magazine A. We then stack the magazine-specific equations within the same segment and estimate them with system GMM for each segment.

As discussed in more detail in Appendix B, we find that the cross-price effects are jointly significant for all magazine segments and each segment has a fair number of separately statistically significant cross-effects. We therefore reject the monopoly model in favor of our IV logit model that does allow for competition without an explosion in the number of parameters. It should be noted, however, that we frequently encounter upward sloping demand curves and negative cross-price effects in our log-linear model with cross-price effects so it

seems that we ask too much of our data when we try to identify this model.

5.2. Random coefficient logit model

In the random coefficient logit model we allow the coefficients on the magazine characteristics to be distributed normal, so we have $\beta_{ki} = \beta_k + \sigma v_i$ for characteristic k , where $v_i \sim N(0, 1)$. We generate 1000 simulated consumers for each random coefficient and estimate the model following [Berry \(1994\)](#) and [Berry et al. \(1995\)](#). However, as mentioned in Section 2.1, we do not have multi-market data or micro data to help identifying consumer heterogeneity.

Appendix C reports estimation results for three different specifications of the random coefficient logit model. In the first specification we put a random coefficient on advertising share only. In the Women's, the Business and politics and the Car magazine segments the advertising share variable's mean coefficient is no longer identified, while its variance is identified only in the Women's magazine segment. In the TV magazine segment the advertising share variable's mean coefficient changes its sign and its variance is significant, but the price coefficient becomes positive and insignificant. In the Adult magazine segment the advertising share variable's mean coefficient now becomes significant and negative and its variance is significant as well. The absolute value of the price variable goes down but is still significant.

In the second specification we put random coefficients on price and advertising share. Except for the TV and the adult magazine segments the variance variables are not significant. In the TV segment the two variance variables are significant and the mean price variable is negative and significant, but the advertising share variable's mean coefficient is no longer significant. In the adult magazine segment both price and advertising share have significant variance coefficients, and the mean price is negative and significant. The advertising share variable's mean coefficient is negative and significant at the 10% significance level.

In the third specification we add random coefficients on the constant term. The identification does not improve in any segment. In the TV and the adult magazine segments the variance of the price coefficient becomes insignificant, and the mean of the advertising share coefficient become insignificant in the TV segment. However, in the adult magazine segment both the mean and the variance of the advertising share variable are significant and the mean is negative.

6. Conclusion

The body of theoretical literature on the economics of two-sided markets is sizeable and steadily growing. A large fraction of that literature considers media markets since they constitute a prototypical example of a two-sided market. However, most scholars assume that media consumers dislike advertising. We empirically test this assumption on German magazine data. We use a discrete choice demand model in an oligopolistic setting to estimate the utility function of magazine consumption. We treat both price and advertising share as endogenous variables and use magazine characteristics in other segments as instruments.

We show that consumers mostly appreciate advertising in magazines. Consumers of TV and Women's magazines appreciate advertising most, followed by those in the Car and the Business and politics magazine segments. Consumers of Adult magazines are indifferent. These differences across magazine segments may be due to demand-side effects – consumer heterogeneity across segments – and supply-side effects – consumers appear to be appreciating advertisements more in segments where advertisements are more informative.

The latter hypothesis is confirmed by our data while the former cannot be tested with the data we have at our disposal.

Appendix A. Informational content count

	Genre	Total # of ads	Total # of pages	1 Price or	2 Quality	3 Performa	4 Component	5 Availability	6 Special	7 Taste	8 Packaging	9 Guarantee	10 Safety	11 Nutrition	12 Independent	13 Spon.	14 New	Counts/sum ads	ratio
Playboy	Adult	39	192	9	9		16	31		2	4		2	3				76	1.95
Praline	Adult	18	63															0	0.00
<i>Sum</i>		57	255															76	1.33
Börse online	Business/politics	17	90	2	8			16	6				3					35	2.06
Der Spiegel	Business/politics	37	158	12	19	4		7	19	1	1		1					64	1.73
Focus	Business/politics	32	146	10	3		12	24	3	1	4		4	1				64	2.00
Impulse	Business/politics	41	130	7	13		10	30	5		1		2					68	1.66
Manager Magazin	Business/politics	68	200	9	19		16	38	7	1	2		5	2				99	1.46
Stern	Business/politics	38	138	13	15		2	30	6	1			4					71	1.87
<i>Sum</i>		233	862															401	1.72
Auto Bild	Car	16	82	7	7			17	16		1		2					51	3.19
Auto Motor Sport	Car	46	166	13	29			42	13		1		7					106	2.30
Auto Zeitung	Car	12	115	9	9			10	5									33	2.75
Gute Fahrt	Car	10	98	2	2			5	2									11	1.10
Motorrad	Car	14	146	5	5			9	3									22	1.57
<i>Sum</i>		98	607															223	2.28
Living at Home	Interior design	75	194	10	19	1	20	47	6	5	12		2	8				131	1.75
Schöner wohnen	Interior design	41	154	5	16		10	29	1	3	3		4	2				73	1.78
Wohnidee	Interior design	50	202	8	14		13	36	5		5		3	2				88	1.76
<i>Sum</i>		166	550															292	1.76
BILD-Woche	TV	7	82	2			4	5	4				1					16	2.29
Hör zu	TV	11	110	2	4		3	7	3	1			1	1				22	2.00
TV-hören und sehen	TV	10	122		8		5	9	3					1				26	2.60
<i>Sum</i>		28	314															64	2.29
Bild der Frau	Women's	38	90	5	14		10	20	10	4			6	10				79	2.08
Brigitte	Women's	39	170	3	24		13	28	4	4			10	10				96	2.46
Die Aktuelle	Women's	16	79	1	7		9	9	4				2	5				37	2.31
Frau im Spiegel	Women's	8	74	2	2		2	4	2					2				14	1.75
Freundin	Women's	59	180	4	21		18	37	4	6	1		10	7				108	1.83
Neue Welt für die Frau	Women's	18	71	4	8		7	15	2				2	3				41	2.28
Tina	Women's	17	76	2	7		8	13	5	1			3	2				41	2.41
<i>Sum</i>		195	740															416	2.13
<i>Sum</i>		777	3328	146	282	5	178	518	138	30	35	7	74	59	0	0	0	1,472	1.89

Appendix B. Mean Group Estimation

B.1. Basic setup

We adopt a log-linear monopoly model for magazine circulation, q_{jt} , in our magazine-specific estimation. Determinants of demand are cover prices, p_{jt} , the number of content pages, c_{jt} , and the ratio of advertising pages to content pages (“advertising share”), a_{jt} .

Our estimation equation of interest is:

$$\ln(q_{jt}) = \alpha_j \ln(p_{jt}) + \beta_j \ln(c_{jt}) + \gamma_j \ln(a_{jt}) + \mu_j + \eta_{jt},$$

where the parameter of interest is γ , the “nuisance” or “utility cost” parameter as it is referred to in the theoretical literature. The subscripts denote magazine j observed at time t , parameter μ_j denotes a time-invariant magazine-specific effect which absorbs all time-invariant magazine “fixed effects” such as magazine periodicity or magazine ownership and η_{jt} is an idiosyncratic error term.¹

Note that the parameters of interest in the equation above are magazine-specific. The long time-series dimension of our data allows us to identify the model parameters without imposing any homogeneity restrictions. The mean of the parameter estimates is the Mean Group Estimate (Pesaran and Smith, 1995). For example, $\alpha_{MGE} = 1/N \sum_{j=1}^N \alpha_j$ with a corresponding variance of $1/(N(N-1)) \sum_{j=1}^N (\alpha_j - \alpha_{MGE})^2$, where N denotes the number of magazines under consideration.

Many of the time series of the magazines in our data have unit roots, even if when it is accounted for linear time trends. Since our time series under consideration also exhibit substantial seasonality, we estimate Eq. (6) in annual differences (i.e. fourth differences in our quarterly data). Differentiation removes the magazine-specific fixed effect, μ_t .

B.2. Identification

Our main identifying assumption for the magazine-specific monopoly model estimations is that (unobserved) cost factors are common across magazines published by a magazine's own publisher and that other (demand-side) shocks specific to the magazine are not correlated with these factors, an approach similar to that used by Hausman and Taylor (1981), Hausman et al. (1994) and Berry et al. (1995). This means that cover prices of a publisher's magazines in other segments of the magazine market are assumed to be driven by common underlying costs associated with a publisher's production, distribution and marketing of its magazines to readers. These costs also determine the particular magazine's cover prices, but are assumed to be uncorrelated with the disturbances in the magazine demand equations. This is why the average cover price of a publisher's other magazines can be used as an instrument for cover prices. The same logic applies to the use of the average advertising share of a publisher's other magazines as an instrument for a magazine's advertising share.

To give an example for our cover price instruments, suppose that a cost shock hits the own publisher. Such a shock could be caused by (i) changes in the contractual relations between the publisher and the firm the publisher outsources printing to, (ii) changes in the discounts which that firm receives on pulp and paper purchase, (iii) management changes or (iv) changes in publisher strategies that lead to changes in the possibilities to use the same editorial material in different magazines etc. These shocks will be correlated with production cost and hence with magazine prices but not with demand shocks.

Our example for our advertising share instrument is that a particular publisher may form an ongoing relationship with a large advertising client through one of its magazines, but this will tend to raise demand for advertising in the publisher's other magazines, given some large advertisers may place advertisements across different magazine markets (“cross-selling” as it is termed in the media industry). Thus, we use the average advertising share of a publisher's other magazines to instrument the advertising share of a particular magazine produced by the same publisher.

Additional cost-side instruments for cover prices are the natural logarithm of the number of magazine titles published by the own publisher in a given quarter (a proxy variable for returns to scope in production), the natural logarithm of the total number of pages printed by the own publisher in a given quarter (a proxy for returns to scale in production) and a pulp and paper production price index.

Our instruments are differenced since our endogenous variables are differenced as well. We occasionally use levels as instruments as well.

The table below presents our magazine-specific estimates.

B.3. Results with instrumentation

	ln (price)		Adshare		ln (content pages)		Overid. restr.	Joint significance tests	
	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	p-val.	Price p-val.	Adshare p-val.
7 Tage	-0.92	0.25	0.97	0.41	1.47	0.08	0.13	0.00	0.09
Auf einen Blick	-0.12	0.79	0.24	0.00	0.70	0.00	0.14	0.00	0.01
Auto Bild	-0.65	0.27	-0.52	0.16	-0.44	0.40	0.48	0.00	0.50
Auto Zeitung	-0.06	0.62	-0.19	0.28	0.38	0.35	0.26	0.05	0.32
Auto, Motor und Sport	-0.35	0.12	0.12	0.07	0.07	0.69	0.20	0.01	0.28
Börse Online	1.39	0.13	-0.08	0.65	-0.08	0.85	0.32	0.05	0.89
Bild der Frau	0.78	0.21	0.29	0.01	0.27	0.17	0.27	0.00	0.27
Bild der Wissenschaft	0.51	0.55	0.30	0.04	0.80	0.02	0.46	0.86	0.11
Bravo Girl	-5.34	0.21	2.30	0.15	1.06	0.63	0.87	0.02	0.10
Brigitte	-0.03	0.96	0.04	0.65	0.00	0.95	0.30	0.52	0.53
Bunte	-1.48	0.46	-0.37	0.27	0.09	0.74	0.17	0.90	0.72
Burda Mode+Magazin	-0.77	0.01	0.05	0.51	0.08	0.65	0.38	0.34	0.63
Capital	-0.04	0.80	-0.07	0.30	-0.04	0.54	0.88	0.00	0.00
Chip	-0.43	0.68	0.28	0.10	0.47	0.71	0.64	0.06	0.52

¹ To the extent that the share of different types of content does not vary much across time within magazines for German magazines (Kaiser, 2007), the fixed effect also captures magazine content.

Appendix B.3 (continued)

	ln (price)		Adshare		ln (content pages)		Overrid. restr.	Joint significance tests	
	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	p-val.	Price p-val.	Adshare p-val.
Cinema	-1.26	0.97	2.60	0.55	1.68	0.57	0.18	0.00	0.00
Cosmopolitan	-0.24	0.67	0.36	0.45	0.31	0.62	0.35	0.01	0.63
Das Goldene Blatt	-0.28	0.01	0.25	0.55	0.36	0.26	0.61	0.00	0.25
Das Haus	-0.72	0.18	-0.09	0.68	-0.03	0.93	0.45	0.00	0.00
Das Neue	-0.15	0.97	3.91	0.04	0.72	0.45	0.41	0.03	0.00
Das Neue Blatt	-0.26	0.17	0.66	0.06	0.21	0.49	0.16	0.20	0.14
Das neue Wochenende	-6.02	0.86	-2.46	0.16	-3.96	0.04	0.23	0.13	0.23
Der Spiegel	-0.41	0.01	0.03	0.26	-0.01	0.76	0.34	0.00	0.00
Die Aktuelle	-2.46	0.00	0.21	0.79	-0.16	0.50	0.44	0.02	0.01
Die Zwei	-0.29	0.94	1.35	0.34	-0.99	0.16	0.40	0.00	0.00
DMEuro	-0.55	0.64	-0.02	0.79	-0.12	0.67	0.84	0.00	0.18
Echo der Frau	-1.41	0.06	-0.38	0.56	-0.21	0.67	0.72	0.00	0.77
Ein Herz für Tiere	-1.41	0.45	0.25	0.87	-0.37	0.82	0.17	0.00	0.20
Elle	-1.38	0.10	-0.19	0.36	-0.57	0.08	0.19	0.02	0.01
Eltern	-0.21	0.33	0.09	0.09	0.08	0.33	0.11	0.00	0.14
Essen & Trinken	-0.29	0.77	-0.01	0.63	-0.32	0.59	0.73	0.00	0.00
Für Sie	-0.05	0.83	0.11	0.33	-0.05	0.75	0.47	0.00	0.54
Fernsehwoche	-2.72	0.13	1.22	0.00	0.21	0.22	0.25	0.00	0.31
Flora	-0.02	0.95	0.03	0.74	0.24	0.22	0.18	0.00	0.01
fotoMAGAZIN	-0.36	0.74	-2.04	0.35	-0.39	0.74	0.93	0.03	0.61
Frau aktuell	-0.10	0.46	0.45	0.29	-0.18	0.66	0.27	0.00	0.08
Frau im Leben	-0.10	0.75	1.29	0.00	0.60	0.02	0.36	0.00	0.74
Frau im Spiegel	-0.03	0.13	0.24	0.67	-0.12	0.80	0.31	0.38	0.00
Frau mit Herz	-0.78	0.85	-0.64	0.48	-0.58	0.40	0.45	0.00	0.00
Freizeit Revue	-0.01	0.86	0.23	0.36	0.48	0.00	0.25	0.45	0.62
Freundin	-0.46	0.31	-0.01	0.90	-0.01	0.86	0.21	0.12	0.89
Funk Uhr	-0.25	0.06	0.15	0.83	-1.34	0.13	0.77	0.94	0.32
Geo	-0.39	0.33	-0.07	0.37	-0.01	0.33	0.12	0.13	0.01
GeoSaison	-0.15	0.17	0.01	0.40	-0.03	0.74	0.50	0.26	0.12
Glücks Rätsel	-0.44	0.01	0.90	0.58	-0.03	0.98	0.23	0.00	0.01
Glücks Revue	-1.37	0.03	2.57	0.00	1.84	0.00	0.36	0.00	0.04
GuteFahrt	-1.19	0.27	0.06	0.63	0.38	0.55	0.68	0.31	0.34
Guter Rat!	-0.09	0.84	0.13	0.42	1.05	0.10	0.43	0.01	0.00
Hörzu	-0.36	0.19	-0.19	0.71	-0.92	0.04	0.70	0.10	0.00
Heim und Welt	-1.83	0.04	-0.35	0.88	-0.10	0.95	0.17	0.00	0.31
Impulse	-0.04	0.91	0.17	0.07	0.63	0.22	0.45	0.11	0.19
Ingrid	-0.19	0.38	0.05	0.47	0.52	0.10	0.89	0.00	0.34
Journal für die Frau	-1.60	0.07	0.18	0.77	0.07	0.95	0.58	0.28	0.30
Kochen & Genießen	-2.08	0.04	0.44	0.00	0.05	0.01	0.99	0.03	0.04
Kosmos	-0.51	0.06	-0.12	0.31	0.24	0.62	0.29	0.16	0.12
Leben & erziehen	-1.96	0.01	0.09	0.59	0.41	0.62	0.84	0.00	0.38
Mädchen	-0.94	0.14	-0.09	0.06	0.19	0.61	0.64	0.03	0.58
Manager Magazin	-0.16	0.84	-0.02	0.82	0.61	0.65	0.33	0.01	0.00
Max	-0.75	0.18	0.46	0.01	0.53	0.03	0.24	0.16	0.02
Maxi	-0.32	0.79	0.33	0.39	0.50	0.30	0.26	0.37	0.38
Mein schöner Garten	-2.44	0.22	0.24	0.35	0.44	0.33	0.52	0.00	0.00
Meine Familie & Ich	-2.10	0.16	0.40	0.07	0.47	0.20	0.12	0.00	0.00
Merian	-0.59	0.05	0.28	0.05	-0.30	0.55	0.95	0.04	0.06
Mini	-1.38	0.86	6.94	0.04	0.23	0.80	0.31	0.00	0.00
motAutosTestTechnik	-2.80	0.05	0.40	0.74	1.15	0.37	0.27	0.15	0.04
Motorrad	-0.22	0.89	2.68	0.05	1.19	0.05	0.30	0.01	0.09
Motorrad, Reisen & Sport	-0.37	0.74	0.37	0.84	3.93	0.55	0.24	0.51	0.00
Neue Mode	-0.05	0.89	0.08	0.08	0.66	0.12	0.71	0.00	0.08
Neue Revue	-0.41	0.09	0.07	0.75	-0.64	0.03	0.60	0.07	0.33
Neue Welt	-0.33	0.49	0.92	0.19	-0.72	0.02	0.98	0.01	0.04
P.M.Magazin	-0.55	0.08	0.11	0.67	0.01	0.02	0.14	0.07	0.01
Petra	-1.42	0.01	-0.09	0.51	0.08	0.97	0.52	0.41	0.19
Playboy	-0.33	0.52	0.68	0.07	1.64	0.00	0.11	0.12	0.19
Pop Rocky	-0.65	0.27	-0.09	0.56	1.65	0.44	0.24	0.15	0.00
Popcorn	-1.37	0.37	1.15	0.03	0.30	0.21	0.34	0.63	0.07
Praline	-1.54	0.05	-2.53	0.17	-2.63	0.07	0.16	0.00	0.00
PS-DasSport-Motorrad Magazin	-0.42	0.60	1.30	0.07	0.52	0.04	0.14	0.00	0.00
Quick	-0.70	0.12	0.46	0.05	-0.29	0.22	0.15	0.03	0.00
RallyeRacing	-3.11	0.00	-0.01	0.94	-0.33	0.76	0.30	0.34	0.00
Schöner Essen	-3.60	0.07	-0.62	0.21	0.27	0.62	0.82	0.53	0.01
SelberMachen	-0.62	0.58	-0.02	0.94	0.60	0.52	0.56	0.43	0.02
Selbst ist der Mann	-0.37	0.58	0.36	0.21	0.14	0.21	0.14	0.66	0.30
Spektrum der Wissenschaft	-0.04	0.95	0.07	0.83	0.31	0.85	0.41	0.00	0.20
Spielen und Lernen	-1.07	0.02	0.23	0.52	-0.17	0.75	0.76	0.69	0.02
Sport Auto	-0.51	0.19	-0.31	0.02	-0.25	0.41	0.20	0.37	0.17
Sport Bild	-1.12	0.03	-0.20	0.27	2.64	0.46	0.96	0.00	0.07
Stern	-6.73	0.02	3.21	0.10	-0.17	0.31	0.34	0.26	0.04
Surf	-1.59	0.28	0.75	0.00	-0.56	0.90	0.30	0.03	0.15
Tennis Magazin	-1.40	0.16	-0.01	0.98	0.40	0.66	0.68	0.03	0.02
Tina	-0.09	0.84	0.14	0.13	3.03	0.07	0.15	0.08	0.00

(continued on next page)

Appendix B.3 (continued)

	ln (price)		Adshare		ln (content pages)		Overid. restr.	Joint significance tests	
	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	p-val.	Price p-val.	Adshare p-val.
TV Hören und Sehen	-1.07	0.72	-0.11	0.60	0.09	0.52	0.21	0.00	0.01
Vital	-2.67	0.00	1.85	0.00	3.28	0.35	0.24	0.00	0.12
Weltbild	-0.14	0.92	0.11	0.57	0.43	0.13	0.41	0.00	0.00
Wirtschaftswoche	-5.46	0.03	0.30	0.66	-0.74	0.63	0.14	0.38	0.02
Wohnidee	-1.53	0.23	-0.39	0.34	-0.33	0.28	0.39	0.31	0.04
Zuhause wohnen	-0.04	0.93	0.12	0.76	0.00	0.69	0.81	0.05	0.01

In some cases we also use advertising shares in *other* magazines in the *own* market segment as instruments. Note that we assume monopoly demand but that advertisers may still choose to place their advertisement wherever they want. Some advertisers may even “multi-home”, i.e. place ads in different magazines. Our additional instruments hence are close to Berry et al.'s (1995) suggestion to use functions of other products characteristics as instruments. The list of instruments eventually used for each magazine-specific estimation is available from the authors upon request.

B.4. Monopoly model test

We test our assumption of monopoly model by adding prices of other magazines in the own magazine segment to each magazine-specific equation. We stack each estimation equation for each magazine segment and impose symmetry. For example, consider a two-magazine case where magazines A and B are competing. Our system of equations then reads:

$$\ln(q_{At}) = \alpha_{AA} \ln(p_{At}) + \alpha_{AB} \ln(p_{Bt}) + \beta_A \ln(C_{At}) + \gamma_A \ln(a_{At}) + \mu_A + \eta_{At} \quad (2)$$

$$\ln(q_{Bt}) = \alpha_{BA} \ln(p_{At}) + \alpha_{BB} \ln(p_{Bt}) + \beta_B \ln(C_{Bt}) + \gamma_B \ln(a_{Bt}) + \mu_B + \eta_{Bt}. \quad (3)$$

The cross-price effects are a_{AB} and a_{BA} . We impose symmetry so $a_{AB} = a_{BA}$. a_{AA} and a_{BB} are the own-price effects of magazine A and magazine B, respectively. If $a_{AB} = a_{BA} \neq 0$, we cannot accept the monopoly model. If more than two magazines are involved, we apply tests for joint significance.

We instrument the prices of competing magazines by their respective prices of other magazines published by their own publisher.

The table below presents Mean Group Estimation results for the competitive model are the Car magazine segment. We omit the results for other magazine groups for brevity. They are available from the authors upon request.

System IV estimation, symmetry conditions imposed																			
		AutoBild		AutoZeitung		GuteFahrt		Motorrad		MotorradReise		PS		RallyeRacing		SportAuto		mot	
		Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.
Prices	AutoBild	-0.051	0.789	-0.250	0.040	0.004	0.973	0.640	0.000	-0.011	0.930	0.061	0.241	-0.057	0.647	-0.209	0.283	0.080	0.356
	AutoZeitung	-0.250	0.040	-0.255	0.269	0.323	0.102	-0.010	0.959	-0.126	0.730	0.596	0.084	0.159	0.401	0.290	0.380	-0.056	0.610
	GuteFahrt	0.004	0.973	0.323	0.102	0.219	0.406	0.287	0.107	0.128	0.347	0.085	0.137	0.254	0.083	0.023	0.931	0.394	0.070
	Motorrad	0.640	0.000	-0.010	0.959	0.287	0.107	-0.777	0.004	-0.399	0.006	0.024	0.662	-0.183	0.246	0.228	0.366	-0.365	0.018
	MotorradReise	-0.011	0.930	0.168	0.371	0.128	0.347	-0.399	0.006	-0.361	0.138	-0.122	0.167	-0.240	0.073	0.424	0.014	0.088	0.290
	PS	0.061	0.241	-0.042	0.410	0.085	0.137	0.024	0.662	-0.122	0.167	-0.523	0.000	0.082	0.105	-0.063	0.359	-0.018	0.537
	RallyeRacing	-0.057	0.647	-0.512	0.014	0.254	0.083	-0.183	0.246	-0.240	0.073	0.082	0.105	0.339	0.088	-0.216	0.352	-0.135	0.277
	SportAuto	-0.209	0.283	1.765	0.000	0.023	0.931	0.228	0.366	0.424	0.014	-0.063	0.359	-0.216	0.352	1.161	0.008	0.616	0.024
	mot	0.080	0.356	0.376	0.417	0.394	0.070	-0.365	0.018	0.088	0.290	-0.018	0.537	-0.135	0.277	0.616	0.024	-0.575	0.141
	ln (# cont. page)	-0.060	0.264	0.074	0.421	0.107	0.096	0.494	0.015	0.032	0.773	-0.136	0.354	0.070	0.388	0.198	0.187	0.007	0.919
Other vars	Adshare	0.207	0.106	-0.192	0.363	0.071	0.351	0.764	0.006	0.352	0.101	0.416	0.084	0.133	0.181	0.221	0.182	-0.131	0.078
	Period	-0.004	0.000	-0.001	0.469	-0.004	0.000	0.000	0.745	-0.001	0.378	0.000	0.833	-0.001	0.188	-0.002	0.127	0.000	0.539
	Constant	0.412	0.000	0.081	0.317	0.500	0.000	-0.004	0.957	0.117	0.358	-0.051	0.674	0.066	0.312	0.156	0.109	0.028	0.612

Specification also includes own Adshare, own number of content pages, a time trend and a constant term.

Test for all cross-effects equal to 0:

chi2 test s 178.960, p-val.: 0.000, # obs.: 40.000.

System OLS estimation, symmetry conditions imposed																			
		AutoBild		AutoZeitung		GuteFahrt		Motorrad		MotorradReise		PS		RallyeRacing		SportAuto		mot	
		Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.
Prices	AutoBild	-0.151	0.392	-0.228	0.039	0.017	0.884	0.545	0.000	-0.039	0.731	0.064	0.198	-0.051	0.658	-0.232	0.209	0.063	0.445
	AutoZeitung	-0.228	0.039	-0.043	0.830	0.305	0.067	0.135	0.365	-0.133	0.688	0.533	0.083	0.115	0.484	-0.014	0.959	-0.003	0.973
	GuteFahrt	0.017	0.884	0.305	0.067	0.339	0.152	0.125	0.396	0.225	0.065	0.103	0.051	0.255	0.059	0.014	0.955	0.327	0.115
	Motorrad	0.545	0.000	0.135	0.365	0.125	0.396	-0.912	0.000	-0.379	0.003	0.030	0.564	-0.139	0.309	0.098	0.641	-0.233	0.049
	MotorradReise	-0.039	0.731	0.046	0.775	0.225	0.065	-0.379	0.003	-0.275	0.241	-0.116	0.179	-0.244	0.045	0.487	0.002	0.059	0.432
	PS	0.064	0.198	-0.051	0.295	0.103	0.051	0.030	0.564	-0.116	0.179	-0.533	0.000	0.069	0.160	-0.049	0.453	-0.020	0.472
	RallyeRacing	-0.051	0.658	-0.643	0.001	0.255	0.059	-0.139	0.309	-0.244	0.045	0.069	0.160	0.349	0.063	-0.092	0.667	-0.116	0.326
	SportAuto	-0.232	0.209	1.622	0.000	0.014	0.955	0.098	0.641	0.487	0.002	-0.049	0.453	-0.092	0.667	1.358	0.001	0.639	0.014
	mot	0.063	0.445	0.179	0.677	0.327	0.115	-0.233	0.049	0.059	0.432	-0.020	0.472	-0.116	0.326	0.639	0.014	-0.493	0.190
	ln(# cont. p.)	-0.051	0.315	0.125	0.147	0.121	0.042	0.315	0.036	0.038	0.726	-0.143	0.325	0.050	0.516	0.098	0.464	0.028	0.658
Other vars	Adshare	0.143	0.209	-0.128	0.486	0.073	0.300	0.557	0.004	0.333	0.096	0.419	0.051	0.110	0.225	0.141	0.343	-0.090	0.175
	Period	-0.004	0.000	0.000	0.589	-0.004	0.000	0.000	0.723	-0.001	0.430	0.000	0.873	-0.001	0.155	-0.001	0.149	0.000	0.446
	Constant	0.392	0.000	0.057	0.453	0.481	0.000	-0.005	0.950	0.105	0.406	-0.044	0.717	0.072	0.252	0.152	0.108	0.036	0.499

Specification also includes own Adshare, own number of content pages, a time trend and a constant term.

Test for all cross-effects equal to 0:

chi2 test s 178.96, p-val.: 0.0000, # obs.: 40.

Appendix C. Results for random coefficients logit specifications

	Random coefficients I					Random coefficients II						Random coefficients III						
	Mean utility				Variance	Mean utility				Variance	Mean utility				Variance			
	Constant	Price	Content	Adshare	Adshare	Constant	Price	Content	Adshare	Price	Adshare	Constant	Price	Content	Adshare	Constant	Price	Adshare
<i>Women's</i>																		
Coeff.	-4.23	-1.54	0.05	0.34	1.41	-4.40	-1.38	0.04	0.84	0.03	0.42	-8.40	-2.03	0.07	1.30	12.98	0.00	1.12
Std. err.	0.18	0.49	0.02	0.58	0.58	0.16	0.62	0.02	0.67	3.42	1.45	5.68	0.58	0.03	0.50	15.91	0.35	0.78
<i>Business and politics</i>																		
Coeff.	-6.96	-0.26	0.08	0.24	0.49	-6.95	-0.27	0.09	0.24	0.00	0.51	-8.68	-0.29	0.08	0.24	2.47	0.09	0.66
Std. err.	1.20	0.58	0.02	0.64	0.72	1.28	0.58	0.02	0.62	3.18	0.69	18.27	0.59	0.02	1.46	15.85	2.66	1.10
<i>Car</i>																		
Coeff.	-6.53	-0.87	0.00	0.73	0.17	-6.54	-0.88	0.00	0.73	0.12	0.10	-13.17	-0.94	0.00	0.83	5.12	0.43	0.45
Std. err.	0.34	0.14	0.02	0.51	2.21	0.23	0.28	0.02	0.52	1.09	2.36	26.40	0.35	0.02	0.50	15.05	0.38	0.67
<i>Interior design</i>																		
Coeff.	-6.54	0.00	0.07	-0.03	0.05	-6.17	-0.83	0.07	-0.03	0.95	0.05	-13.83	-0.06	0.03	-0.04	4.92	0.48	0.07
Std. err.	0.10	0.15	0.11	0.12	0.17	0.52	1.15	0.11	0.12	0.70	0.18	19.63	0.30	0.13	0.12	9.77	0.55	0.22
<i>TV</i>																		
Coeff.	-3.82	0.73	0.04	-1.90	3.84	-0.02	-5.72	0.03	0.61	7.05	-2.39	-2.41	-1.28	0.03	-0.93	1.89	3.44	3.75
Std. err.	0.76	1.49	0.02	0.85	0.70	1.23	2.52	0.02	0.98	2.27	0.95	1.32	2.13	0.02	1.17	3.54	2.03	0.69
<i>Adult</i>																		
Coeff.	-1.04	-1.87	0.00	-8.85	4.53	-1.25	-3.52	-0.01	-3.71	1.33	2.63	-1.55	-2.34	0.00	-2.33	0.12	0.79	1.68
Std. err.	0.96	0.57	0.04	4.38	1.57	0.61	1.18	0.04	2.20	0.65	1.14	0.55	1.13	0.04	1.73	1.63	0.70	0.97

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