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Abstract: What happens to demand if a magazine launches a website? This question is empirically analyzed for the German women's magazine market, a particularly large segment of the German magazine where fierce competition is reigning. Models for differentiated product demand are estimated on panel data covering the period 1990 to 2000, showing that website provision does not significantly affect magazines' market shares. Magazines that launched a website face a significantly lower price elasticity of demand than competitors that did not go online. Descriptive evidence on the magazines' website contents shows that websites are used to provide supplementary information and to advertise current print issues.
Keywords: differentiated product demand models, magazines, instrumental–variables estimation, panel data
JEL classification: C3, L1

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Non–technical summary

In recent years, an accelerating number of magazines launched an own website. Launching a website is, however, a costly venture. Even if a magazine is already online, it's website needs to be maintained and updated. Putting these 'direct' costs aside, and additional at least potential drawback might occur: consumers may visit the magazine's website instead of purchasing a print copy at the kiosk. This paper analyzes the effects of website provision on magazine demand. The focus is on German women's magazine, a particularly important and hardly fought segment of the German magazine market where ten out of 43 titles are online by 2000. A descriptive analysis of the website contents shows that magazine tend to put up information complementary to the printed issue online and that they use their websites to advertise the current print edition as well as other magazines published by their publishing houses. Moreover, online subscription information occupies a prominent place on the websites.

The descriptive analysis shows that there is no reason to believe that consumers may indeed substitute magazines' website for purchasing the print edition. By contrast, magazines that went online have a significantly younger, better educated and higher income readership than those magazine that are still offline — these characteristics also distinguish internet users from non–internet users. It hence appears as if the decision to launch a website is to a large extent driven by the magazine purchasing clientele.

In the econometric investigation, website provision is therefore considered as a magazine quality characteristic. It turns out that website provision does not have a significant effect on magazine demand but that magazine that went online are faced by a significantly lower price elasticity of demand. Interestingly, 'Brigitte' is the only magazine that went online where a sizeable negative effect of website provision on the demand for the printed issue is found. 'Brigitte' is well known for its dietary information in its spring edition. With regard to the fact that its website allows to call up dietary information for free, it seems as if at least some substitution effects between the online and the print media are at work here.

1 Introduction

Launching a website is a costly venture. Even if a website already is online, it has to be technically maintained, its content has to be updated and every now and then a relaunch is in order. At least potentially, additional indirect costs may arise if magazines go online since one might fear that consumers substitute away from the print media towards calling up information from the internet. Given these facts and fears, two questions arise. The first is "why do magazines go online?", followed by "what happens to demand if a magazine goes online?"

This paper aims at answering these questions by looking at the German women's magazine market between 1990 and 2000 using publicly available panel data. The first German women's magazine went online in spring 1996. Two competing magazines followed the same year. By 2000, ten women's magazines out of a total of 45 magazines active on the market provide their own website. This indicates that there are in fact incentives to invest in a website.

In this study, the German women's magazine market and women's magazine websites are descriptively analyzed. Demand effects of website launching are studied using econonometric panel data techniques within a differentiated product demand framework.

An analysis of the characteristics of purchasers of women's magazine shows that consumers purchasing a magazine that went online are on average younger, better educated and endowed with a higher household income than the consumers of non–online magazines. These demographic characteristics also distinguish internet users from non–internet users, suggesting that the decision to launch a website is likely to be to a large extent driven by the readership of the magazine.

An analysis of the ten existing women's magazine websites shows that the content of the websites is complementary to the information provided by the printed magazine. Article downloads are not provided by the magazine websites. Instead, visitors call up a variety of information coming under headings such as 'Beauty and fashion', 'Love and partnership' or 'Today's horoscope'. Important other ingredients of the websites are the table of contents of the most current printed magazine edition, a subscription possibility and links to products of the affiliated publishing group.

Due to the fact that the websites have quite different contents compared to the printed magazine and tend to be used to advertise the current print edition, the possibility to substitute away from the magazine is very limited. Instead, the

provision of an own website appears to serve as a quality characteristic of the magazine and as a quality signal to consumers and advertising clients. Therefore, the analysis of the effect of website provision on the demand for the print magazine uses a differentiated product demands framework, treating website provision as a magazine quality characteristic.
Main findings of this paper are that (i) website provision does not significantly affect market shares and (ii) magazines that provide a website are faced by a significantly lower price elasticity of demand than their offline competitors.

2 Descriptive analysis

2.1 Why study the women's magazine market?

There are at least two good arguments for analyzing the women's magazine market: first, this is a big market and second, this is a market in which the actors face fierce competition. These two facts are shown in Table 1. The table is based on a publication entitled 'Markt– und Medienentwicklung 1990–2001' (Gruner + Jahr 2001), edited by one of the large German publishing houses. This data source is described in greater detail in Section 3. Table 1 displays the number of titles, the market share — measured in terms of sold copies — and the Hirshman–Herfindahl index of market concentration for each segment of the German magazine market.[1] TV magazines and women's magazines own the largest shares of the German magazine market, followed by TV supplements[2] as well as car and motor cycle magazines. While TV and women's magazines are almost equal important in terms of market shares, they differ markedly with respect to market concentration and the number of titles published. Market concentration is by far the lowest and the number of published titles is by far the highest in the women's magazine market compared to any other segment in the industry, hence further motivating the analysis of this particular market segment.

Figure 1 displays changes in the total number of copies sold by German women's magazines and their development of relative market shares (relative to total cir-

[1]The definition of the segments follows the Gruner + Jahr (2001) publication mentioned above.

[2]These are weekly supplements to newspapers that cannot be purchased independently of a newspaper.

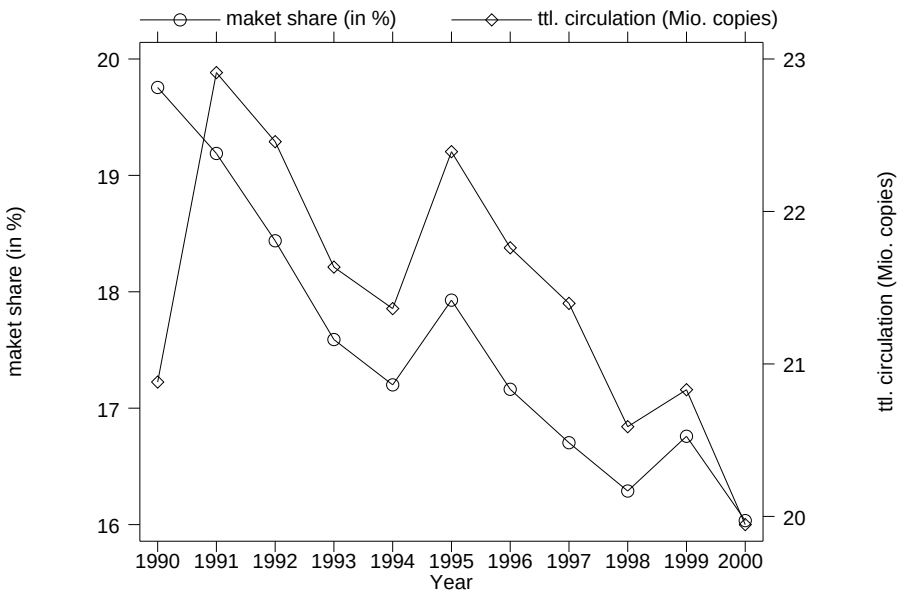

Figure 1: Changes in market shares and in total circulation in the German women's magazine market 1990–2000.

culation in the German magazine market). Both circulation, with exception of 1990 — the year after the German reunification —, and relative market shares declined within the ten years period. The development is, however, less dramatic than the figure suggests. Market shares declined by 3.7 per cent in the period 1990—2000 and total circulation decreased by 12.9 per cent. The years 1995 and 1999, where both total circulation and market shares went up, were characterized by entry; five magazines entered in 1995, three entered in 1999. The increase in both figures in 1995 and 1999 suggests that entry induced increased demand.

2.2 What types of magazines launch a website?

Two driving forces may basically be at work when a magazine decides upon launching a website. First, the publishing house might have an interest to signal to consumers and advertising clients that it is up–to–date and at the edge of technological development. It might also be interested in implementing a joint internet platform for all its magazines to realize returns to scale. Second, consumers might demand to have the opportunity to call up additional information on the internet.

Table 1: Number of titles, market shares and Hirshman–Herfindahl index for the segments of the German magazine market

	# of titles	Market share	Herfindahl index
TV magazines	16	19.4	0.0835
Women's magazines	43	19.3	0.0377
TV supplements	4	16.2	0.3368
Car and motor cycle magazines	11	16.1	0.6919
News magazines	13	9.1	0.1343
Living and gardening magazines	8	4.0	0.2934
Computer, photo and video magazines	7	3.0	0.1954
Teenager magazines	5	1.8	0.3
Science, nature and culture magazines	7	1.8	0.2023
Business and economics magazines	8	1.7	0.1315
Life-, City- and Men's magazines	6	1.6	0.1704
Fiction magazines	4	1.4	0.7652
Food magazines	5	1.1	0.2718
Sports magazines	7	1.1	0.3917
Erotic magazines	4	0.9	0.2923
Parenthood magazines	4	0.9	0.3254
Do-it-yourself magazines	2	0.2	0.5412
Health magazines	2	0.2	0.5954

Note: Market share is measured by the total number of copies sold in each segment over the total number of copies sold in the entire market. The Hirshman–Herfindahl index is calculated as the sum of the squared market shares of each title in each segment. *Source:* Gruner + Jahr (2001).

Table 2: Magazines that went online and their publishing houses

Magazine	Publisher	Publisher's total # of titles	# of publisher's women titles	First year online	Internet address
Allegra	Axel Springer	20	3	1996	www.allegra.de
Amica	Milchstrae	7	1	1997	www.amica.de
Brigitte	Gruner + Jahr	28	4	1997	www.brigitte.de
Brigitte YM	Gruner + Jahr	28	4	1999	www.youngmiss.de
Cosmopolitan	MVG	3	2	1998	www.cosmopolitan.de
Elle	Burda	20	9	1996	www.elle.de
Freundin	Burda	20	9	1996	www.freundin.de
Joy	MVG	3	2	2000	www.joy-mag.de
Petra	Jahreszeiten	15	3	2000	www.petra.de
Vogue	Condé Nast	3	1	1999	www.vogue.de

Note: 'Brigitte YM' is shorthand for 'Brigitte Young Miss'. The data refers to 2000. *Source:* Telephone and email inquiries; publishers' and magazines' website information.

Table 2 displays the names of the magazines that went online, their publishing houses, the total number of titles published by the publishing house, the number of women's magazines published by the publishing house and the magazines' internet addresses.[3] Magazines and publishers were matched on the basis on information called up on the internet at http://medialine.focus.de/ and http://www.media-daten.de/. Both sources provide a brief description of the magazines, including the publishers names. With the exception of the small publishing houses Milchstrasse and Condé Nast, all other publishers also edit women's magazines that have not yet gone online. Even if magazines have the same publisher, such as 'Elle' and 'Freundin' (Burda Media) as well as 'Brigitte' and 'Brigitte Young Miss' (Gruner + Jahr), their websites appear to be quite dissimilar with respect to website organization and design, suggesting that publishing houses do not aim at providing lookalike websites based on a joint platform for their magazines. The decision to launch a website hence appears not mainly be driven by the publishing house. Interestingly in this respect, the decision to relaunch a website also seems to be unrelated to publisher affiliation since the

[3]This data is gathered from personal inquiries by telephone or email as well as from information provided on the magazines' and publishers' websites.

three magazines that ever relaunched their website — Allegra, Brigitte and Cosmopolitan (all relaunched in 2000) — belong to different publishing houses.
Indeed, the magazines that went online are much more similar with regard to their readership than with respect to their publishers, as Table 3 suggests. Table 3 is based on data that was made available by *Burda Advertsing Center*[4] and essentially compares the distribution of consumer characteristics across magazines that went online and those that do not provide a website. *Burda Advertsing Center* kindly offered me to use aggregated data, in particular the share of consumers in certain age, income and education groups, differentiated by the magazine title they purchased. Table 3 shows, by displaying means and medians of the consumer characteristics as well as by testing for significant difference in means (t–test) and medians (ranksum test), that purchasers of women's magazines that went online are (i) younger, (ii) better educated and (iii) enjoy a higher household income. As it is well documented in many studies (e.g. Gruner + Jahr 2000), these characteristics match exactly with the demographics of the group of people that is most likely to use the internet.
Running a simple probit model for the probability to provide a website on the share of magazine purchasers (i) between 14 and 39 years of age and (ii) owning at least a university–qualifying high–school degree also supports the hypothesis that the decision to launch a website is demand–driven:[5] the simple probit model leads to significantly positive effects of both variables and a high pseudo R^2 of 0.7011. The marginal effect corresponding to the coefficient on age is .7994 and is 66 times larger than that of education, implying that the age structure of the consumers indeed plays an important role in launching a website.[6]
The evidence provided in this subsection hence suggests that a magazine's decision to launch a website is demand–driven rather than publisher–driven.

[4]This data is based on a consumer survey collected by the Institut für Demoskopie, Allensbach, Germany, in spring 2000. 20,606 realized interviews were conducted. For more information on this data, see http://www.awa-online.de/. The Burda Advertsing data is the only data set used in this paper that is not publicly available.

[5]Income group share as well as additional age and education variables are left out here to save degrees of freedom — 41 magazines are involved in the estimation only — and to avoid that the explanatory variables perfectly determine the outcome. Also note that the income, age and education are highly correlated with one another; the correlation coefficients are above 0.8.

[6]By contrast, magazines' market share is not significantly related to the decision to provide a website.

Table 3: Differences in consumer characteristics between magazines with and without website provision

	W/ website		W/o website		t–test	Ranksum test
	Mean	Median	Mean	Median	p–value	p–value
Age groups (in years)						
14–19	15.5	9.5	3.6	3.3	0.0299	0.0001
20–29	22.2	19.8	9.2	8.0	0.0016	0.0002
30–39	22.3	22.9	15.8	15.6	0.0035	0.0025
40–49	16.8	18.2	15.6	16.0	0.4625	0.2408
50–59	11.0	12.7	16.4	16.3	0.0171	0.0109
60–69	7.1	8.5	19.1	19.5	0.0000	0.0000
> 70	5.1	4.2	20.5	17.0	0.0000	0.0000
Education groups						
High school student	11.6	6.9	2.4	2.0	0.0351	0.0001
High school degree w/o voc. training	8.2	8.7	17.4	16.7	0.0000	0.0000
High school degree w/ voc. training	23.2	20.6	41.5	43.1	0.0002	0.0001
Sec. school w/o degree	35.9	37.9	30.2	28.5	0.0165	0.0213
Sec. school degree w/o univ.	13.8	15.1	4.4	3.6	0.0002	0.0001
Sec. school degree w/ univ.	7.3	6.0	4.0	3.2	0.0113	0.0016
Household income groups (in DM)						
$< 2{,}000$	8.5	8.2	13.3	12.5	0.0000	0.0004
2,000 — 2,500	6.9	7.3	10.7	11.2	0.0000	0.0004
2,500 — 3,000	8.4	8.4	12.7	12.3	0.0000	0.0001
3,000 — 4,000	17.8	18.2	23.7	23.8	0.0000	0.0000
4,000 — 5,000	21.9	21.7	18.4	18.0	0.0015	0.0009
$> 5{,}000$	36.5	36.3	21.7	18.8	0.0000	0.0001

Note: 'voc. training' is shorthand for 'vocational training', 'sec. school' is shorthand for secondary school education. *Source:* Data provided by Burda Advertising Center.

2.3 Key contents of the magazine's websites

In contrast to many newspapers that basically put up the entire set of articles contained in the current printed issue on the internet, the websites of the women's magazines do not provide information identical to those offered by the print media. They merely provide an additional and complementary resource of news and recommendations.

A visit of the ten websites in early October 2001 indeed suggests that there is very little overlap between the printed magazine and the website information. Neither are full text downloads of articles available nor do the topics covered by the website coincide with the contents of the current magazine edition. All of

the websites offer, however, online subscription possibilities, links to other magazine marketed by the own publishing group and a table of contents of the most current magazine issue. Self–advertisement hence appears to play an important role in the decision to launch a website. Instead of placing full text articles online, the magazine websites contain information that might be termed 'timeless', meaning that they allow to gather information that is not subject to very recent developments. Topics include recommendations concerning furnishing, cooking, nutrition, travelling etc. Two separate website headings also fitting in the 'timeless' category are 'Beauty and fashion', a title that is self–explanatory, as well as 'Love and partnership', which usually contains flirting and sex recommendations as well as recommendations for a durable partnership. Another feature that is common to all of the ten websites is the provision of an up–to–date horoscope. Other popular website headings include:

Games of chances: website visitors are invited to take part in an online gamble.

Job & career: provides job hunting recommendations, general career perspectives discussions and in some cases even an online job market.

Chat: a possibility to chat, send e–postcards, subscribe to newsletter etc. is offered here.

Shopping: shopping recommendations are provided here; in one case — www.brigitte.de — products can be ordered online.

Table 4 displays the URLs of the ten websites under consideration and shows which magazines provide the respective information.
Another potential reason to launch website is to raise additional money from banner and pop–up advertising. Although eight websites in fact contain banner ads, only one ('Joy') places them somewhat excessively. The other magazines very sparingly use banner–ads, not exceeding more than two banner ads per page and of sizes below 2×2 inches. They also do not place pop–up ads.
To summarize, the ten women's magazines that have launched a website are apparently aiming at the following (i) advertise the own print edition as well as other products offered by the publishing house and (ii) provide information complementary to the print magazine. It is also probably fair to say that another, somewhat hidden, reason to launch a website is to signal the current and potential readership that the magazine is 'modern'. This argument is supported by the fact

Table 4: Key information pieces contained in magazine websites

	Games of chances	Job and career	Chat etc.	banner ads	Shopping recommen-dations
Allegra	x	x	x	x	x
Amica	x	x	x	x	x
Brigitte		x	x		x
Brigitte Young Miss			x	x	
Cosmopolitan		x			
Elle		x	x	x	x
Freundin	x	x		x	
Joy	x			x	
Petra		x		x	
Vogue	x			x	

Note: Information obtained from website visits in early October 2001. An 'x' indicates that the website comes with respective feature.

that the magazines that went online advertise their websites on prominent places such as the title page or the table of contents. With regard to the complementary information provision argument and the signalling effect, it hence appears to be reasonable to treat the existence of a website as a quality component in the empirical analysis hereafter.

2.4 Prices and market shares

Table 5 casts a first spotlight on the women's magazine market by displaying its most current price, its least current price its most current market share (in 2000 or in exit year), its least current market share (in 1990 or in entry year), its subscription share (the number of subscribers over the total number of copies sold; in 2000 or in exit year), the year of the magazine's first edition and its most important age group. It also contains information on the grouping of the respective magazine, a point to that I shall return to below.

Cover prices vary considerably across magazines, ranging from a minimum of one DM to a maximum of 11 DM with a mean of 3.8 DM and a median of 2.4 DM. The modulus in 2000, which includes 18 per cent of all titles, is 2.5 DM and has

Table 5: Key characteristics of the magazines under consideration

	Most current price	Least current price	Most current market share (in %)	Least current market share (in %)	Sub–scrition share in 2000$^+$ (in %)	First issue in	Magazine group
7 Tage	2.5	2	0.6	0.9	16.5	1843	> 70
Allegra	5	5	1.0	0.9	6.4	1995	20–29
Amica	6	5	1.6	1.1	5.0	1996	20–29
Anna	5.5	5.5	0.6	0.7	46.6	1974	50–59
Bella	2.4	2	2.0	2.5	14.3	1978	60–69
Bild der Frau	1.4	0.9	8.6	9.3	2.9	1983	40–49
Brigitte	4	3.3	4.8	5.0	27.2	1957	30–39
Brigitte YM	4.3	4	1.1	0.8	20.4	1995	14–19
Burda M+M	6.8	4.8	1.4	3.0	30.3	1950	30–39
Cosmopolitan	5	5.5	1.7	1.8	11.6	1980	20–29
Das Goldene Blatt	2.5	2	1.3	2.2	20.1	1971	> 70
Das Neue	2.6	1.8	2.1	2.7	7.4	1983	> 70
Das Neue Blatt	2.5	2	5.2	5.7	7.2	1968	> 70
Die Aktuelle	2.6	2	2.7	3.2	4.9	1979	> 70
Die Neue Frau	1.6	1.5	1.1	1.2	0.2	1999	30–39
Echo der Frau	2.5	2	2.0	1.5	29.7	1973	> 70
Elle	7.5	7	1.0	0.8	11.0	1988	30–39
Frau aktuell	2.5	2.2	1.7	1.5	19.6	1965	> 70
Frau im Leben	3.5	2.5	0.7	1.4	59.8	1948	60–69
Frau im Spiegel	2.7	2	3.3	3.5	6.7	1945	> 70
Frau mit Herz	2.5	2.1	0.8	0.9	17.3	1949	> 70
Freizeit Revue	2.6	2.2	5.4	6.4	19.0	1970	> 70
Freundin	4	3.3	3.1	3.6	12.4	1948	30–39
Für Sie	4	3.3	3.1	3.7	21.2	1948	40–49
Glücks Revue	2	1.2	1.6	1.8	13.3	1986	> 70
Heim und Welt	2.3	1.6	0.5	0.6	3.9	1948	> 70
Journal f. d. Frau	4	3	2.0	2.1	15.5	1978	40–49
Joy	4.5	4	0.8	0.7	3.4	1995	20–29
Laura	1.5	1	2.5	3.1	1.2	1995	30–39
Lea	1.5	1.5	1.4	1.7	0.0	1999	30–39
Lisa	1.5	1.2	3.1	2.7	1.5	1995	30–39
Mach mal Pause	2.1	1.9	1.6	2.1	19.4	1994	40–49
Madame	11	11	0.5	0.5	27.5	1950	50–59
Marie Claire	7	6	0.8	0.6	11.9	1990	30–39
Maxi	7	3	1.4	2.1	6.0	1986	20–29
Mini	1.4	0.6	1.5	2.3	4.0	1986	60–69
Neue Mode[a]	5.8	5	1.1	2.0	35.1	1966	30–39
Neue Post	2.5	2	6.5	8.0	9.8	1948	> 70
Neue Welt	2.5	2	2.0	2.2	12.0	1932	> 70
Neue Woche	1.5	1.4	2.5	2.1	0.3	1998	60–69
Petra	5	4	1.8	1.9	7.2	1969	40–49
Prima Carina[b]	4.5	3.3	1.3	2.6	15.6	1977	30–39
Ratg. Frau u. Fam.	3.8	3	1.7	1.6	75.5	1901	30–39
Strick & Schick[c]	3.2	2.5	0.2	0.5	20.1	1984	30–39
Tina	2.4	2	5.1	7.6	19.7	1975	60–69
Verena[d]	4.5	3.3	1.0	1.8	13.7	1986	30–39
Viel Spass	1	1	3.6	3.7	0.0	1999	> 70
Vital	4	3.5	1.6	1.7	16.7	1966	> 70
Vogue	11	11	0.6	0.5	19.0	1979	20–29
YoYo[e]	4	3.16	0.8	0.7	2.1	1995	14–19
Mean	3.8	3.1	2.1	2.4	15.4	1971.2	
Median	3.0	2.4	1.6	2.0	12.9	1978.0	

Note: [a] exit in 1993; [b] exit in 1998; [c] exit in 1995; [d] exit in 1997; [e] exit in 1998. The market shares do not necessarily add to 100 since they do not refer to the same date due to market entries and market exits. 'Least current market share' and 'Least current price' either refer to 1990 or to the year of the first edition. The grouping variable is explained Subsection 2.6. 'Brigitte YM' is shorthand for 'Brigitte Young Miss', 'Burda M+M' is shorthand for 'Burda Mode + Magazin', 'Journal f.d. Frau is shorthand for 'Journal f"ur die Frau' and 'Ratg. Frau u. Fam. is shorthand for 'Ratgeber Frau und Familie'.

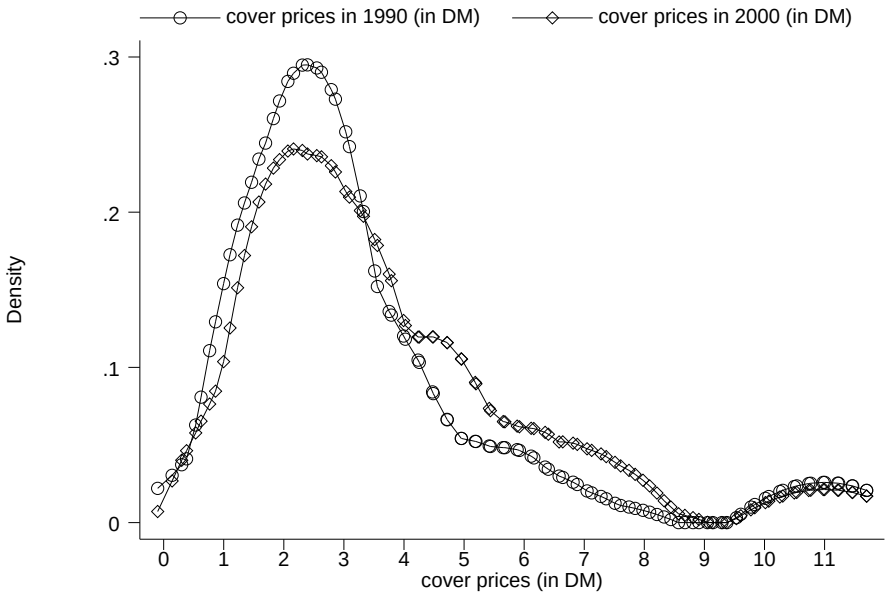

Figure 2: Changes in the cover price distribution 1990–2000: Kernel density estimates. *Source:* Gruner + Jahr (2000).

moved up by 0.5 DM since 1990. Mean and median prices have also increased. These aggregate price increases are mostly due to price changes in the low price segments while, by contrast, prices of the magazines above or equal to 4 DM have remained remarkably stable in the ten years period. Figure 2 displays Kernel density estimates of the price distributions in 1990 and 2000. The right tail of the distribution, in particular the price range 3 DM to 8 DM, has increased. This is to a large extent due to market entries in this price range.

While at least some changes occurred in the distribution of cover prices between 1990 and 2000, the distribution of market shares has remained fairly stable, as Figure 3 indicates. Mean and median market shares slightly increased, causing a drop in the Hirshman–Herfindahl index of market concentration by -0.0087.

The years of the first appearances of the individual titles displayed in Table 5 describe to some extent the history of the German women's magazine market. The years 1948 to 1950 were characterized by a total of eight entries to the market. Entry was comparatively modest in the following years until the early/mid 1980s, when another eight new magazines were published. A third wave of market entry occurred in the late 1990s, when eleven new women's magazines entered the market between 1994 and 1999. Six of them were low–price magazine costing

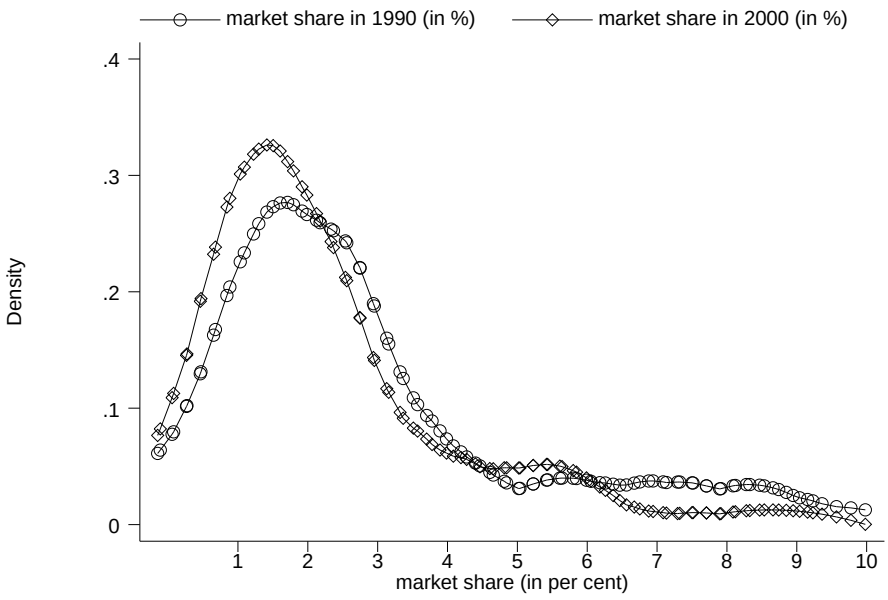

Figure 3: Changes in the market share distribution 1990–2000: Kernel density estimates. *Source:* Gruner + Jahr (2000).

below 1.5 DM, the other five belong to the high/medium price segment with cover prices between 3.6 and 5 DM.

Six exits occurred between 1990 and 2000, all of which belonged to the high/medium price segment with prices at the year of exit ranging between 3.2 DM and 8.5 DM. Among these exits is one magazine that entered in 1995, YoYo. It was pulled out of the market in 1998. Three of the exiting magazines are magazines that quite narrowly focus on handicraft issues.[7] The most prominent market withdrawal probably is the German edition of the well–known U.S. fashion magazine 'Harper's Bazaar'. It entered the market in 1987 and exited in 1992, priced 8.5 DM and with a market share of 0.05 per cent, after experiencing a total decrease in sales by 27 per cent.[8]

[7]The Gruner + Jahr (2001) data do not contain information on magazines that exited the market, not even if the exit occurred between 1990 and 2000. Information on exits was therefore retrieved from a complementary internet data source: http://medialine.focus.de/.

[8]It was impossible for me to obtain information other than price and market share for 'Harper's Bazaar' so that it is left out in the further analysis.

2.5 Cover prices and subscription prices

While consumers can save up to 80 per cent of a magazine's cover price in the U.S. in case of subscription,[9] more or less the reverse is true for the German magazine market. A comparison of cover and subscription prices in early October 2001, which included 43 magazines, shows that for 26 magazines subscription and cover prices are exactly the same. For 13 magazines the subscription price is *higher* than the cover price (this is the case for the low–price magazines, the mean price difference is 17.9 per cent) and for four magazines, consumers save when they subscribe (the mean difference is -10.5 per cent). It is important to stress at this point that those magazines whose subscription price is higher than the cover price do not offer subscriptions on their own. Instead, commercial magazine distributors offer to deliver these magazines to the consumers, charging the difference between the 'subscription' and cover price as the compensation for the delivery. With regard to this fact and to the in general small differences between subscription and cover prices, the cover prices are considered as the one and only prices valid.

The subscription share, calculated as the ratio of the number of copies sold to subscribers and the total number of copies sold, varies considerably across the magazines. The minimum is 0.03 per cent ('Lea'), the maximum is 75.5 per cent ('Ratgeber Frau und Familie') in 2000. Unsurprisingly, older magazines tend to have a larger subscription share than younger magazines — an observation that is rather surprising given that consumers might want to get to know the magazine well before they decide to subscribe to it.

2.6 Magazine contents

There is a great variety of topics covered in the women's magazine market. A market fact–book by one of the leading German publishers (Jahreszeitenverlag 2001) distinguishes between the following 15 topics covered by women's magazines: (i) 'beauty' (fashion, cosmetics, hairdressing), (ii) 'cooking, eating and drinking', (iii) 'furnishing, living and gardening', (iv) 'health and fitness', (v) 'marriage, partnership and sexual education', (vi) 'vacation and travelling', (vii) 'advice and law,

[9] This at least was the case for a subscription to 'U.S. news & world report', a weekly U.S. news magazine, in early October 2001.

career and money', (viii) 'computer, internet, telecommunication', (xi) 'politics and economics', (xii) 'science, sociology, nature and technology', (xiii) 'art and cultural events', (xiv) 'VIPs' and (xv) 'fiction, riddles, humor'. Jahreszeitenverlag (2001) also subdivides the German women's magazine market into subgroups. This grouping is, however, essentially based on price and periodicity, a point to that I shall return to in Footnote 22. Given the fact that such a grouping is not informative in terms of actual magazine contents and hence in terms of sensitive magazine grouping, the Jahreszeitenverlag (2001) grouping does not appear to be very useful. The grouping of magazines is important for the Nested Logit analysis conducted in Section 4.3.

Instead of following the Jahreszeitenverlag (2001) classification, I group the magazines according to their main customer age groups.[10] Since magazines targeting the same main age groups provide similar magazine contents, this seems to be a straightforward approach. For example, if a magazine's most important consumer age group are purchasers aged between 20 and 29 years, this magazine is associated with age group 20–29 as displayed in Table 5. In Table 7, some descriptive statistics on the seven magazine age groups are provided. Magazines that target at consumers aged over 70 years play the most important role in the women's magazine market. They posses the largest market share in terms of the number of titles, circulation share, advertising share (group advertising sales over total advertising sales) and sales share. In general, the 'importance' of each of the seven age groups increases with age groups — thereby reflecting the relative weight of each age group in the German population.

Website provision is particularly widespread among the young age group magazine. By contrast, none of the magazines targeting at ages above 50 years runs a website.

[10]Information on the consumer age distribution is unavailable for those magazines that left the market before 2000 — 'Neue Mode', 'Prima Carina', 'Strick & Schick', 'Verena' and 'YoYo'. They are classified by myself based on content comparisons to the still existing magazines. 'Neue Mode' for example is most closely to 'Burda Mode+Magazin' so that I assume that 'Neue Mode' focuses on the same age group as 'Burda Mode+Magazin'. The content information on the exited magazines was called up at the following URLs: http://medialine.focus.de/, http://www.media-daten.de/ and http://www.netzmarkt.de/.

Table 7: Magazine group characteristics

Magazine group	# of titles	Circulation share	sales share	Advertising sales share	# of Website provisions
14–19	1	1.1	1.6	0.9	1
20–29	6	1.1	2.9	2.5	5
30–39	10	7.1	8.4	7.6	3
40–49	5	11.8	14.4	10.7	0
50–59	2	17.2	15.0	16.2	0
60–69	5	20.9	24.3	23.2	0
> 70	16	40.9	33.4	39.1	0

Source: Burda Advertising Center.

3 Data

The main data set used in this paper is based on a publication by Gruner + Jahr (2001).[11] It provides annual averages on (i) circulation, (ii) cover prices, (iii) advertising prices and (iv) advertising volume for the German magazine market. The data traces the time period 1990–2000.

Gruner + Jahr in turn takes the information concerning circulation from the 'Information Association for the Determination of the Spread of Advertising Media' ('Informationsgemeinschaft zur Feststellung der Verbreitung von Werbeträgern e.V', IVW). IVW ascertains, monitors and publishes circulation and magazine dissemination information.

The other information used in the Gruner + Jahr publication is taken from the 'Association Media Analysis' ('Arbeitsgemeinschaft Media–Analyse', AG.MA), an association of the German advertising industry for the research of mass communication. The purpose of the AG.MA is to gather and supply data for media audience measurement. AG.MA closely cooperates with IVW.

Additional information on the (i) number of subscribers, (ii) publication year date of first magazine issue, (iii) the total number of pages and (iv) the total number of advertising pages was downloaded from http://medialine.focus.de.[12] This information is based on AG.MA publications as well.

Information on the total number of titles published by the women's magazines' publishing houses was gathered from the publishing houses' websites, by tele-

[11] This publication is publicly available at a nominal fee of DM 100.–.

[12] MediaLine is a costless service of the German news magazine 'Focus'.

phone interviews and e–mail inquiries to the publishing houses.
Data on the date of the first website launch was gathered by phone calls and by sending emails to the editorial staff of the magazines.
Appendix A provides an overview of the data resources used in this paper.

4 Empirical analysis

4.1 Empirical framework

Discrete–choice models of product differentiation (Anderson et al. 1990; Berry 1994) provide a somewhat natural framework for studying the determinants of demand for women's magazines. Internet provision is considered as a quality characteristic, and its effect on magazine demand is analyzed using Logit and Nested Logit models of product differentiation. In contrast to existing studies based on these frameworks (e.g. Trajtenberg 1989), I explicitly use the panel dimension of the data to control for unobserved product characteristics.
Clearly, the computational simplicity of Logit and Nested Logit models comes at a cost: both models place somewhat restrictive assumptions on own and cross–price elasticities (Berry 1994; Berry et al. 1995)[13], so that recent research uses the more flexible random coefficient model to estimate models for differentiated product demands (Berry et al. 1995, 1997; Berry and Pakes 1999; Davis 1998, 2000; Nevo 2000a, 2001; Petrin, 1998). Given that (i) own and cross–price elasticities (or the effects of other continuous variables in general) are of secondary interest only, (ii) estimating these models implies not to explicitly use the panel character of the data[14] and (iii) estimating a random coefficient model is computationally more burdensome,[15] Logit and Nested Logit models appear to actually serve very well for the current purpose.

[13]This is due to the well–known 'Independecne of Irrelevant Alternatives' assumption underlying multinomial logit models.

[14]For computational reasons, it is recommended to consider different submarkets in random coefficient models instead of considering one single market (Nevo 2000b). If panel data is available, each year is treated as a different market (e.g. Berry et al. 1995; Nevo 2000a, 2001) so that unobserved product heterogeneity cannot be modelled using standard panel data technique.

[15]Introducing random effects causes the market share equations to be no longer analytically solveable, calling for simulation techniques to estimate the model.

The general assumption underlying all models of product differentiation choice are based on the following functional form of consumer utility,

$$u_{ijt} \;=\; \boldsymbol{x_{ijt}\beta} \;+\; \alpha\, p_{jt} \;+\; \xi_{jt} \;+\; \tau_t \;+\; \epsilon_{ijt}, \tag{1}$$

where u_{ijt} denotes the utility of consumer i at time t from purchasing good, or magazine in the present context, j. The vector $\boldsymbol{x_{ijt}}$ defines the characteristics of good j other than price, p, at time t. The term ξ_{jt} denote a product quality characteristic that is known to consumers and producers but that is unknown to the econometrician and ϵ_{ijt} denotes an i.i.d. (across consumers and products) extreme value distributed unobserved quality component (to the econometrician).[16] In the present case, a potentially important quality characteristic for example is magazine design and layout. The parameter τ represents a time–dependent utility component that is identical across consumers and magazines, for example general shifts in consumer taste.
Consumer i's mean utility, δ_{jt}, from consumption of good j at time t is hence given by

$$\delta_{jt} \;=\; \boldsymbol{x_{ijt}\beta} \;+\; \alpha\, p_{jt} \;+\; \tau_t \;+\; \xi_{jt}. \tag{2}$$

In the present panel data setting, the error term ξ_{jt} can be decomposed in an individual–specific component, γ_i, and an i.i.d. error mean zero, variance σ_ε distributed component that varies across consumers and time, ε_{it}, leading to the following error decomposition:

$$\xi_{jt} = \gamma_j + \varepsilon_{jt}. \tag{3}$$

The way error component γ_j is treated constitutes either the 'fixed effects' or the 'random effects' model. If γ_j is considered as an unknown parameter specific to each product j, this leads to the fixed effects model. If γ_j is assumed to be a random variable with mean μ and variance σ_γ, this leads to the random effects model. The fixed effects model does not place a priori restrictions on the relationship between the explanatory variables and the idiosyncratic error component, while the random effects model assumes that there is no correlation

[16]Note that the vector of taste parameters $\boldsymbol{\beta}$ and the price coefficient α are assumed to be constant across consumers. This is the main difference to random coefficient models where the taste parameters are treated as consumer–specific, usually made dependent on consumer characteristics such as age, gender, income etc.

between them.[17]

The i.i.d. extreme value distributed error term ϵ_{ijt} generates the following well–known Logit form of market shares:

$$s_{jt}(\delta_{jt}) = \frac{exp(\delta_{jt})}{\sum_{k=1}^{N} exp(\delta_{kt})}, \tag{4}$$

where N denotes the total number of products and market share s_{jt} is defined as the share of magazine j in the total German magazine market at time t. That is, the share of the 'outside good' required to identify models of differentiated product demands is defined as the sum of the shares of all magazines other than women's magazines at time t. Equivalently, $s_{0t} = 1 - \sum_{k=1}^{N} s_{kt}$, where the subscript 0 denotes the outside good. The utility obtained from the consumption of the outside good is normalized to be equal to zero so that

$$s_{jt}(\delta_{jt}) = \frac{exp(\delta_{jt})}{1 + \sum_{k \neq 0} exp(\delta_{kt})} \quad \text{and} \quad s_{0t}(\delta_{jt}) = \frac{1}{1 + \sum_{k \neq 0} exp(\delta_{kt})}. \tag{5}$$

Rearranging terms and taking natural logarithms leads to Logit–type market share estimation equations:

$$ln(s_{jt}) - ln(s_{0t}) \equiv \delta_{jt} = x_{jt}\beta + \alpha\, p_{jt} + \tau_t + \xi_{jt} \tag{6}$$

A general drawback of the Logit model is that it does not allow for correlation of consumer taste across products j, a property that implies that own and cross–price elasticities as well as the effects of other product characteristics depend upon product j's market shares only, independent of the product group product j belongs to. The nested logit model allows for considering differences across product groups while retaining the i.i.d. extreme value assumption of the unobserved consumer utility component ϵ_{ijt}, thereby generating a closed–form solution for market shares as in the Logit case.

In the Nested Logit model, consumer utility is given by

$$u_{ijt} = \delta_j + (1 - \sigma)\epsilon_{ijt}, \tag{7}$$

[17] If the explanatory variables and the idiosyncratic error component are correlated with one another, the fixed effects model is consistent and efficient, while the random effects model is inconsistent. If there is no correlation between the explanatory variables and the idiosyncratic error component, the fixed effects model is consistent but inefficient while the random effects model is consistent and efficient.

where σ is a parameter of product substitution within product groups. If $\sigma = 1$, products are perfect substitutes and if $\sigma = 0$, products are symmetric. Denoting g the magazine group to which magazine j belongs to leads to the following definition of market share:

$$s_{jt}(\boldsymbol{\delta_{jt}}, \sigma) = \frac{exp(\frac{\delta_j}{1-\sigma})}{D_g^{\sigma} \sum_g D_g^{1-\sigma}}, \tag{8}$$

with $D_g = \sum_{j \in \ product\ group\ g} exp(\delta_j/(1-\sigma))$.
The market share estimation equation is

$$ln(s_{jt}) \ - \ ln(s_{0t}) = \boldsymbol{\delta_{jt}} + \sigma ln(\bar{s}_{j|g}) + \xi_{jt}, \tag{9}$$

where $\bar{s}_{j|g}$ denotes the share of product j in product group g.
Even though panel data estimation technique allows to take into the time–invariant component of the unobserved product characteristic, ξ_{jt}, estimation of the market share equations — Equation (6) and Equation (9) — requires instrumental–variables technique since the non time–invariant error component ε_{jt} is likely to be positively correlated with product price p. This leads to a downward bias in the parameter estimate for the price coefficients, α, calling for instruments on price. By the same token, within group market shares need to be instrumented as well in the Nested logit model.[18]
Descriptive statistics of the variables involved in the estimations are presented in Appendix B.

4.2 Empirical specification

The specification of the vector of product characteristics, $\boldsymbol{x_{ijt}}$, contains the following variables: (i) the natural logarithm of the magazines' ages and its square, $ln(age)$ and $ln(age)^2$; (ii) the natural logarithm of the number of magazine pages per issue and its square, $ln(\#\text{ of pages})$ and $ln(\#\text{ of pages})^2$, (iii) year dummy variable — representing the time–variant/magazine-invariant quality component τ — and (iv) a dummy variable for website provision, $WEBSITE$.[19]

[18]The need for instrumentation is even more urgent in a fixed effects model setting since it requires the explanatory variables to be strictly exogenous.

[19]Random effect models which additionally include dummy variables for weekly and biweekly magazine (with monthly being the comparison group) in the market share equation and a set of publishing house dummy variables in the pricing equation. Note that these time–invariant variables wipe out in the fixed–effects model.

Magazine age measures how long the magazine has been on the market. On the one hand, it takes time until consumers get to know the magazine and until the editorial staff is able to precisely identify its target group needs, implying that age has a positive effect on market shares. One the other hand, 'organizational geriatics' (Agarwal and Gort 1996), caused e.g. by an aging editorial staff that is faced by an on the average constantly aged readership, may lead to a decrease in market shares. The inclusion of a linear and a squared age term allows to calculate women's magazines 'senility points'.

The inclusion of the number of magazine pages in the specification is motivated by the fact that readers may appreciate many pages, but obtain disutility if the number of pages exceeds a certain limit which for example makes it inconvenient to carry the magazine around due to increased weight for example.

The inclusion of the website dummy variable is straightforward given the finding of Section 2 that website provision serves as a quality signal. In addition to the inclusion of the website dummy variable, an interaction term of a dummy variable for ever having launched a website (this is a time–invariant variable that is coded one if a magazine has ever launched a website) and price is included in one of the specifications. The intuition behind the inclusion of the interaction term is that magazines which launched a website might be faced by less price elastic demand.

The data fortunately provide a rich set of instruments for price and within group market share. Potential instruments for price are cost variables that are not already contained in the vector of product characteristics. The following cost side variables are used as instrument for price: (i) the natural logarithm of the number of titles issued by the own publishing house and its square since — publishers may be able to gain from article and information spillovers generated by other magazine titles edited by the publishing house. This positive effect might be counteracted, however, if the organization grows 'too big' in the sense that interaction between staff members of the different magazines decreases as the size of the publishing house increases. (ii) The natural logarithm of the average advertising price per page and (iii) the natural logarithm of the number of advertising pages and the natural logarithm of the number of advertising interacted with dummy variables for the seven magazine groups that are considered (with the magazine age group over 70 years serving as the base group). Variable sets (ii) and (iii) are included since higher advertising page prices as well as a larger number of advertising pages allow magazines to sell at lower cover prices.

Within group share $\bar{s}_{j|g}$ is instrumented by the following set of variables: (i)

'potential within group market reach', (ii) the natural logarithm of number of titles in the own magazine group published by the own editor as well as (iii) the natural logarithm of the respective magazine's share in the total number of advertising pages within the own group. 'Potential market reach' is a variable which is measured as the ratio of the number of potential magazine readers to the total German population. It is based on a large survey conducted by AG.MA. The argument behind the inclusion of this variable is that the larger potential within group market share is, the larger should actual market share be. The number of within group titles is included here since the larger the number of within group publications by the own publisher are, the smaller the within group market share of the individual magazine is likely to be. Within group advertising pages should have a positive effect on within group market share since magazines owning a large fraction of within group advertising pages should also own a large fraction of within group market shares.

4.3 Estimation results

The estimation results for four empirical models are presented in Table 8 : (i) a Logit model without price instrumentation, (ii) a Logit model with price instrumentation, (iii) a Nested Logit model without the interaction of price and a dummy variable for ever having launched a website and (iv) a Nested Logit model with the interaction term.[20] Price and within group share are instrumented in both Nested Logit models.

The instrumental–variables models are estimated using two and three stage technique as described in Baltagi (1995, Ch. 7.1 and Ch. 7.2).

A result which is common to all the estimations displayed in Table 8 is that the random effects and the fixed effects estimation results significantly differ from one another, as indicated by Hausman (1978) specification tests. An important reason why the two estimators would be different is the existence of correlation between the individual–specific error component and the explanatory variables.

[20]Estimation results for a Logit model with interaction are not displayed here for brevity. The Logit model with interaction leads to estimation results very similar to that of the Nested Logit model with interaction. The point estimate for α is -.5390 (0.0629) (standard errors in parenthesis). It is 0.3358 (0.0674) for the interaction term and -0.0020 (0.0338) for the website dummy variable.

Hence, significant differences indicate that the fixed effects specification is to be preferred over the random effects specification since the fixed effects approach is consistent even if the individual–specific error components and the explanatory variables are correlated, while the random effects model is inconsistent in this case.

Significant fixed effects are also found in all specifications. This indicates that there are important quality components influencing consumer utility which are not captured by the explanatory variables chosen here.

The within R^2 is well above 0.6, indicating a very reasonable goodness of fit for those types of models.

Other results common to all estimations are that: (i) magazine age has a concave

Table 8: Estimation results for Equation (6) and Equation (9)

	Equation (6)				**Equation (9)**			
	(i) FE Logit		**(ii) FE IV**		**(iii) FE IV NLogit w/o interaction**		**(iv) FE IV NLogit w/ interaction**	
	Coeff.	Std. err.	Coeff.	Std. err.	Coeff.	Std. err.	Coeff.	Std. err.
α	-0.2154***	0.0295	-0.4219***	0.0594	-0.3774***	0.0519	-0.4661***	0.0579
$\alpha_{ever\ website}$							0.2278***	0.0695
$Website$	0.0836***	0.0315	0.0353	0.0338	0.0201	0.0329	-0.0043	0.0333
σ					0.3556***	0.0660	0.2848***	0.0686
$ln(age)$	0.3081***	0.0522	0.3833***	0.0557	0.2707***	0.0556	0.2632***	0.0548
$ln(age)^2$	-0.0868***	0.0246	-0.1103***	0.0254	-0.0756***	0.0250	-0.0725***	0.0246
ln(# of pages)	-3.4154***	0.9373	-3.4864***	0.9410	-1.6674*	0.9741	-2.1189**	0.9703
ln(# of pages)^2	0.3331***	0.0948	0.3401***	0.0952	0.1445	0.0993	0.1964**	0.0992
1990	0.1983***	0.0582	0.0336	0.0714	0.0346	0.0672	0.0050	0.0669
1991	0.1862***	0.0527	0.0409	0.0641	0.0293	0.0609	0.0028	0.0606
1992	0.1915***	0.0475	0.0768	0.0556	0.0533	0.0536	0.0344	0.0532
1993	0.1827***	0.0423	0.1041***	0.0467	0.0717	0.0458	0.0606	0.0453
1994	0.1734***	0.0383	0.1108***	0.0415	0.0684*	0.0414	0.0601	0.0409
1995	0.1548***	0.0342	0.1136***	0.0358	0.0944***	0.0351	0.0868***	0.0346
1996	0.1255***	0.0305	0.0962***	0.0314	0.0638**	0.0314	0.0644**	0.0310
1997	0.0781***	0.0284	0.0461	0.0296	0.0224	0.0293	0.0238	0.0289
1998	0.0420	0.0268	0.0192	0.0275	0.0051	0.0269	0.0059	0.0265
1999	0.0350	0.0247	0.0224	0.0250	0.0192	0.0243	0.0167	0.0240
Constant	3.5542***	2.3186	4.5673***	2.3409	1.0737	2.3463	1.9768	2.3298
Tests for joint significance								
Age	21.14***		27.93***		14.27***		14.05***	
# of pages	7.19***		7.43***		4.46**		4.18**	
Year dummies	3.5***		3.73***		2.06***		2.29**	
Entire speci–fication	36.4***		35.97***		36.94***		36.48***	
Maximum (*)/minimum ($^\diamond$)								
Age	5.90*		5.69*		5.99*		6.15*	
# of pages	168.44$^\diamond$		168.37$^\diamond$		320.26$^\diamond$		220.23$^\diamond$	
R^2, # of groups and # of observations								
Within R^2	0.6307		0.6279		0.6487		0.6595	
# of groups	48		48		48		48	
# of observations	405		405		405		405	
Test random vs. fixed effects and test for fixed effects								
Random vs. fixed	27.25		175.06		37.38		36.75	
Fixed effects	181.83		281.14		215.47		176.30	

Note: The instrumental–variables (IV) estimation results are based on two and three stages procedures. 'FE" is shorthand for fixed effects, 'IV' is shorthand for instrumental–variables, 'NLogit' is shorthand for Nested Logit.

effect on relative market shares with a maximum (the 'senility point') reached at an age of six years. (ii) The number of pages per issue has a convex effect

on relative market share with a minimum reached at magazine sizes between 170 and 320 pages. This result is surprising at first sight. The explanation for a convex effect of magazine size on relative demand is that the low–priced magazines which come with a comparatively low page size per issue possess a relatively high market share. (iii) The year dummy variables are jointly significantly different from zero, suggesting that there are significant changes in market structure over time. The signs and magnitude of the year–dummy coefficients basically replicate the shape of the women's magazine market development between 1990 and 2000 as displayed in Figure 1.

(i) and (ii): Fixed effects Logit estimation results

The fixed effects Logit model without price instrumentation, specification (i), is the only model in which the dummy variable for website provision turns out to be significant. The point estimate of 0.0863 implies that relative market shares, i.e. the magazines' market shares relative to the market share of the outside good, increases by 8.6 per cent if a magazine launches a website.

Once it is controlled for the potential endogeneity of prices, the significance of the website coefficient disappears, however. Indeed, the comparison of the estimated price coefficient $\hat{\alpha}$ between the Logit model with and without instrumentation of cover prices highlights the importance of using instrumental–variables techniques to obtain unbiased estimates of price coefficients: $\hat{\alpha}$ doubles in absolute magnitude, suggesting that cover prices and unobserved time–variant utility components are highly correlated with one another.

(iii) and (iv): Fixed effects Nested Logit estimation results

The price coefficients of the Nested Logit models are quite comparable in absolute magnitude to the price coefficients obtained from the IV Logit model. However, the interaction term between the dummy variable for ever having launched a website and cover price indicates that magazines which provide a website are faced by a significantly lower price elasticity of demand. This suggests that magazines might actually worry about substitution effects between the printed magazine and the online information when they decide upon launching a website.

The within group share coefficients σ is highly significantly different from zero and quite large in absolute magnitude, suggesting that there is considerable within–group correlation of utilities. Own–price elasticities in the Nested Logit model

are given by[21]

$$\eta_{s_{jt},\, p_{jt}} \;=\; \frac{1}{1-\sigma}\,\left[1-\sigma\bar{s}_{jt|g}-(1-\sigma)\;s_{jt}\right]\,\alpha\;p_{jt}, \tag{10}$$

so that point estimates for σ of 0.36 and 0.23 imply that own–price elasticities depend to a larger extent on the absolute market shares, s_{jt}, rather than on within–group market shares, $\bar{s}_{jt|g}$.

Table 9 displays the own–price elasticities of women's magazines, calculated on the basis of the Nested Logit model with interaction. The figures correspond either to 2000 or the year when the magazine was pulled out of the market. By construction of the Nested Logit model, own–price elasticities are highly negatively correlated with cover prices. As implied by the coefficient of the interaction, own–price elasticities are lower for magazines that are online — all else being equal.

The coefficient estimates corresponding to the website dummies are insignificantly different from zero in both Nested Logit models. For the model with interaction between price and the dummy variable for ever having launched a website, marginal effects have to be calculated in order to evaluate the overall effect of website provision on market shares. Due to the discrete nature of both the website dummy variable and the dummy variable for ever having launched a website (denoted by $EVER$), traditional marginal effects do not make sense here so that discrete changes are calculated as the change in market shares due to a switch in the two variables from zero to one: $\Delta = s(\delta_{jt},\sigma)_{|EVER=1,WEBSITE=1} - s(\delta_{jt},\sigma)_{|EVER=0,WEBSITE=0}$.

Except for the high–price magazine 'Madame', all of the offline magazine lost if they provided a website. By contrast, 'Madame' gained 3.6 percentage points in market share if it went online. 'Madame' has a readership structure which is quite similar to that of 'Vogue' (online since 1999) in terms of income and education so that being offline is somewhat surprising for 'Madame' anyway.

Of those magazines which actually provide a website, 'Brigitte' and 'Freundin', both 'classical' magazines which posses a high market share within the medium priced magazine group, lose most due to website provision. The numerical effect of providing a website is -2.2 percentage points for 'Brigitte' and -1.5 percentage points for 'Freundin'. Interestingly, both magazines are well known for dieting information (recipes, medical background information, fitness recommendations

[21] The own–price elasticities for the Logit model are obtained by setting $\sigma = 0$.

etc.) they provide especially in its spring edition. As described in Section 2, dieting tips belongs to the kind of information which can be downloaded on the magazines' websites. At least in the case of 'Brigitte' and 'Freundin', some substitution effects in favor of the magazine websites appear to be present.
For the other magazines that provide a website, the numerical effect on market shares is below 0.5 percentage points in absolute magnitude.
The estimated fixed–effects do not have a qualitative interpretation, for example in monetary or in terms of market shares. Instead, they represent an unobserved time–invariant utility component that shifts demand around.
The fixed effects tend to increase with market share and price, without showing, however, a pattern common to all the magazine titles. A linear regression of the fixed effects on dummy variables for weekly and biweekly appearance (with monthly appearance being the base category) yields a highly significant and positive effect for weekly appearance. The adjusted R^2 of that regression is 0.3065, suggesting that periodicity cannot well explain fixed effects. Likewise, regressing magazine grouping variables, this time following the industry classification by Jahreszeitenverlag (2001) already mentioned in Section 2, also leads to a low adjusted R^2 of 0.3066.[22] The magazine dummy variables are perfectly correlated with the periodicity variables, so that the latter were out in the estimation. The low explanatory power of the periodicity and the grouping variables underscore the importance of taking unobserved magazine heterogeneity into account.
Finally, I experimented with alternative specifications for website provision. These specifications replaced the dummy variable for website provision by interactions between magazine group dummy variables and the indicator variable for website provision as well as variable representing the duration of website provision. None of these alternative specifications leads to statistically significant effects of website provision on market shares.

[22] Jahreszeitenverlag (2001, pp 42–43) distinguishes eight magazine groups: (i) 'monthly high–priced', (ii) 'monthly medium–priced', (iii) 'biweekly classical', (iv) 'weekly counselling', (v) 'to–it–yourself fashion and needlework, (vi) 'teenager magazines', (vii) 'weekly entertaining' and (viii) 'riddle magazines'.

5 Conclusion

Descriptive and econometric evidence on the effects of website provision on market shares suggests a simple answer to the initially asked question about the effects of going online on market demand. Neither is evidence provided that website provision props up magazine demand nor that it leads to a decrease in market shares.

The empirical evidence is provided for the German women's magazine market, a particularly large segment of the German publishing market which is characterized by fierce competition among magazine titles. Ten out of 45 magazines provided websites in 2000, a number that steadily increased since 1996 when the first three magazines went online. By and large, magazines which provide a website are those with a consumer structure that tends on average to be younger, better educated and endowed with a higher income compared to the magazines that are still offline.

An analysis of the women's magazines websites shows that magazines mainly use their website to provide information that is supplementary to the contents of the curent print issue and to advertise the current print issue as well as other products published by their publishing houses. With regard to these facts, consumer substitution in favor of the online media and in disfavor of the printed media does not appear to be reasonable.

Instead, website provision seems to serve as a quality signal to consumers. It is hence treated as a quality characteristic within a differentiated product demands framework in the econometric analysis. Fixed effects panel data estimation including a total of 405 observations on 48 magazines observed between 1990 to 2000 indicates that website provision does not significantly affect women's magazines market shares. It turns out, however, that magazines which provide a website are faced by a significantly lower price elasticity of demand. This result indicates that magazines might actually worry about substitution effects of website provision.

An interesting issue for further research is to include website traffic information in the estimations instead of considering dummy variables for website provision. These data proved to be extremely difficult to obtain for the market under consideration here.[23]

[23]Note that none of the magazines considered here do not display website visitor counters. This indicates that the industry currently is reluctant to release traffic information.

Other future research will include an analysis of the news magazine market, where substitution between internet information and magazine information is more likely due to the large overlap in contents between the online and the printed media. Again, however, website traffic information is required here.

Table 9: Price, website provision, website effect on market shares, estimated fixed effects and estimated own–price elasticity

Magazine	Price	Website	Website effect (Δ, in %)	Fixed effect	Own–price elasticity
7 Tage	2.5	no	-0.0541	0.5463	-1.6109
Allegra	5	yes	0.2458	-0.4274	-1.4962
Amica	6	yes	0.4147	-0.1107	-1.7547
Anna	5.5	no	n.a.	n.a.	n.a.
Bella	2.4	no	-0.4147	0.0351	-1.4799
Bild der Frau	1.4	no	-3.0022	0.5602	-0.7589
Brigitte	4	yes	-1.9111	-0.4623	-1.1698
Brigitte Young Miss	4.3	yes	-0.0792	-1.6843	-0.9745
Burda Mode+Magazin	6.8	no	-0.5029	-0.4987	-4.3204
Cosmopolitan	5	yes	0.3673	0.0936	-1.4579
Das Goldene Blatt	2.5	no	-0.0753	0.3197	-1.6022
Das Neue	2.6	no	-0.2400	0.3626	-1.6551
Das Neue Blatt	2.5	no	-0.8509	0.8780	-1.5530
Die Aktuelle	2.6	no	-0.2319	0.6027	-1.6472
Die Neue Frau	1.6	no	-0.1643	-0.4599	-1.0203
Echo der Frau	2.5	no	-0.1957	0.5504	-1.5929
Elle	7.5	yes	-0.3983	-2.0376	-2.3084
Frau aktuell	2.5	no	-0.1700	0.4849	-1.5966
Frau im Leben	3.5	no	-0.0737	-0.1040	-2.2274
Frau im Spiegel	2.7	no	-0.3883	1.0315	-1.7032
Frau mit Herz	2.5	no	-0.0789	0.0430	-1.6080
Freizeit Revue	2.6	no	-0.9231	1.1942	-1.6114
Freundin	4	yes	-1.2976	-0.6683	-1.1963
Für Sie	4	no	-1.0509	0.0418	-2.4369
Glücks Revue	2	no	-0.1824	0.1029	-1.2780
Heim und Welt	2.3	no	-0.0288	-0.1434	-1.4829
Journal für die Frau	4	no	-0.6180	-0.4083	-2.4899
Joy	4.5	yes	0.1450	-0.7386	-1.3607
Laura	1.5	no	-0.5734	-0.1052	-0.9384
Lea	1.5	no	-0.2259	-0.2822	-0.9536
Lisa	1.5	no	-0.9220	-0.2645	-0.9317
Mach mal Pause	2.1	no	-0.1380	-0.1511	-1.3180
Madame	11	no	3.3169	1.7746	-6.1964
Marie Claire	7	no	-0.2908	-1.7950	-4.4864
Maxi	7	no	n.a.	n.a.	n.a.
Mini	1.4	no	-0.2148	-0.3975	-0.8738
Neue Post	2.5	no	-1.1980	1.2442	-1.5362
Neue Welt	2.5	no	-0.2464	0.7906	-1.5932
Neue Woche	1.5	no	-0.2378	0.3376	-0.9116
Petra	5	yes	-0.5336	-1.1819	-1.5236
Ratgeber Frau und Familie	3.8	no	-0.3702	0.4722	-2.4060
Tina	2.4	no	-1.4753	0.6047	-1.3597
Viel Spass	1	no	-0.5968	0.7251	-0.6292
Vital	4	no	-0.2352	0.2854	-2.5576
Vogue	11	yes	0.1583	-0.9183	-3.3533
Mean	3.7				
Median	2.6				

Note: The magazines 'Anna' and 'Maxi' are not included in the estimations due to missing values of explanatory variables.

Appendix A: Data sources

Except for the information on consumer characteristics (which were made available to me upon request), the data components used in this paper are publicly available.

In order to collect information on the German magazine market in general and on women's magazines in particular, the following website proved to be useful:

http://www.pz-online.de/: Contains key figures on German magazines and publishing houses; was used to match magazines and publishing houses.

http://www.media-daten.de/: Same information as http://www.pz-online.de/ but also considers newspapers.

http://www.gujmedia.de/: Contains a media encyclopedia, information on Gruner + Jahr product and research report downloads on the German magazine market.

http://www.agma-mmc.de: Describes the original data sources for the information on magazine characteristics.

http://www.awa-online.de/: Describes the original data sources for the information on magazine purchasers characteristics.

The bulk on information on the total number of titles published by the women's magazines publishing houses was collected from the publishing houses' websites. The table below list the publishing houses along with their websites ('no website' means that the corresponding publishing house did not provide a website by early October 2001).

Publishing house	**Website**
Axel Springer Verlag	www.asv.de
Burda Media	www.burda.de
Condé Nast Verlag GmbH	www.condenast.de
Gong Verlag	www.gonginfo.de
Heinrich Bauer Verlag	www.hbv.de
Gruner + Jahr AG & Co.	www.gujmedia.de
Jahreszeiten–Verlag	www.jalag.de
J. Weck GmbH u. Co. KG Verlag	www.weck.de
Klambt Verlag	no website
MAGAZINPRESSE Verlag GmbH Zeitschriften & Co KG	no website
MVG Medienverlagsgesellschaft mbH & Co.	www.mvg.de
Verlagsgruppe Lübbe GmbH & Co. KG	www.media.bastei.de
Verlagsgruppe Milchstrae	www.milchstrasse.de
Weltbild Verlag GmbH	www.weltbild.com
WZV Westdeutsche Zeitschriftenverlag GmbH & Co.KG	no website

Appendix B: Descriptive statistics

	Mean/ share	Standard deviation overall	between	within
Instruments for price				
$ln(\#\ of\ titles\ of\ own\ publishing\ house)$	2.2688	0.8523	0.8135	0.1492
$ln(average\ advertising\ price)$	10.0185	0.6694	0.6545	0.0965
$ln(\#\ of\ advertising\ pages)$	3.4455	0.9642	1.0742	0.1658
interaction with group dummies:				
14–19	0.0661	0.4691	0.6651	0.0339
20–29	0.4146	1.3350	1.4199	0.0288
30–39	1.0696	1.7926	1.6791	0.2404
40–49	0.3939	1.2294	1.0912	0.2223
50–59	0.1281	0.7679	0.6808	0.0190
60–69	0.2713	0.8700	0.8167	0.0286
> 70	1.1019	1.4041	1.3336	0.1176
Instruments for within group market share				
$ln(potential\ within\ group\ mkt.\ share)$	-2.3580	1.0123	1.0567	0.1379
$ln(\#\ of\ titles\ by\ own\ publisher\ within\ group)$	0.6801	0.5947	0.5907	0.0945
$ln(share\ in\ within--group\ advertsing\ pages)$	-2.2824	1.0274	1.0999	0.1637
Dependent variables				
p	3.6805	2.3024	2.2004	0.2731
$ln(s_{jt}) - ln(s_{0t})$	-5.6886	0.7638	0.7333	0.1636
Explanatory variables in market share equations				
$WEBSITE$	0.0790			
$EVER$	0.2099			
$ln(age)$	2.9635	1.0717	1.3203	0.2690
$ln(\#\ ofpages)$	4.8107	0.5358	0.5569	0.0576

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