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Do Magazines' "Companion Websites" Cannibalize the Demand for the Print Version? ¶

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Abstract

We analyze the extent to which visits to a magazine's companion website affects total circulation, subscription, kiosk sales and foreign sales using Granger causality tests on the basis of monthly data for the German magazine market spanning the period January 1998 to September 2005. We find evidence for positive effects of website visits on magazine subscription but negative effects on magazine kiosk sales. Contrary to the widespread belief that the Internet will cannibalize print media markets, our results do not, however, provide evidence for website visits adversely affecting total circulation.

JEL-classification: C32, C33, L11

Keywords: Granger causality, heterogeneous panel data models, Mean Group Estimation, website visits, magazine circulation

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"The Internet: too much to die, too little to survive?" Frank Patalong in Germany's leading news magazine "Der Spiegel", April 6, 2005.

"Newspapers are cannibalizing themselves." Frederick W. Searby of J.P. Morgan in "The New York Times", March 14, 2005.[1]

"It is widely assumed that the Internet is cannibalistic [and] will replace all conventional ways of doing business." Michael E. Porter (2001, p. 73)

"Seize the day! Either you are going to cannibalize yourself or somebody else is going to cannibalize you." Mark Mooradian, Vice President of the media consultancy Jupiter Media Metrix (1997).[2]

1 Introduction

The Internet is often termed "the great equalizer" of product prices.[3] The Internet might, however, very well have more direct effects on physical markets by complementing or substituting physical products. This study analyzes the relationship between a particular physical market, the print versions of magazines, and a corresponding virtual market, the online companion version of those magazines.[4]

Magazines' companion websites are potentially perfect substitutes to their corre-

[1] Cited by Seelye (2005).

[2] Cited by Hickey (1997, p. 38).

[3] For example by Brynjolfsson and Smith (2001).

[4] We follow a distinction by Barsh et al. (2001, pp. 84-85) and use the term "companion website" for websites that have a large content overlap with the print version. By contrast, "destination websites" are top sites in their own categories and provide a complete and compelling experience and come with unique content and applications.

sponding print editions, which is why industry observers as well as publishers indeed tend to be pessimistic about the prospects of print media publishing, as the survey evidence summarized in Section 3.2 shows. There are, however, also stories of complementarity to tell, like the reach of a different audience over the Internet (whom might be turned into purchasers of the print version), and additional service that can be offered over the Internet like searchable archives, permanently updated news,[5] chat–rooms, bulletin boards, instant messaging or links to external content. Such complementary service is likely to raise switching costs for the combined product offering as pointed out by Porter (2001), and the websites we study in this paper all provide such features. Moreover, a companion website serves as a vehicle for advertising the print edition. The cross–advertising goes both ways, since the print editions also advertise the online companion and many articles in the print versions provide URLs that lead to further information on the companion website.[6] Section 2 further discusses the competing forces that might be at work here.

We econometrically test for causal relationships between website visits and magazine circulation using externally audited monthly data on 37 German consumer magazines. Our study hence provides an analysis of "channel competition" or "channel

[5]The magazines we consider appear at most once a week.

[6]Mitchell (2001) presents information on this kind of cross–channel promotion for the US. He cites survey evidence that 95 per cent of the offline editions promote the web editions (which is very similar to our data) while only 45 per cent of the web editions promote the print edition (which is very different from our data).

conflict", as it is termed in the marketing literature.[7]

Going beyond existing studies, we not only consider total circulation but split up total circulation into kiosk sales, subscription and foreign sales. We believe this distinction to be important since for example an online companion website will more likely be a complement to a loyal subscriber than for a casual kiosk purchaser.

The results of existing econometric studies, reviewed in Section 3.1, on the relationship between magazine and newspaper websites and the demand for the corresponding print edition are widely divergent. With one exception, existing studies analyze the effects of sheer website presence and do not consider, how often a website is actually accessed. These studies also tend to disregard a potential reverse causality. Moreover, most existing studies we are aware of are based on data that end in 2001, when Internet adoption rates were considerably lower than they are today whereas or our data extends up to September 2005.

The main contributions of this paper are that we (i) differentiate between total circulation, kiosk sales, subscription and foreign sales instead of just considering total circulation, (ii) use monthly data that extend up to September 2005 and (iii) provide evidence for the quantitative effects of the actual number of website visits on circulation, subscription and kiosk sales, as well as for causalities running in the opposite direction. A fourth contribution is that we produce and compare results

[7]See Alba et al. (1997), Brynjolfsson and Smith (2000) as well as Coughlan et al. (2001) for discussions of channel competition between the Internet and physical markets.

of estimators that impose different degrees of homogeneity in parameters across magazines instead of restricting them to be equal across magazines. Since we have a fairly long time series of data for individual magazines, we apply both a so–called "Mean Group Estimator" (Pesaran and Smith 1995) that aggregates magazine–specific parameter estimates and pooled OLS estimation (which, since we demean our time series, in fact is a fixed effects estimator). An important feature of the Mean Group Estimator is that it takes into account magazine heterogeneity, an issue that we believe is important given that our data contain both well known magazines with a high circulation even by international standards and magazines that are only nationally recognized.

The main findings of this paper is that we provide evidence for the presence of (i) negative Granger causality running from website visits to kiosk sales and (ii) positive Granger causality running from subscription to kiosk sales. In other words: a higher number of website visits causes lower kiosk sales but increases subscription. There is no robust statistical effect on total circulation, however, which indicates that the negative effect on kiosk sales balances out with the positive effect on subscription. We do not find any evidence for causalities running in the other directions, i.e. from the circulation to website visits. There is no evidence for any relationship between foreign sales and website visits.

2 Competing forces

This section discusses the competing forces that may drive the relationship between circulation, subscriptions, kiosk sales and foreign sales on the one hand and website visits on the other.

2.1 Potential negative effects of website visits on circulation

It is generally believed that the Internet is cannibalistic and that it will eventually replace the conventional ways of doing business, as critically discussed by Porter (2001). Newspapers and magazines are indeed, at least in principle, ideal goods that can be distributed online. Their online distribution is associated with a comparatively low outlay and a frequent purchase. Shapiro and Varian (1999) point out that cannibalization might indeed be more imminent when information products are delivered online.

2.2 Potential positive effects of website visits on circulation

There are two main ways in which companion websites could actually have a positive effect on magazine demand (and vice versa): (i) "awareness" and (ii) additional service.

(i) *Awareness:* Companion websites allow consumers to get an idea about a maga-

zine free of charge and hence may generate consumer awareness. If the online and offline readership differ with respect to readership characteristics, then a magazine's companion website extends market reach (Nicholson 2001). Joukhadar (2004) for example points out that online companions may attract a more technology savvy readership than the print version. All of our magazines also offer a preview or at least a table of contents of the current or forthcoming print version, so that prospective consumers can learn about the printed magazine. These "sampling" effects are at the core of an analysis of record sales and music downloads by Oberholzer–Gee and Strumpf (2004), whose empirical evidence suggests that music downloads act as appetizers for a later record purchase. An Internet presence might thus be seen as "a necessary step in the effort of a magazine to broaden and deepen its audience", as argued by Barsh et al. (2001, p. 91).

(ii) *Additional service:* Existing studies, like Barsh et al. (1999) and Silk et al. (1999), point out that a key factor determining the relationship between "real" and "virtual" versions of a print medium is the relative positioning of the two outlet channels. The relative positioning argument is also emphasized in econometric work by Deleersnyder et al. (2002), Pauwels and Dans (2001) and Simon (2004). If the companion websites are just "shovelware", where contents of the print medium are moved to the website, substitution will be more likely. If the companion website offers additional service, it might well be a complement (Barsh et al. 1999).[8]

[8]Note that we do not observe the companion websites' characteristics. There is no data archive

A particular form of additional service is online subscription. Observers of the US publishing industry, such as Capell (2004) and Barsh et al. (2001), believe that convenient and cost–effective online subscription is an important feature of a companion website.

Awareness and additional services are likely to differently affect the consumption habits of subscription–affine readers and those of casual kiosk purchasers. Subscription–affine consumers will particularly appreciate additional service, while kiosk purchasers may use the online companion to acquire information about the current print issue.

There is a fairly sizeable literature on the relationship between online and physical retail outlet channels. In that context Peterson et al. (1997) interpret an additional online distribution channel as that of a diversification strategy. Biyalogorsky and Naik (2003) develop a model that determines the extent to which cannibalization effects exist between the online outlet channel and the physical outlet channel. They apply their model to data from Tower Records and do not find evidence for channel cannibalization. Other marketing authors (Chiang et al. 2003; Lal 2005; Rhee and Park 2000) emphasize the role of the online channel in limiting pricing inefficiencies in the physical outlet channel.

in Germany that allows us to trace websites back to their launching date. Even if we could, a definition of a companion website's relative positioning is largely arbitrary and thus subject to measurement error.

2.3 No effects of website visits on circulation

It might of course also be the case that there is no observable relationship between companion website visits and magazine demand. One obvious reason is that the positive and negative effects just balance out one another. Another reason might be that, since website access is for free, the companion website attracts low–valuation consumers, who would not have bought the print version anyway, as discussed by Oberholzer–Gee and Strumpf (2004). This is closely related to the issue of reaching a different set of consumers online rather than offline as discussed above. More importantly, in particular in the case of magazines where consumption often presumably is for leisure rather than for information, the online reading behavior might be completely different than offline reading habits so that there might be no relation at all between online and offline consumption.[9]

The review of the competing forces which may (or may not) dictate the relationship between companion websites and circulation shows that there is no clear evidence about the direction — and even less so about the magnitude — of the effects. We, therefore, believe that it is necessary to conduct a thorough econometric analysis as a next step. The alternative to such an econometric study is to conduct surveys among Internet users and publishers. We do not find, for reasons that we shall

[9]Things might be different for newspapers that tend to be consumed primarily for information, and less much for hedonic reasons.

describe in Section 3.2, the evidence provided by surveys to be convincing so far.

3 Existing studies

3.1 Existing econometric evidence

There are two groups of existing econometric studies. The first group, which includes Deleersnyder et al. (2002) and Pauwels and Dans (2001), uses time series econometric methods. The second group of studies uses structural microeconometric models to evaluate the effects of websites on print media demand, such as Filistrucchi (2004), Gentzkow (2003), Kaiser (forthcoming) and Simon (2004).

Deleersnyder et al. (2002) test for structural breaks in monthly circulation time series of 67 daily newspapers from Great Britain, observed between January 1990 and June 2001. On average, 42 monthly observations are available after the date at which the companion website was introduced. The identifying assumption of the paper is that significant positive (negative) structural breaks in the time series of a newspaper's circulation after a website launch indicate positive (negative) effects of Internet presence on circulation. The authors find that few newspapers experience a drop in circulation due to the existence of a companion website. The effects are, however, disperse and economically fairly small.

Similarly, Pauwels and Dans (2001) analyze twelve Spanish newspapers using tests

for unit roots and cointegration. They use daily data on website visits, page views and circulation. Their main finding is that circulation increases digital visits, but they omit to analyze reverse causality. In addition, Pauwels and Dans use data on audience characteristics to show that a close match in characteristics between online and offline readers increases the size of the online audience.

Existing microeconometric studies tend to find either no effects of companion websites on circulation or negative effects. Gentzkow (2003) uses consumer survey and media consumption data for 16,171 adults from Washington D.C. His data spans the period March 2000 to February 2003 and was collected by a market research firm. He derives a structural model for the demand for differentiated products which, unlike standard models for differentiated product demand, allows products to be substitutes. His main finding is that print and online editions of the same newspaper are weak substitutes.

In an analysis for German women's magazines Kaiser (forthcoming) estimates structural econometric models for the demand for differentiated models. He uses quarterly panel data for the period I/1996 to II/2005. The study shows that magazines that run an online companion on average loose 4.2 percent of their market share, an effect that varies substantially across different consumer age groups and across time.

Filistrucchi (2004) adopts the framework of an earlier version of Kaiser (forthcoming). He uses monthly data on the four leading Italian daily newspapers observed

between 1976 and 2001. He finds statistically highly significant and economically sizeable negative effects of website presence on newspaper circulation which, he claims, may explain why Italian daily newspapers started to charge access fees from early 2001 onwards.

Simon (2004) applies a simple linear demand model to analyze the effects of website presence and content overlap between the print version and the companion website. He uses panel data on 556 US magazines from 40 markets for the period 1996 to 2001. Simon does not find evidence for complementarities between online contents and magazine circulation. His results suggest that a magazine's print circulation on average declines by about three per cent when it offers a website.

3.2 Existing survey evidence

The survey evidence that we found in the existing literature points at some limited cannibalization effects. Mitchell (2001) refers to a survey among 255 US editors and publishers which finds that half of all survey participants fear that their online operations may inflict long–run harm on their print business. An online consumer survey for the US from 1997, cited in Barsh et al. (1999), suggests that 16 per cent of the Internet users say they spend less time reading magazines because of time they spend on the Internet. Filistrucchi (2004) cites an Italian study from 2001 that finds that 26 per cent of the survey respondents report to read less newspapers and

magazines because they use the Internet.

Even though all three studies point in the same direction, we have some reservations against these types of surveys since (i) they do not provide actual counter–factual evidence since they do not describe actual consumption behavior, (ii) survey respondents tend to overstate both their online and offline consumption behavior as described by Deleersnyders et al. (2002), (iii) there are apparent sampling problems and (iv) there are problems with the accuracy of survey conduct. The latter two points are particularly relevant for online surveys (Dillman 2000) and, hence, for the consumer surveys from Italy and the US.

4 Data

4.1 Sources

We use publicly available data on magazine circulation and website visits from URLs http://medialine.focus.de and http://www.ivw-online.de respectively. The data spans the period January 1998 and September 2005, or 93 months (periods). In this respect, the time series dimension of our data is fairly large. We discard all magazines as well as their websites if they come with less than 20 observations in order to enhance the feasibility of our Mean Group Estimations. That leaves us with 37 magazines. Our unrestricted sample contains 2,133 observations. For parts of the

analysis we exclude some magazines that either have unit roots or because of serial correlation. Our restricted sample contains between 17 and 26 magazines or between 941 and 1,541 observations — depending on the time series under consideration.

We regard our website visits information as reliable for two reasons: (i) magazines use this data to sell advertising space and (ii) it is collected by an impartial non–profit public utility institution, the "Information Association for the Determination of the Spread of Advertising Media" ("Informationsgemeinschaft zur Feststellung der Verbreitung von Werbeträgern e.V.", IVW) — the German equivalent to the US Audit Bureau of Circulation. IVW ascertains, monitors and publishes circulation and magazine dissemination information with, according to IVW's statutes, the aim to facilitate open competition between the suppliers of advertising space. IVW is also the original source of the circulation data we use in this study. Suppliers of online advertising space may join IVW and, once their membership is approved, they are endowed with the IVW's technical equipment for measuring website visits.

It is not surprising that many magazine websites are not tracked by the IVW data, due to the fact that quite a few German magazine websites contain very little advertising. Thus, they do not need to gather visits data from a publisher's point of view. Therefore, we thus suspect our data to contain just a fraction of all magazine websites, although we lack consistent information on website presence of the magazines which are not in our sample. We do believe, however, that our data covers

the most relevant fraction of magazine websites — in terms of complementarities and substitutabilities between the websites and the print versions — since magazine websites containing advertising are most likely to be professionally managed and frequently updated.

4.2 Sample relevance

We measure website visits as the total number of website visits per month (which we compare to total circulation, subscription, kiosk sales and foreign sales per month). The companion websites in our sample attract on average 2.1 mio. website visits per month. That compares to an average monthly circulation of the magazines in our sample of 409,907.

It is important to note that 24 magazines in our sample (65 percent) appear once a month only. The periodicity of our website visits data and the periodicity of our circulation data hence coincide for most of our magazines. Ten magazines (27 percent) have a weekly periodicity and three magazines (eight percent) appear biweekly.

Appendix A describes our data and variable definitions more thoroughly.

The magazines in our sample constitute a substantial fraction of the German magazine market. They account for between 14.3 and 21.5 per cent (mean 17.9 per cent) of total circulation between 1998 and 2004 and on average constitute 17.3 per cent of all titles.

The magazines in our sample have a larger share of readers, who regularly use the Internet (over the period 1998 to 2004). Figure 1 displays the mean share of regular online users, who read magazines contained in our sample, and the corresponding mean share for readers of out–of–sample magazines. The figure shows slow growth in online shares between 1998 and 2000 with small differences between the magazines inside and outside our sample and steady growth in online shares thereafter.[10]

Insert Figure 1 about here!

It is important to note that website access is free of charge for the magazines we study, and that website users are not requested to register before entering the websites.[11] This is consistent with the evidence from the US, where companion websites also do not charge access fees to generate visits in order to sell online advertising space (Barsh et al. 2001; Deleersnyder et al. 2002). There has, however, been a tendency towards charging in the US, but results have so far not been encouraging (Hickey 1997; Robins 2001; Seelye 2005).

According to data gathered by FIPP (2004), four of our magazines belong to the

[10]The data on magazine reader characteristics we use here was also provided by "Arbeitsgemeinschaft Media–Analyse", and is based consumer survey data annually collected by the "Institut für Demoskopie, Allensbach".

[11]There is one exception, however. "Der Spiegel" (www.spiegel.de), Germany's leading weekly news magazine, charges an access fee for few selected articles, mostly lengthy feature articles or groups of related articles from past issues.

worldwide Top 50 "General interest magazines" (with ranks between 15 and 42), one appears in the Top 50 "Special interest magazines" list (rank 26), five belong to the Top 50 "Finance, business and news magazines" (rank 4–45), two belong to the Top 50 "Men's magazines" (rank 18 and 29) and one belongs to the Top 50 "Women's magazines".

4.3 Trends and seasonality

All time series under consideration have marked time trends and show substantial seasonality. We remove deterministic trends and seasonality by running auxiliary regressions of our times series of interest on a linear time trend and a set of monthly dummy variables for each magazine and each time series. Let Z_{it} denote the time series of interest corresponding to magazine i at time t, let M_{mt} denote a dummy variable that takes on the value 1 (and 0 otherwise) if the observation corresponds to month m ($m = 1, ..., 11$) and let M_{i0} denote a magazine-specific constant term. We estimate $Z_{it} = M_{i0} + \sum_{m=1}^{M} a_{im} M_{mt} + b_i \; t + \epsilon_{it}$. The residual $\hat{\epsilon}_{it}$ is the trend–adjusted and seasonality–adjusted time series that we use in the analysis throughout. We shall use the estimates for the time trends, b_i, in Subsection 6.1.

The website visits time series has an evident structural break in January 2002 when the data measurement method changed. In order to capture the structural break in the series, we include the variable D_{it} that takes on the value 1 if the corresponding

observation is from January 2002 or later (and 0 otherwise). We also include an interaction term between the break dummy and the linear trend. This extension allows the deterministic trend in website visits to be different in the two subsamples. The seasonal adjustment (and structural break adjustment) for the website visits series hence is: $V_{it} = M_{i0} + \sum_{m=1}^{M} a_{im} M_m + b_i\ t + \theta_0 D_{it} + \theta_1 D_{it}\ t + \epsilon_{it}$. Both the level and trend slope of website visits are potentially different before and after the break (M_{i0} versus $M_{i0} + \theta_0$ for the level, b_i versus $b_i + \theta_1$ for the trend slope). Since both our dependent and explanatory variables are demeaned, this implies that our OLS estimation results we present below are in fact fixed effects estimation results.

It is important to note that our use of time–trend adjusted data implies that our focus is on deviations from the trend. The use of time–trend adjusted data also helps us to get around non–stationarity problems in the website visits series since none of them is stationary but almost all of them are trend–stationary. We shall return to this issue in the next section.

5 Empirical approach

We apply the Granger (1969) non–causality (GnC) methodology to test for causalities between circulation and website visits. One variable, say, x, is Granger-causal to another variable, say, y, if — conditional on past values of y — the inclusion of past values of x significantly helps in improving the predictability of y. We rely on

this definition in order to identify the relationships between (different components of) circulation and website visits from their covariations over time within a dynamic model.[12]

Our basic empirical model is a bivariate vector autoregression (VAR) for circulation (or subscription, kiosk sales or foreign sales), C_{it}, and visits to the companion website, V_{it}, of magazine i in periods $t = 1, 2, ..., T_i$. The VAR is a standard vehicle for GnC analysis, as it allows for shocks in both the print market and the online market to be correlated, and to have lagged effects within a particular market ("own-effects") as well as lagged "cross–effects" between markets.

The magazine–specific model is formulated in terms of the natural logarithm of circulation and visits, $\boldsymbol{X_{it}} = (c_{it}, v_{it})'$,

$$\boldsymbol{X_{it}} = \boldsymbol{\Gamma_i W_{it}} + \mu_i + \epsilon_{it}, \quad t = 1, 2, ..., T_i, \quad i = 1, 2, ..., N, \tag{1}$$

where $\boldsymbol{W_{it}}$ contains lagged own effects and lagged cross–effects. We consider models that contain two lags of circulation and website visits. We set the lag length to two as a compromise between the Bayesian Information Criterion which is minimal for lag length 1 and potential problems of serially correlated errors which become less severe when we add more lags. We hence have $\boldsymbol{W_{it}} = (c_{it-1}, c_{it-2}, v_{it-1}, v_{it-2})'$.

[12] See Dekimpe and Hanssens (2000) as well as Franses (2005) for a recent overview of the use of time series techniques in the marketing literature, including the Granger causality concept.

The parameters of main interest for the GnC analysis are contained in the matrix

$$\mathbf{\Gamma_i} = \begin{pmatrix} \gamma_{11i} & \gamma_{12i} & \gamma_{13i} & \gamma_{14i} \\ \\ \gamma_{21i} & \gamma_{22i} & \gamma_{23i} & \gamma_{24i}, \end{pmatrix}.$$

where the "own effects" are represented by coefficients γ_{11i} and γ_{12i} for the circulation series and by γ_{23i} and γ_{24i} for the visits series. The "cross effects" are given by the coefficients γ_{13i} and γ_{14i} for the circulation series and by γ_{21i} and γ_{22i} for the visits series. We distinguish between short–run deviations from the trend (hereafter termed "short run effects") and long–run deviations from the trend (hereafter termed "long run effects"). The short–run effects are the coefficients γ_{13i} for the circulation series and γ_{23i} for the visits series respectively. The long–run cross–effect for the circulation series are $\frac{\gamma_{13i}+\gamma_{14i}}{1-\gamma_{11i}-\gamma_{12i}}$ and $\frac{\gamma_{23i}+\gamma_{24i}}{1-\gamma_{21i}-\gamma_{21i}}$ for the visits time series.

The term $\mu_i = (\mu_{ci}, \mu_{vi})'$ in Equation (1) denotes a vector of drift parameters. The subscripts c and v denote drift parameters for circulation and website visits, respectively. The error term ϵ_{it} is assumed to be independently and identically distributed across i and t, with mean zero and a variance matrix which may differ across magazines. We apply covariance estimates that are robust to heteroscedasticity throughout and test for serially uncorrelated error terms (e.g. absence of serial correlation). The assumption of ϵ_{it} being independent across magazines is commonplace in panel data analysis.

We exploit the fact that the data on many magazines in our sample have reasonable time–series dimensions to specify N magazine-specific vector autoregressions. This

allows for full heterogeneity in terms of the parameters from the outset. Clearly, magazine–specific estimates potentially lack precision and will be inefficient if the parameters are homogenous across magazines. To investigate the effects of possible parameter heterogeneity across magazines, we employ two different strategies for aggregating the information on individual magazines: (i) pooled OLS estimation where we impose homogeneity of all parameters across magazines ($\mathbf{\Gamma_i} = \mathbf{\Gamma}$), and (ii) Mean Group approach estimation which allows for fully heterogeneous parameters, while estimating their mean across magazines. The Mean Group estimate of $\mathbf{\Gamma}$ is obtained as the average of the magazine-specific estimates, $\hat{\mathbf{\Gamma}} = 1/N \sum_{i=1}^{N} \hat{\mathbf{\Gamma}}_{\boldsymbol{i}}$.

We test for parameter heterogeneity by applying Hausman (1978) tests. Under the null hypothesis of parameter homogeneity, both the OLS and the Mean Group estimates are consistent for the common parameter but only the OLS estimates are efficient. We hence prefer the OLS estimates over the Mean Group estimates if we cannot reject parameter homogeneity (and vice versa). A practical problem with Hausman tests is that the difference between the variance–covariance matrix of the efficient estimator (under the Null hypothesis) and the inefficient estimator is not negative semi–definite and cannot be inverted. Our results table contains a "n.a." in such circumstances.

Note that the kind of finite T biases usually associated with pooled OLS estimation of dynamic panel data models, see Arellano (2003), are expected to be less of a

problem here as we have a reasonable time series dimension for all magazines.

6 Results

6.1 A long–run perspective

The primary focus of this paper are deviations from the trend of the time series under consideration. We ask: what is the short–run deviation from the trend of total circulation (or subscription or kiosk sales or foreign sales) due to a change in website visits (and vice versa)? We hence do not handle long–run causalities in our econometric analysis. In this subsection we do, however, provide graphical evidence on the relationship of time trends between circulation and visits to check if the time series are "co–evolving" (e.g. follow the same time trend) or if there is no relationship in the time trends between the print market and the online market.

To analyze the long–run behavior of our time series, we plot the coefficients on the time trends, parameters b_i from Subsection 4.3, corresponding to the website visits series against against the time trends corresponding to the circulation–related series.

Our analysis differentiates between an "immature" period of Internet penetration which we define as the period before January 2002, and a period of "mature" Internet penetration — the period including and after January 2002 —, where Internet penetration was around one third even for the out–of–sample magazines (compare

Figure 1). Our definition of the two time periods also coincides with the structural break in the visits series.

Figure 2 plots the time trends of the visits series against the time trends of the total circulation, subscription, kiosk sales and foreign sales series respectively. Each dot in Figure 2 corresponds to a magazine–specific combination of website visits and circulation time trends. The figure also contains straight lines that correspond to OLS estimation results of the time trends against one another. We find a positive but statistically insignificant relationship between visits and circulation for the immature period. The companion website and the print version were hence weak long–run complements. There is no relationship between visits and circulation in the mature period. This is consistent with the Internet initially driving in particularly information–affine readers that demand permanently updated information on the online companion. At the same time, these information–affine readers are likely to be early adopters of the Internet. Another explanation is that those early adopters used the Internet as an appetizers for a later magazine purchase. With increasing Internet penetration, these information–affine readers loose in importance relative to the late adopters who either are less information–affine or use the online companion as a substitute.

The co–evolving of online visits and circulation in the immature period is a consequence of the positive relationships between website visits and kiosk sales on the

one hand and website visits and subscription sales on the other hand, the two most important component of total circulation. For kiosk sales the appetizer argument is clearly more relevant than for subscription, while updated information is more relevant for subscription sales. Interestingly, the relationship between kiosk sales and website visits becomes negative in the mature period: increased Internet adoption goes along with long–run substitution between website visits and kiosk sales. The relationship between website visits and subscription remains being positive and now also is statistically significant at the five percent level. Subscribers hence have a taste for additional online information. Finally, we do not find any relationship between foreign sales and website visits.

6.2 A short–run perspective

6.2.1 Aggregate results

Table 1 displays our main results on the presence of Granger causality between website visits on the one hand and total circulation, subscription, kiosk sales and foreign sales on the other. The table shows results from OLS and Mean Group estimations and also splits the sample into all magazines and unit–root and serial correlation free magazines ("restricted sample"). The entire set of estimation results is displayed in Appendix B.

As already mentioned in Section 5, we prioritize OLS estimation results over Mean

Group estimation results if Hausman tests indicate parameter homogeneity. If those tests indicate parameter heterogeneity, we prioritize the Mean Group estimates. Moreover, we consider a relationship to be "robust" if it is statistically significant (and pointing in the same direction) both for the full sample and the restricted sample. Given the importance of the identifying assumptions, we refer to the restricted sample when we discuss point estimates.

With this in mind, Table 1 provides robust evidence for positive short–run effects of website visits on magazine subscription and for negative effects of website visits on magazine kiosk sales.[13] The Internet companion hence apparently has different effects on different types of consumers. Subscribers, who are likely to be more loyal and to have a stronger taste for the printed magazine, presumably appreciate the Internet as an additional and complementary source of information, while casual kiosk purchasers, who attach less value to the print version than subscription–affine consumers, use the online companion as a substitute.

Our point estimates indicate a short–run increase by 1.4 percent in subscription due to a one percent increase in website visits. By contrast, a one percent increase in

[13]The short–run effect of the OLS estimation, which we prefer over the Mean Group estimate given that we cannot reject parameter homogeneity, is statistically insignificant in the full sample for the subscription–relationship. The second lag is, however, estimated to be 0.0002 only and is grossly insignificant. Once we leave it out, we obtain the same estimate for the short–run effect which now is statistically significant given a p–value of 0.069.

website visits leads to a decrease in kiosk sales by 3.1 percent.

Given an average share of subscription of 28 percent in our sample and that the negative effect of website visits on kiosk sales is larger than the positive effect on subscriptions, it is not surprising that total circulation appears to be negatively affected by website visits. This result is, however, not robust with respect to the time–series properties of our data: there are no statistically significant effects in the restricted sample. Even though the lack of significance may be due to the substantial reduction in the number of observations, we can therefore not assert a causal effect running from website visits to total circulation. There is no evidence for a causal relationship running in the other direction either.

By the same token, we cannot assert a causal effect running from website visits to foreign sales either. The estimation results for the full sample suggest a negative and statistically significant relationship, but this finding is not confirmed by the restricted sample. We can neither assert a reverse relationship.

6.2.2 Magazine–specific results

Even though our Mean Group estimator takes into account magazine heterogeneity, it still is an aggregate of 37 potentially very heterogenous magazine–specific estimates. Moreover, the average parameter value might not be representative for very many magazines. Table 2 therefore presents magazine–specific estimates for the

relationship between different components of total circulation and website visits. The table shows that the circulation of "Brigitte Young Miss", a girl's magazine, is most adversely affected by its companion website. This could be a consequence of a combination young — and therefore price sensitive — readership and high Internet penetration rates. The negative effect is due to a large negative feedback from website visits to kiosk sales, while there is no statistically significant effect for subscription. Similar effects are present for "Börse online" and "Impulse". Both are business magazines.

More generally, the combination of negative effects on kiosk sales and positive effects on subscription appears 16 times (or in 43 percent of all cases) in Table 2, even though there are few statistically significant effects in general. This once again indicates that loyal consumers appreciate the companion website as a complement while it is a substitute to casual kiosk purchasers.

7 Conclusion

Print media managers, editors, publishers and industry observers alike tend to believe that the Internet cannibalizes their product. Most print media today maintain own companion websites, which means that, if market participants are right, print media cannibalize themselves. It is also acknowledged, however, that companion websites may have positive effects on circulation through two main channels: (i)

"awareness" (consumers become aware of the quality of the print medium via the companion website) and (ii) additional service (which may lead to an increased consumer loyalty).

We study the causal relationships between website visits on the one hand and total circulation, kiosk sales, subscription and foreign sales on the other hand using monthly data for the German magazine market spanning the period January 1998 to September 2005.

Our estimation results show evidence for a positive and statistically significant causal effect of website visits on magazine subscription. The short–run deviation from the trend in subscription caused by a one percent increase in website visits is estimated to be 1.4 percent. We also find a positive link between the magazine–specific time trends in circulation and the magazine–specific time trends in circulation. These results are consistent with the bundle of print magazines and online companions being particularly attractive for loyal consumers that highly value the print product.

By contrast, we find statistically significant and negative effects of website visits on kiosk sales. The short–run deviation from the trend caused by a one percent increase in website visits is estimated to be 3.1 percent.

These results are indicate that the Internet drives in loyal consumers that attach a high value to the print medium/companion website bundle but is used as a substitute by casual kiosk purchasers.

Even though our results provide evidence for negative effects of website visits on total circulation, these effects are not robust to alternative estimators and also vary with the time series properties of our data.

In conclusion, we hence can only partly share the pessimistic view of print media market participants. Companion websites indeed seem cannibalistic to kiosk sales but increase subscription. Given that print media advertisers highly appreciate subscriptions and that there also revenues from online advertising, magazines may hence well benefit from their online companion.

The strategic management implication of our results is straightforward: in order to make the online companion websites even more attractive for (potential) subscribers, the editors of the online companion must move content to the Internet version that complements what readers find in the print version. Examples for such content that many magazines already offer over the Internet are as searchable archives, permanently updated news, chat–rooms, bulletin boards, instant messaging or links to external content. Editors may also want to invest in "community building" through online discussion groups and online chats, an issue that has recently been underscored by a Wall Street Journal article about a particular niche magazine (Matlick 2005).

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Figure 1: Mean share of magazine readers who regularly use the Internet for magazines inside and outside the sample

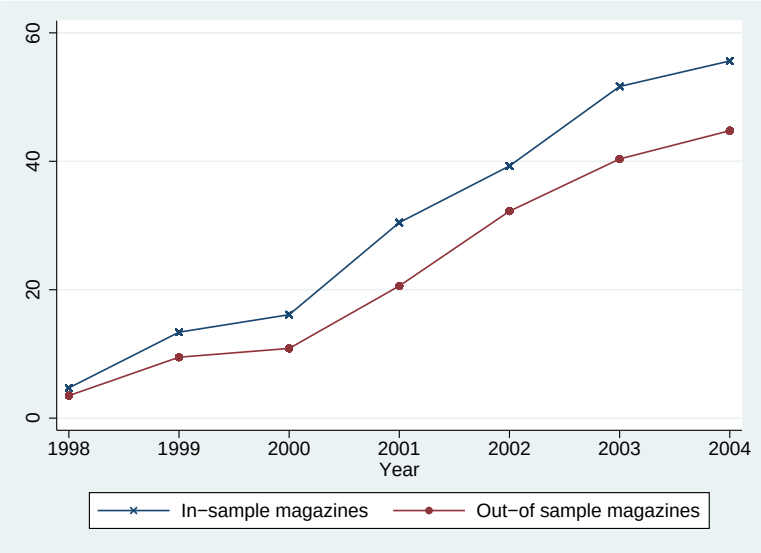

Figure 1 displays the mean share of readers who regularly use the Internet for the magazines inside and outside our sample.

Figure 2: Relationships between growth rates in circulation, kiosk sales as well as subscription and website visits before (left panel) and after January 2002 (right panel)

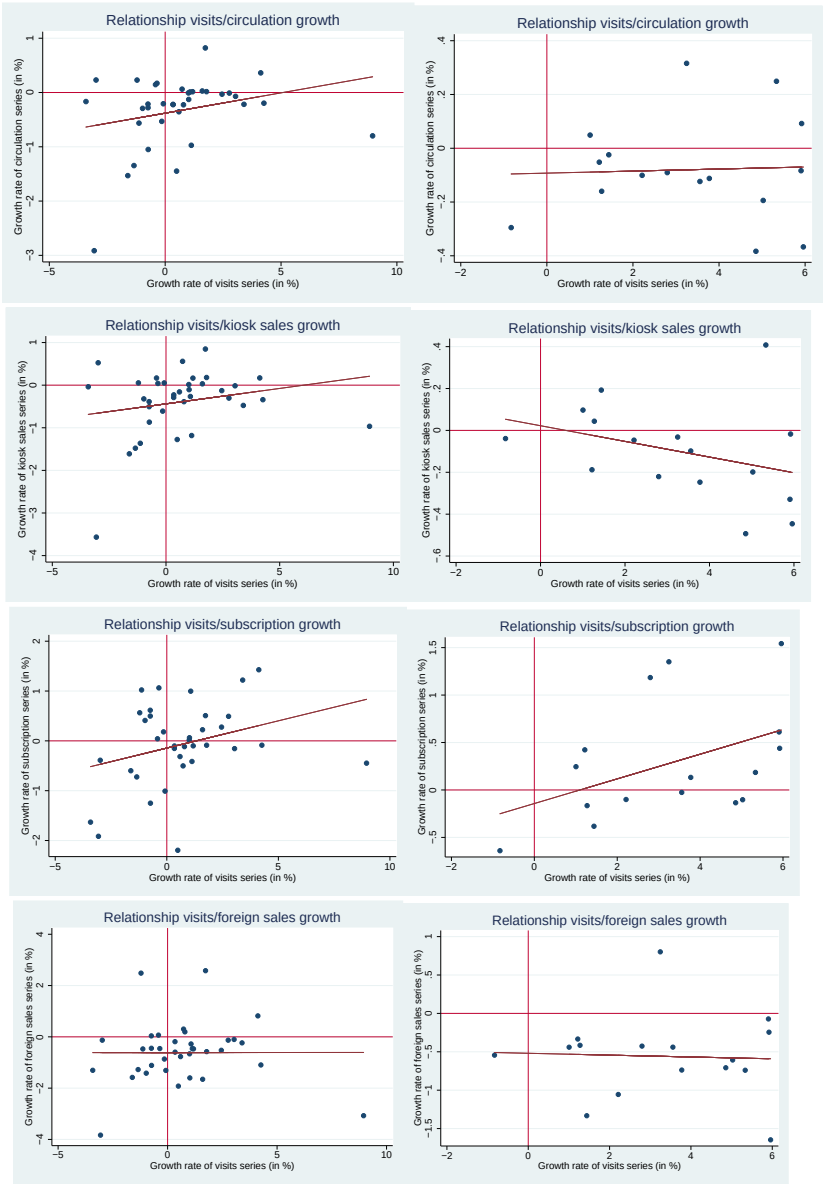

Figure 2 displays plots growth rates in website visits against growth rates in circulation, kiosk sales and subscription. There is no indication for any relation between foreign sales and website visits which is why the corresponding figures are left out. The growth rates were generated from linear regressions of each respective series on a linear time trend. The regressions also included monthly dummy variables to pick up seasonality in the data. The straight line in the figures are linear predictions from a OLS regression of visits growth rates on the growth rates of the circulation, kiosk sales, subscription and foreign sales series. The slope parameter corresponding to the circulation/visits plot is 0.0748 (standard error .0733) for the period before I/2002 and 0.0038 (standard error 0.0247) for the period including and after I/2002, for the kiosk/visits plot it is 0.0724 (before, standard error 0.0865) and -0.0374 (after, standard error 0.0280) and for the subscription/visits plot it is 0.1092 (before, standard error 0.0774) and 0.1300 (after, standard error 0.0593; p–value 0.046)

Table 1: Summary of causal short–run and long–run effects

		Circulation		**Subscription**		**Kiosk sales**		**Foreign sales**	
		visits ⟶ circulation	circulation ⟶ visits	visits ⟶ subscription	subscription ⟶ visits	visits ⟶ kiosk sales	kiosk sales ⟶ visits	visits ⟶ foreign sales	foreign sales ⟶ visits
Restricted sample: unit root free and autocorrelation free magazines									
# magazines/# obs.		16/932	22/1,388	9/551	13/815	17/1,082	20/1,285	19/1,195	21/1,404
OLS	short–run	-0.0063	-0.0095	0.0144*	0.1214	-0.0307**	-0.0024	-0.0320	0.0216
	long–run	0.0018	-0.3209	0.0456	0.0642	0.0115	-0.1527	0.0028	0.0724
MGE	short–run	-0.0114	0.1825	0.0072	0.4334	-0.0221	0.0787	0.0004	0.0968
	long–run	-0.0019	-0.2671	0.0326	1.0038	0.0070	-0.3456	0.1258	-0.1241
Hausman test p–val.									
Own & cross effects		n.a.	0.0000	n.a.	0.0000	n.a.	0.0000	n.a.	n.a.
Own effect lag 1		0.7629	0.4921	0.3112	0.6082	0.3974	0.5067	0.4015	0.9968
Own effect lag 2		0.1794	0.0000	0.3738	0.0000	0.2977	0.0002	0.0951	0.0000
Cross effect lag 1		0.7034	0.0684	0.1463	0.4512	0.6438	0.3440	0.0924	0.2170
Cross effect lag 2		0.6307	0.1552	0.2048	0.6531	0.5570	0.3117	n.a.	0.0742
All magazines (37 magazines, 2,133 observations)									
OLS	short–run	-0.0197**	-0.0325	0.0085	0.1237**	-0.0351***	-0.0269	-0.0669**	0.0221
	long–run	0.0040	-0.1606	0.0299*	0.2067	-0.0138	-0.1689	0.0151	0.2082
MGE	short–run	-0.0303	0.1103	0.0190	0.4343	-0.0566*	0.0358	-0.0673	0.1729*
	long–run	-0.0135	-0.3987	0.1320	0.7554	-0.0394	-0.4004	-0.0389	0.3274
Hausman test p–val.									
Own & cross effects		0.1779	0.0000	0.0111	0.0000	0.0000	0.0000	n.a.	0.0000
Own effect lag 1		0.1279	0.3613	0.0009	0.0531	0.7406	0.3599	0.2476	0.2947
Own effect lag 2		0.0208	0.0000	0.0003	0.0000	0.0000	0.0000	0.0449	0.0000
Cross effect lag 1		0.5760	0.0281	0.4135	0.5537	0.4239	0.1913	0.9961	0.0403
Cross effect lag 2		0.8746	0.0489	0.0000	0.9782	0.9956	0.1194	n.a.	0.2644

Table 1 displays a summary of the causal short–run and long–run effects of website visits on circulation, subscription, kiosk sales and foreign sales (and vice versa). The arrows ⟶ indicate in which direction the Granger causality runs. "MGE" is short for "Mean Group Estimation". The entire set of estimates is moved to Appendix B. Both the dependent and the explanatory variables are in natural logarithms so that the coefficient estimates directly translate into percentage changes.
Reading example: a one percent change in website visits leads to a reduction in circulation by 1.97 percent. The asteriks' ***, ** and * denote marginal significance levels of one, five and ten percent respectively.

Table 2: Magazine–specific effects

	Circulation			Subscriptions			Kiosk sales			Share	Sub–	
	Effect (in %)	Std. Err. (in %)	Restr. sample?	Effect (in %)	Std. Err. (in %)	Restr. sample?	Effect (in %)	Std. Err. (in %)	Restr. sample?	readers online	scription share	Genre
Allegra	24.1	16.3	no	7.8	34.5	no	24.7	15.6	no	61	3	women
AMICA	6.8	12.9	no	-1.1	8.5	yes	8.7	14.6	no	70	9	women
Auto - Bild	1.0	2.9	no	1.6	1.2	yes	-1.2	2.9	no	54	19	cars
Börse Online	-13.1*	7.2	no	0.5	6.5	no	-23.3**	11.1	no	n.a.	46	finance
Bravo	11.5*	6.7	no	-1.1	2.5	no	15.2*	8.7	no	62	19	youth
Brigitte	3.1	2.8	no	1.4	1.8	no	4.9	3.7	yes	41	32	women
Brigitte Young Miss	-60.1***	22.4	no	-5.2	3.5	no	-75.0**	28.0	no	65	20	women/youth
Bunte	-2.5*	1.4	no	1.0*	0.6	no	-4.1**	1.8	no	30	16	entertainment
CINEMA	10.1*	6.2	yes	-0.8	0.8	yes	11.9	8.0	yes	81	28	cinema
Der Spiegel	4.6**	2.3	yes	0.3	0.6	no	5.7	3.5	no	61	41	business, economics & politics
Ein Herz für Tiere	-10.1	7.2	no	0.5	0.3	no	-16.4	10.9	no	34	40	pets
Elle	-10.0	8.1	no	-0.7	3.0	yes	-9.8	10.0	no	50	11	women
Eltern	4.0	4.1	no	-0.6	1.6	no	7.0	7.1	no	54	42	parenting
Euro	0.3	6.6	no	4.0	2.7	no	-2.1	10.1	no	62	31	business, economics & politics
Familie & Co	-7.2*	4.0	no	0.2	1.1	no	-7.7	5.2	yes	51	42	women
Fit for Fun	-3.6	7.3	yes	-1.5	2.2	yes	-4.2	8.6	yes	67	15	fitness/men's
Flora	-0.9	2.7	yes	-0.3	0.6	yes	-0.5	4.4	yes	33	47	gardening
Focus	-3.5	2.9	no	0.3	0.8	no	-8.9*	5.3	no	60	46	business, economics & politics
Freundin	-1.2	8.2	yes	9.6***	3.3	no	-2.8	9.7	yes	43	17	women
Gala	1.2	2.5	yes	-2.5	1.9	no	3.0	2.8	yes	41	11	entertainment
Geo	-4.1	3.8	no	0.6	1.2	no	-5.2	13.7	yes	61	70	popular science
Guter Rat!	-0.1	2.1	no	1.9**	0.9	no	-0.6	3.2	yes	43	35	business, economics & politics
Impulse	-15.4**	7.0	yes	-0.7	1.9	no	-41.9***	16.6	no	n.a.	58	business, economics & politics
Kicker/Sport-Magazin	-0.7	1.7	yes	1.4	1.2	yes	-1.3	2.7	yes	53	38	sports
Kochen & Geniessen	-15.1*	8.3	no	3.4	3.8	no	-12.2	9.8	no	38	19	cooking
Living at home	-14.1	12.7	yes	0.0	4.5	no	-27.3	17.9	yes	65	27	interior design
Manager Magazin	0.4	2.4	yes	1.0	2.5	no	-0.2	4.8	yes	79	48	business, economics & politics
Max	3.8	10.1	yes	-2.6	3.9	no	3.8	11.2	no	n.a.	15	men's
Mein schöner Garten	-3.1	3.4	no	-1.1	1.2	no	-1.5	6.6	yes	36	63	gardening
Men's Health	4.2	5.4	no	-3.0	2.7	no	-0.8	7.2	no	67	23	fitness/men's
Motorrad	-11.7*	6.9	no	-3.7	3.1	no	-6.6	13.5	no	69	56	motorcycles
Playboy Deutschland	-8.7	21.9	yes	51.1**	20.8	no	-16.2	26.3	yes	65	14	men's
Selbst ist der Mann	1.7	18.3	no	-2.7	2.5	no	9.4	33.7	no	47	n.a.	do–it–yourself
Stern	2.6	2.7	yes	3.7**	1.9	no	2.1	3.6	yes	52	31	business, economics & politics
Super Illu	14.3*	8.2	yes	2.5	2.6	yes	17.1*	10.5	yes	27	25	entertainment
Tomorrow	-13.2	12.7	no	-0.5	8.2	no	-44.3	29.5	no	87	48	TV
Wohnidee	-7.8	5.0	yes	5.1	4.1	yes	-9.2	6.4	yes	57	14	interior design

Table 2 displays a magazine–specific estimates for the effects of website visits on circulation, subscription and kiosk sales. The asteriks' ***, ** and * denote marginal significance levels of one, five and ten percent respectively. "Restr. sample" indicates if the times series of the corresponding magazine are unit–root free and serial correlation–free. The share of readers online is in percent and refers to 2004. Subscription shares are in percent as well and refer to the fourth quarter of 2004.
Reading example: a one percent increase in website visits of Bravo's companion website leads to an increase in total circulation by 11.5 percent.

Appendix A: data and definitions

Data

Our econometric analysis combines two data sets: (i) data on website visits and (ii) data on magazine circulation as well as advertising pages. Both data sets are collected by the same institution, the "Information Association for the Determination of the Spread of Advertising Media" ("Informationsgemeinschaft zur Feststellung der Verbreitung von Werbeträgern e.V.", IVW) and can be downloaded free of charge from the Internet at http://www.ivwonline.de and http://medialine.focus.de. IVW ascertains, monitors and publishes circulation and magazine dissemination information as well as website visits. Magazines freely choose to join IVW to be able to provide potential advertisers with reliable figures on circulation and website visits. The IVW fees, which need to be paid for the collection of circulation data, range between 309 Euros (for magazines with a circulation of less than 5,000 copies in the last quarter of the respective earlier year) and 8,895 Euros (for magazines with a circulation of more than 5,000,000 copies). The fees, which depend on the average number of website visits, range between 300 Euros and 1,200 Euros.

Definitions

Total circulation is measured as the residual between the number of magazine copies produced and the number of magazines returned to the publisher. A specific feature of the German magazine market is that publishers are obliged to pertaining unsold copies from distributors. There is a possibility of cheating on behalf of the publisher here, and cheating indeed has occurred in the past (with severe reputation damages to the cheating magazines), even though this had not been the case for the magazines in our sample. IVW tries to ascertain the figures submitted by the publisher by drawing stratified random samples at newsstands and by extrapolating actual circulation based on this data.

A "Page Visit" is defined as a successful and non–interrupted contact between an Internet browser and the magazine website from another URL. "Non–interrupted" means that, if a website is accessed once and the user continues to surf on the same website by clicking on different contents, this still is counted as a single access.

There is, however, a measurement problem in our data, due to the fact that "unique users" cannot ultimately be circumscribed due to the strict German data secrecy law and since website providers do not ask users to identify themselves. Accessing the websites in our sample is free of charge, so unique users cannot be identified from payment information either.

The information on website visits is gathered from so–called "log–files", i.e. the

protocol of all accessed documents and user data submitted to the Internet server.

Apart from the unique user issue, there also is a second measurement problem: more than one user can be attached to a single IP address, for example since dynamic IP addresses are used, which consequently means that many user visits might go unnoticed in our data. The use of "firewalls" creates the same type of measurement problem, since it translates several internal IP addresses into a single IP address, which means that website accesses by multiple users behind the same firewall are counted as one access. An IP address is an identifier for a computer or device on a network.

Website visits are technically measured by analyzing "clickstreams". A clickstream is the continuum of one or more website visits. The IVW measurement method analyzes when a visit begins within a clickstream, thereby only considering website accesses from the outside. A so–called "referer variables", which are transferred by the web browser to the server log file, are used here. The starting point for a new visit is if a user accesses the website from the outside.

Even though we do have data on the number of "Page Impressions" — i.e. the access of an Internet site — as an alternative indicator of website visits we abstain from using it since it also measures the appearance of frames as a page impression which implies that a single website with, say, ten frames would be counted as ten Page Impressions.

Appendix B: the entire set of estimation results

			Visits ⟶ circulation		Circulation ⟶ visits	
			Coeff.	**Std. Err.**	**Coeff.**	**Std. Err.**
All magazines						
OLS	Own–effects	1st lag	0.3228***	0.0216	0.6590***	0.0213
		2nd lag	0.0666***	0.0217	0.1353***	0.0211
	Cross–effects	1st lag	-0.0197**	0.0096	-0.0325	0.0479
		2nd lag	0.0222**	0.0095	-0.0006	0.0481
	Constant		0.0006	0.0013	0.0045	0.0029
MGE	Own–effects	1st lag	0.2522***	0.0511	0.6110***	0.0568
		2nd lag	0.0097	0.0328	0.0113	0.0277
	Cross–effects	1st lag	-0.0303	0.0213	0.1103	0.0807
		2nd lag	0.0204	0.0148	-0.2609*	0.1406
	Constant		0.0006*	0.0003	0.0029**	0.0012
Unit root free and autocorrelation free magazines						
OLS	Own–effects	1st lag	0.2869***	0.0326	0.5512***	0.0262
		2nd lag	0.0505	0.0328	0.1416***	0.0257
	Cross–effects	1st lag	-0.0063	0.0144	-0.0095	0.0715
		2nd lag	0.0074	0.0140	-0.0891	0.0717
	Constant		0.0008	0.0018	0.0037	0.0037
MGE	Own–effects	1st lag	0.3006***	0.0561	0.5089*	0.0000
		2nd lag	0.0370	0.0343	0.0339**	0.3593
	Cross–effects	1st lag	-0.0114	0.0197	0.1825	0.1665
		2nd lag	0.0101	0.0151	-0.3046	0.0837
	Constant		0.0004	0.0005	0.0022***	0.1635

			Visits ⟶ subscription		Subscription ⟶ visits	
			Coeff.	**Std. Err.**	**Coeff.**	**Std. Err.**
All magazines						
OLS	Own–effects	1st lag	0.4295***	0.0207	0.6579***	0.0212
		2nd lag	0.2785***	0.0202	0.1344***	0.0210
	Cross–effects	1st lag	0.0085	0.0090	0.1237***	0.0491
		2nd lag	0.0002	0.0089	-0.0808*	0.0479
	Constant		-0.0001	0.0012	0.0045	0.0028
MGE	Own–effects	1st lag	0.9501***	0.0541	0.5588***	0.0555
		2nd lag	-0.1716***	0.0345	-0.0084	0.0269
	Cross–effects	1st lag	0.0190	0.0145	0.4343	0.5266
		2nd lag	0.0102	0.0091	-0.0946	0.5056
	Constant		-0.0004	0.0006	0.0023**	0.0011
Unit root free and autocorrelation free magazines						
OLS	Own–effects	1st lag	0.9766***	0.0432	0.5479***	0.0342
		2nd lag	-0.1230***	0.0395	0.1479***	0.0337
	Cross–effects	1st lag	0.0144*	0.0087	0.1214	0.0958
		2nd lag	-0.0077	0.0085	-0.1019	0.0873
	Constant		-0.0008	0.0010	0.0029	0.0045
MGE	Own–effects	1st lag	0.8985***	0.0884	0.5127***	0.0766
		2nd lag	-0.1714**	0.0673	0.0662*	0.0346
	Cross–effects	1st lag	0.0072	0.0072	0.4334	0.4250
		2nd lag	0.0017	0.0042	-0.0108	0.2206
	Constant		-0.0014	0.0012	0.0021	0.0021

			Visits ⟶ kiosk sales		Kiosk sales ⟶ visits	
			Coeff.	**Std. Err.**	**Coeff.**	**Std. Err.**
All magazines						
OLS	Own–effects	1st lag	0.2468***	0.0219	0.6586***	0.0212
		2nd lag	0.0763***	0.0219	0.1350***	0.0210
	Cross–effects	1st lag	-0.0351***	0.0137	-0.0269	0.0339
		2nd lag	0.0258*	0.0136	-0.0080	0.0340
	Constant		0.0008	0.0018	0.0045	0.0029
MGE	Own–effects	1st lag	0.2316***	0.0509	0.6112***	0.0559
		2nd lag	-0.0104	0.0280	0.0138	0.0263
	Cross–effects	1st lag	-0.0566*	0.0302	0.0358	0.0587
		2nd lag	0.0259	0.0225	-0.1859	0.1192
	Constant		0.0008*	0.0004	0.0030***	0.0011
Unit root free and autocorrelation free magazines						
OLS	Own–effects	1st lag	0.2696***	0.0306	0.5504***	0.0272
		2nd lag	0.0579*	0.0308	0.1432***	0.0266
	Cross–effects	1st lag	-0.0307**	0.0155	-0.0024	0.0493
		2nd lag	0.0385***	0.0152	-0.0444	0.0495
	Constant		0.0010	0.0023	0.0039	0.0040
MGE	Own–effects	1st lag	0.2973***	0.0448	0.5063***	0.0718
		2nd lag	0.0491	0.0319	0.0471	0.0373
	Cross–effects	1st lag	-0.0221	0.0242	0.0787	0.0989
		2nd lag	0.0267	0.0252	-0.2331	0.1929
	Constant		0.0011**	0.0005	0.0024	0.0016

			Visits ⟶ foreign sales		Foreign sales ⟶ visits	
			Coeff.	**Std. Err.**	**Coeff.**	**Std. Err.**
All magazines						
OLS	Own–effects	1st lag	0.2326***	0.0215	0.6567***	0.0212
		2nd lag	0.1547***	0.0217	0.1360***	0.0210
	Cross–effects	1st lag	-0.0669**	0.0321	0.0221	0.0142
		2nd lag	0.0762**	0.0317	0.0211	0.0144
	Constant		0.0005	0.0043	0.0046	0.0028
MGE	Own–effects	1st lag	0.2789***	0.0454	0.6011***	0.0571
		2nd lag	0.1011***	0.0344	-0.0085	0.0278
	Cross–effects	1st lag	-0.0673	0.0807	0.1729**	0.0749
		2nd lag	0.0431	0.0312	-0.0395	0.0562
	Constant		-0.0003	0.0008	0.0031***	0.0012
Unit root free and autocorrelation free magazines						
OLS	Own–effects	1st lag	0.2376***	0.0284	0.5617***	0.0260
		2nd lag	0.2154***	0.0288	0.1419***	0.0255
	Cross–effects	1st lag	-0.0320	0.0444	0.0216	0.0187
		2nd lag	0.0335	0.0435	-0.0002	0.0190
	Constant		0.0001	0.0056	0.0036	0.0036
MGE	Own–effects	1st lag	0.2745***	0.0523	0.5616***	0.0485
		2nd lag	0.1677***	0.0406	0.0536**	0.0262
	Cross–effects	1st lag	0.0004	0.0484	0.0968	0.0637
		2nd lag	0.0698**	0.0272	-0.1445*	0.0831
	Constant		0.0004	0.0012	0.0028**	0.0014