

The Impact of Internet on the Market for Daily Newspapers in Italy

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First draft: June 2001
This version: February 2006

ABSTRACT

Recent years have seen a surge in websites that provide news for free and, up to the end of 2001, daily newspapers in Italy have shown a growing trend towards making available online for free the exact articles published on paper.

To assess whether on-line news and traditional daily newspapers are substitute, complement or independent goods, I model the choice between different daily newspapers as a discrete choice among differentiated products. Considering the availability of a website as a newspaper characteristic and controlling for other observable and unobservable characteristics of newspapers and of the outside good, I estimate a logit model of demand on market level data from 1976 to 2001 for the main national daily newspapers in Italy.

Results suggest that opening a website had a negative impact both on the sales of the newspaper who opened it and on those of its rivals. I calculate the implied short-run and approximated long-run losses in both sales and profits and provide some evidence of the additional negative effect stemming from the general availability of Internet and on-line news.

Results also contribute to explaining why, starting from the end of 2001, many publishers introduced a fee to read on-line the paper edition of the newspaper.

Keywords: daily newspapers, Internet, websites, substitution, discrete choice models, product differentiation, dynamics, market level data.

JEL Classification: C23, D12, L86, O39.

^o I am grateful to Massimo Motta and Andrea Ichino for their trust and comments. I also wish to thank Fabian Bornhorst, Timothy Bresnahan, Paul Chwelos, Stephan Fahr, Bronwyn Hall, Helmut Lutkepohl, Johan Stennek, Frank Vella and participants in the Microeconometrics Working Lunch, Second Year Forum 2001/02 and Third Year Forum 2002/03 at the EUI as well as participants in the Economics of Industry Work in Progress Seminar 2002/03 at the LSE and participants in ESSID-2001, the 4th Kiel-Munich Workshop on the Economics of Information and Network Industries, 31st EARIE Conference, the 2004 IDEI conference on Economics of Electronic Communication Markets and the 5th ZEW Conference on the Economics of Information and Communication Technologies. Finally, I am indebted for many suggestions to my colleague Elena Argentesi, with whom I have been building the database on the market for daily newspapers in Italy. All remaining errors in the paper are however mine. Financial support from CESIFIN "Alberto Predieri" Foundation for my visiting period at LSE is gratefully acknowledged.

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1. INTRODUCTION

Internet has undoubtedly been the major economic innovation of the last two decades. Among its main effects was the introduction of new products, such as music, videos, e-books and news. Yet the question of whether these new products are substitutes, complements or independent goods has only recently received some attention in the literature.

This paper looks at the market for daily newspapers in Italy, which in the last ten years has witnessed a surge in the number of websites which provide news and other information for free and, up to the end of 2001, a growing trend by daily newspapers publishers towards putting online the exact articles published on paper.

Table 1 below reports the results from a survey of the Italian research centre Censis, carried out in the year 2000. Almost 26% of the people interviewed reported “using less” newspapers and magazines since they started surfing on Internet¹.

**Table 1 - Changes in the use of old media because of Internet
(% of population above 14 years of age)**

“Since I use Internet I use less ...”	
Books	29.2
Newspapers and magazines	25.8
TV	50.5
Radio	21.6

Censis, 2001

(Note that it was possible to give more than one answer.)

Unfortunately the question did not distinguish between magazines and newspapers and it is also not clear whether the respondents were just spending less time reading the newspaper they bought or they were actually buying fewer newspapers². This paper therefore investigates whether less people buy daily newspapers because of Internet.

¹ Similarly a survey of U.S. adult Internet users carried out in 1997, cited in Barsh et al.(1999), reports that in 1995 13% spent less time reading newspapers and 12% of them spent less time reading magazines, while in 1997 both numbers had grown to 16%.

² It is also not clear whether those 74% of people who did not read less in fact read as much as before or read more, that is whether, although for 26% people there was some kind of substitution, for others there was complementarity, in which case at the aggregate there might be smaller substitutability, independence or even complementarity between the new and the old product.

In fact, following the appearance of Internet and on-line news, a priori three substitution effects can be expected: one from the general availability of Internet, as people allocate less time to reading (and thus do not buy newspapers) because they prefer surfing on the net (effect 1), a second one from the general availability of news online, whereby people do not buy newspapers as they prefer to read news via Internet (effect 2)³, and a third one from the opening of the website of the newspaper itself and the availability of the exact articles of the printed edition, whereby people do not buy a newspaper as they prefer to read it on the Internet (effect 3)⁴.

I focus here on the third of these three conceivable substitution effects, and I therefore look for the effect of the appearance of a daily newspaper website on its market share on paper and on those of its rivals. In addition I look for some evidence on the first two effects jointly, that is of the general availability of Internet and news on-line.

There is one simple reason why online news and daily newspapers might be substitutes: the news appearing on websites are easily the same of those on the daily newspapers⁵. Even more, they are usually fresher. The substitutability might be stronger between a daily newspaper and its website because of a brand effect if a traditional reader likes⁶ or trusts his newspaper more than other information sources. In addition, when the paper edition is available online, a surfer finds on-line the exact content of the paper edition (which is exactly the case for daily newspaper in Italy in the period I consider).

But there are also reasons to expect daily newspapers and online news to be complements. One might for instance expect online readers to get interested in a piece of news they read online and buy a newspaper to read more about it or vice versa a

³ The market for newspaper is usually believed to have already experienced the first two kinds of substitution effects as the appearance of TV changed the reading habits of the Italian population and the appearance of TV news put an end to the second daily edition of most Italian newspapers. See FIEG(1982-2002), Censis(1961-2002).

⁴ Since, as reported below, a growing number of daily newspaper websites has developed an original online edition in addition to making available online the paper edition, one could further distinguish between whether people do not buy the paper edition of the newspaper because they prefer to read it online (effect 3a) or whether they do so because they prefer to read the online edition (effect 3b).

⁵ Notice that there is no copyright on news themselves but only on the way they are written. It is therefore impossible by both nature and law to stop news from spreading. This is why it has always been so important for traditional newspaper to be the first to write a piece of news. But even this advantage has lost its importance on the Internet, as websites can be updated much more frequently than daily newspapers.

⁶ A reader might like a newspaper more than others which provide the same news because of the newspaper's layout or because of the way these news are presented or commented, the leading journalists or, more generally, the editorial line.

newspaper reader might want to go on-line to get fresh updates on some news or find older references to the issue by searching the news archives. Often a website might provide additional content and services which have found no space on the traditional newspaper, such as discussion forums, blogs, smaller cities weather forecasts, audio and video content and so on. Again this complementarity might be stronger between a daily newspaper and its website because of a brand effect if the traditional reader likes or even trusts more his newspaper or an on-line reader likes a daily newspaper website (or the preview of its paper content) and decides to buy the paper edition. In addition, a website might promote subscriptions to the traditional edition by simplifying the process of subscription itself.

Finally, the place (work, home, pub...) and the support (on paper, on screen) where news are read might substantially contribute to diversify the products. At the extreme, one could expect the two goods to be independent if for instance reading a traditional newspaper at home or in a bar is perceived to be so different than reading it on-line⁷. Yet the on-line and the paper product might also be independent at the aggregate level if the website only attracts highly price sensitive consumers who would not otherwise buy the newspaper or attracts only readers from abroad.

To assess whether traditional daily newspapers and their on-line websites are substitute, complement or independent goods, I model consumer choice among different daily newspapers as a choice for a differentiated product, consider the existence of a website as a product characteristic of the traditional newspaper and estimate a logit model of demand using market level data for the period 1976-2001 on the four main national newspapers in Italy, namely *Corriere della Sera*, *La Repubblica*, *La Stampa* and *Il Giornale*, of which all except *Il Giornale* launched and maintained a website in the period under consideration. I then calculate the effect of the decision to go online on the number of copies sold.

Results suggest that website provision had a negative impact on the sales of those who opened it and on their rivals. The estimated average short-run loss in sales per issue due to the joint openings of the websites is 23,350 for *Corriere della Sera*, 30,765 for *La Repubblica*, 24,810 for *La Stampa* and 9,055 for *Il Giornale*, respectively

⁷ Of course, these two experiences might also be judged to be complementary, although in this case, if we don't want to assume that reading a second time the same piece of news has any marginal utility, we have to assume some constraint on online or on-paper reading.

around 3.6%, 5.1%, 6.9% and 3.9%. The average short-run loss from an own website is instead estimated to be 3.1%, that from a rival website 1.5%. The approximated⁸ average long-run losses due to the joint appearance of their websites are instead estimated to be respectively 197,965 , 260,836 , 210,348 and 76,775, approximately 30.5%, 43.2%, 58.5% and 33.1%. The average approximated long-run⁹ loss from an own website is instead estimated to be 26.4%, that from a rival website 12.8%. Finally, there also seems to be some evidence of an additional negative effect due to the general availability of Internet and on-line news.

The loss in sales is estimated to have lead to substantial losses in profits due to a decline in both sales and advertising revenues. Given the average per copy profit margin for our sample of newspapers obtained from balance-sheet data, the estimated average short-run loss per day over the period 1997-2001 due to the joint openings of the websites is 76,292,139 Italian lire (base:1995) for *Corriere della Sera*, 93,070,701 for *La Repubblica*, 80,206,593 for *La Stampa* and 29,699,231 for *Il Giornale*, while the long-run ones are respectively 646,830,507 , 789,084,819 , 680,018,566 and 251,800,102.

Unsurprisingly, starting from the end of 2001, many Italian daily newspapers introduced a fee to read on-line the paper edition of the newspaper. And so did in particular *La Repubblica* in January 2002 and *La Stampa* in 2003.¹⁰

After discussing in the next section the existing literature, in section 3 I give a brief description of the traditional newspaper market in Italy, define the relevant market and describe the sample of newspapers on which I carry out my analysis. In section 4 I describe the development of the on-line market for news in Italian and the history and features of the websites of the four newspapers in my sample. Section 5 introduces the structural model of demand whereas section 6 provides a general overview of the dataset and section 7 discusses the estimation. Section 8 reports and

⁸ See below and Filistrucchi(2005) for the necessity to calculate an approximation and, more generally, a discussion of dynamics in a discrete choice logit model.

⁹The long-run effect is defined as the limit for $t \rightarrow \infty$ of the effect of a permanent change in the characteristic. All other things being equal it therefore measures the effect of the decision to go on line if that decision is not reversed.

¹⁰ *Corriere della Sera* just set up a fee to access the pdf version and the archive of the paper edition. The non pdf online version of the paper edition is still freely accessible after registration. *Il Giornale* opened its website much later than the others and still provides for free access to the full pdf version of the traditional newspaper.

comments on the results. Finally, in section 9, I conclude and discuss possible rationales for the decision to open a daily newspapers website.

2. THE LITERATURE

The question of whether on-line news and news on-paper are substitutes, complements or independent goods had not initially received much attention in the literature.

A few papers in the business literature have dealt with newspapers on-line (Mings & White (2000), Cameron, Curtin & al. (1996) and Cameron, Hollander et al. (1997)). But only very recently, contemporaneously to my work, some papers have dealt with the issue of on-line and traditional newspapers.¹¹

Kaiser (2003) has analysed the effect of website provision on the demand for German women's magazines. Estimates from a static and a dynamic¹² nested logit demand model on quarterly market level data from 1996 to 2001 for 41 magazines suggest that website provision did not significantly affect magazine's market shares, which would imply that either they are independent goods or at the aggregate level the complementarity and the substitution effects balance out. The latter seems more likely as there appears however to be evidence of positive spillover effects¹³ from the presence of competitor's websites, which suggests that across newspapers the complementary effect is higher than the substitution one. A distinctive feature of the German women's magazine is however, as reported by Kaiser, that the content of the paper edition is not available online. More recently, Kaiser & Kongsted(2005) analyze the relationship between website visits, magazine demand and the demand for advertising pages using Granger non-causality tests on quarterly data for the German magazine market between 1998 and 2004. They find evidence for positive effects from

¹¹ Most of the previous econometric work on the traditional market for daily newspapers had attempted to estimate either the price elasticity of demand, as Reekie (1976) and Blair & Romano (1993), to identify the main features of the pricing decisions by a newspaper publisher, as Booth et al. (1991) and Fisher & Konieczny (2000), or to assess the cause of the observed trend towards monopolisation as Dertouzos & Trautman (1990). Cecchetti (1986) has instead studied the frequency of price adjustment whereas Willis (2000) has estimated price adjustment costs in the US market for magazines. Some other studies, such as Hakfoort & Weigand (2000), have dealt with the market for magazines, which of course shares many features with the one for daily newspapers.

¹² The dynamic model is obtained by adding lags of the dependent variable to the aggregate demand equation obtained from the discrete choice model. For a discussion of the ambiguities involved, see below and Filistrucchi(2005).

website visits to circulation, suggesting that news online and on paper are complement goods. They do not however allow for cross effects of the other magazines' websites. They also report that none of the magazines makes the printed version fully available online.

Gentzkow (2005) has instead tested for substitutability, independence or complementarity between the Washington Times, the Washington Post and the washingtonpost.com¹⁴ in a model that allows multiple choices and complementarity using consumer level data. Estimates of his model on pooled data from a survey conducted twice a year between March 2000 and February 2003, controlling for consumer characteristics provides evidence for moderate substitutability between the Washington Post and its on-line edition. The loss in readership of the paper edition due to the presence of the website is estimated to be approximately 1.7%¹⁵. Given the nature of the data, which at each point in time are observations of different samples of individuals and anyway start after the introduction of the website, there is little identification of the website effect coming from the time dimension.

Finally, Simon (2005) analyses the effect on magazines circulation in the US of the different levels¹⁶ of digital content of their website and using annual market level data on 556 magazines from 1996 to 2001 finds substantial evidence of substitution, with the greatest cannibalization of paper sales taking place when digital access to the entire on paper content is offered on-line. The loss in circulation due to the presence of a website is estimated to be approximately 2.5%, which rises to 10% if the full content of the paper edition is available on-line for free¹⁷. In addition, the effect of all traditional rivals having¹⁸ a website is estimated to be -6.8%¹⁹. He also finds that

¹³ Kaiser calls it “awareness” spillover.

¹⁴ Given the small number of observations in the sample, Gentzkow is forced to omit the washingtontimes.com from the analysis, therefore restricting the estimation of the website cross-effect to that of the post.com on the Washington Times.

¹⁵ Gentzkow does not unfortunately report the cross effect of the post.com on the Washington Times sales (nor the elasticity of the post.com with respect to the Washington Times' price), although it is probably small (given that the previous elasticity is).

¹⁶ Simon ranks available online content in four categories: related content (that which does not appear on paper), preview content, selected articles and all articles of the paper edition.

¹⁷ Simon also finds that this effect is due to the effect on subscriptions rather than on sales at the newsstand which seem instead to suffer relatively more from the availability of related content. In Italy however, subscriptions are only a very small proportion of total sales, the opposite of what Simon reports for US magazines, where one can explain the finding by saying that either subscribers are more price sensitive or that non subscribers are more interested in the news themselves than in the articles.

¹⁸ Unfortunately, Simon does not distinguish also between the different level of content provided by rival websites.

¹⁹ This effect is instead higher on subscription than on newsstand sales.

both having full online access to the paper edition²⁰ and having rivals with a website reduce international sales more than US sales. Also the negative effect of a rival website is stronger on foreign sales than on US sales. Competition between traditional newspapers is however modelled only by allowing circulation to depend on the number of competitors.

My results are therefore qualitatively in line with those of both Gentzkow (2005) and Simon (2005), although I additionally distinguish between a short and a long-run effect. They are also not inconsistent with those of Kaiser (2003) and Kaiser & Kongsted(2005), given Simon (2005) finding that substitutability is the highest when there is full on-line access to the magazine content and the fact that, in the period I am considering, all the three newspapers who had a website made available on-line for free the exact content they had on paper.

3. NATIONAL DAILY NEWSPAPERS

In order to investigate if there is any evidence of a substitution or complementarity between the product on paper and the one on-line, I choose to carry out the analysis on the four main national daily newspapers, namely *Corriere della Sera*, *La Repubblica*, *La Stampa* and *Il Giornale*. I follow here the definition of national newspapers market used by the Italian Federation of Newspapers Publishers (FIEG)²¹, as done also by the Italian Antitrust Authority in a complaint investigated some years ago²². According to FIEG, the four newspapers above belong to the

²⁰ As Simon suggests, the stronger effect could be due to the greater reduction in transaction costs for non US based readers, who could access the newspaper earlier and not pay the additional mail costs they likely face with respect to the national subscribers.

²¹ The Italian Federation of Newspapers Publishers (FIEG) traditionally classifies daily newspapers according to their geographic diffusion, to their content and to whether they are owned by a political party or not. It therefore distinguishes between a) provincial b) regional c) multiregional d) national e) political f) financial g) sport and other) daily newspapers. But the market for daily newspapers has also been evolving substantially in the 26 years under consideration. Many national newspapers have been adding local chronicles through the years, while others made agreements with local newspapers which allowed the two to be sold together at a lower price. Moreover, there has been a growing trend of both national and local newspapers to become generalist, by adding richer business and sport sections. Last but not least, the '90s saw the introduction of all kinds of weekly supplements and of a growing number of promotions which resulted in the bundling of the copy of the daily newspapers with books, videotapes, cassettes, audio CDs, CD-ROMs and, more recently, DVDs. Although in most cases bundling left the consumer free to buy the newspaper alone or together with the bundled product (mixed bundling), in the case of some weekly magazines bundled to the newspaper, if the reader wanted to read the newspaper (the weekly magazine), he had to buy the supplement (the newspaper) and was thus forced to pay the higher price for the bundle (pure bundling). In the econometric analysis which follows I try to control for these evolving characteristics of daily newspapers.

²²See Decision 3354/95 Ballarino vs. Grandi Quotidiani

national market together with *L’Avenire*, *Il Giorno* and *Il Foglio* but even alone account for most of the sales in that market. For instance, in 2001 *Corriere della Sera*, *La Repubblica*, *La Stampa* and *Il Giornale* alone accounted for 91% of the average daily sales of the national daily newspapers, whereas the national daily newspapers accounted for almost 36% of all the average daily sales of daily newspapers in Italy.²³

Figure 1 - Corriere della Sera, La Repubblica, La Stampa & Il Giornale on paper

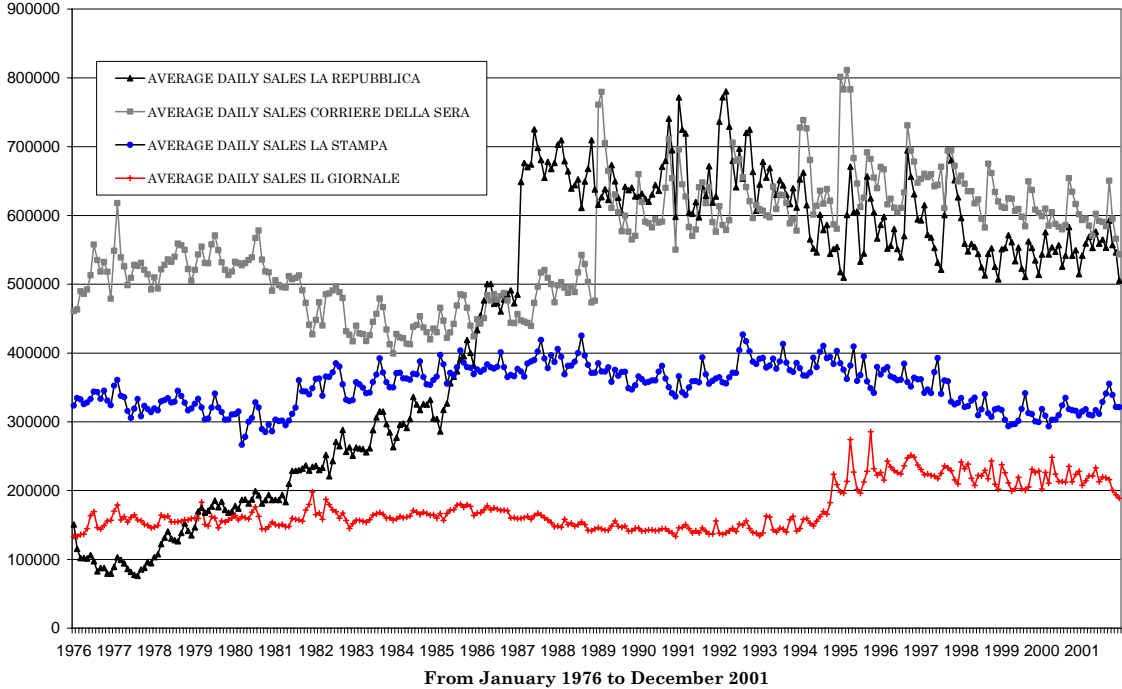


Figure 1 reports the average daily sales in each month from January 1976 to December 2001 for these four daily newspapers. *Corriere della Sera*, founded in March 1876, has been, in the last few years, the one selling more copies, fiercely competing with *La Repubblica*, which was born exactly in January 1976²⁴, while *La Stampa*, which having been founded in Febbraio 1867 is the oldest, shows consistently lower sales in the period considered here. Finally *Il Giornale* was instead launched in June

²³ Today in Italy there are well above 100 registered daily newspapers. However, many of them have a very limited circulation and some are not even sold at the newsstand. For instance, only 64 publishers of 70 daily newspapers are today members of FIEG (though they constitute by far the most of the market in terms of circulation) and only 52 daily newspapers are certified for advertising purposes by Accertamenti Diffusione Stampa (ADS). Interestingly, tabloids are in practice not existent in the daily market (though they are quite widespread in the weekly and especially in the monthly ones) while free daily newspapers appeared only in 2000.

1974 and is the one with the smallest circulation among the four. The opening of the website is an event which took place near the end of the period considered here, as we will discuss in the next section.²⁵

A particular feature of the Italian newspaper market has always been the lack of price competition. Up to the end of 1987 the price was regulated. From the 1st of January 1988 the price was officially liberalized. However, up to today suspicious coordination of price changes appears to be common practice, at least among the main national newspapers²⁶. Only through pure bundling to weekly magazines a limited variability of prices across newspapers has appeared²⁷. Table 2 shows the nominal price of the four daily newspapers in my sample from January 1976 to December 2001 in a day of the week when none of them issues a supplement. It is evident at first sight that prices have always changed almost simultaneously even after their liberalization. It is because of this particular feature that in the econometric analysis I will claim to be allowed to consider prices as econometrically exogenous, or at least pre-determined, to the single publisher decision.

²⁴ Unsurprisingly the graph of its average daily sales seems to follow the usual S-shape well-known in the literature on product diffusion, which already suggests the necessity to use a dynamic model of demand.

²⁵ Looking at the graphs it is also possible to notice that a strong monthly seasonality affects the data. The timing of the spikes which can be observed in January 1989 for *Corriere della Sera* and in January 1987 for *La Repubblica* coincide respectively with *Portfolio* and *Replay*, two games of the lotto kind which could be played only and simply by buying a copy of the newspaper (at the normal price). The jump in sales for *Il Giornale* which took place in 1994 coincides in time with the appearance into politics of its owner Silvio Berlusconi.

²⁶ See the Italian Antitrust Authority communication to the Italian Authority for Broadcasting and the Publishing Industry in January 1996. More in Argentesi&Filistrucchi(2005).

²⁷ For a discussion on identification of the price effect when it varies only with bundling see Argentesi&Filistrucchi(2005).

Table 2 – Nominal Prices without supplements

Since	Corriere della Sera	La Repubblica	La Stampa	Il Giornale
01/06/74	150	150	150	150
01/05/77	200	200	200	200
11/03/79	250	250	250	250
01/08/79	300	300	300	300
17/08/80	400	400	400	400
01/08/82	500	500	500	500
01/02/83	500	500	500	500
01/07/84	600	600	600	600
20/10/85	650	650		650
05/01/86			650	
01/08/86	700	700	700	700
14/06/87	800	800	800	800
01/03/88	900	900	900	900
01/08/88	1,000	1,000	1,000	1,000
01/08/90	1,200	1,200	1,200	1,200
28/06/93	1,300	1,300	1,300	1,300
02/01/95	1,400	1,400	1,400	1,400
10/04/95	1,500	1,500	1,500	1,500
01/06/01				1,700
01/12/01	1,700	1,700	1,700	

unit of measure: Italian lire

4. NEWS ON THE WEB

The last few years have witnessed a surge in the number of websites providing news and other information, as reported in Table 3 below. Many of them were opened by publishers already present in the traditional markets, but a growing number of them is constituted by webzines, that is publications which are available on-line only.

Most traditional publishers are by now on-line, albeit with much different products and not always with a product specially designed for the web. In particular 106 Italian daily newspapers were present on-line in December 2001.²⁸

**Table 3 - Number of news and information sites
by type and date**

Site type	Dec. 1997	Dec. 1998	Dec. 1999	Dec. 2000	Dec. 2001
Daily newspapers	44	54	62	76	106
Periodicals	226	326	501	559	1,051
Webzines	128	197	412	772	1,141
Total	398	577	975	1408	2,298

Source: *Webtime*²⁹

The increase in the number of news and information sites corresponded also to an increase in the quality of the sites themselves. Among daily newspapers in particular there appears to have been a growing trend towards putting online the exact articles published on paper, but also an increasing tendency towards developing an original on-line edition, as reported in Table 4 below.

²⁸ The first newspaper to appear online was the local *L'Unione Sarda* at the beginning of 1995, followed by the political *L'Unità* in August and the national *La Stampa* in September.

²⁹ *Webtime* is an online observatory on news on the web. Its address is www.ipse.com

Table 4 - Number of daily newspaper websites by maximum on-line content and date

On line content	Dec. 1997	Dec. 1998	Dec. 1999	Dec. 2000	Dec. 2001
All articles	11	25	33	54	73
Some articles	6	6	8	7	10
First page	6	7	8	1	3
Presentation	6	8	7	4	12
Under construction	5	3	3	6	7
Not updated	6	2	0	2	0
Newspapers review	4	3	3	2	1
Total	44	54	62	76	106
of which					
with editorial portal	0	0	4	23	23
with local portal	0	3	3	10	17
with on-line newspaper edition	1	1	1	9	12

Source: *Webtime*

Up to the end of 2001 all daily newspaper websites did not charge any fee to access to the information and news they provided, even for reading the articles which appeared also on the traditional newspaper. Since the end of 2001 some of them started to charge a fee, usually to access on-line the paper edition and/or to consult its catalogue.³⁰

Among the four national newspapers in my sample the first one to go on-line was *La Stampa*, which opened its website *www.lastampa.it* in September 1995 and since the beginning made available on the web the traditional newspaper. Only in December 1999 however it started to provide an original on-line edition. *Corriere della Sera* opened its website in December 1996 and it too put on-line the exact articles of the printed edition, but initially the website had to be found inside the website of the publisher holding company RCS. Only in January 1998 was the new website *www.corriere.it* opened and in June 2000 it started to provide in addition to all the articles of its printed edition an original on-line edition. The official website of *La Repubblica* was instead opened in January 1997 at the address *www.repubblica.it*³¹. From its very beginning it started to provide an original on-line newspaper. Finally *Il Giornale* opened a website *www.ilgiornale.it* in May 2005 only, well outside our

³⁰ Most of them offered subscriptions for a given period of time, others also for a given number of issues. It appears in any case that a new business model is believed necessary for the future. This provides weak evidence in favour of product substitutability. But an alternative or additional explanation could be their inability to cover costs through online advertising following the end of the .com bubble on the stock exchange and the economic downturn that followed.

³¹ There was a brief but successful trial in April 1996 when *La Repubblica* opened a specialised website on the occasion of the Italian elections at the address *www.repubblica.interbusiness.it*

sample period, and chose to provide both an original on-line edition and full access to the pdf version of the newspaper.

After a two month trial registration period, in January 2002 *La Repubblica* introduced fees to read on-line the traditional newspaper and search its archive, while maintaining free access to its on-line edition. From the same date it became also possible to download the whole newspaper in pdf format. In January 2003 *La Stampa* adopted a similar business model. *Corriere della Sera*, which had already required registration since August 2000, chose instead to charge a fee only to access the pdf of the paper edition. Maybe because its site is relatively young *Il Giornale* still provides for free full access to the content of the paper edition.

Unfortunately data on on-line readership for newspapers websites, for news sites in general and evidence on Internet use are impossible to find for the first years of life of news websites and more generally of Internet. Even when available they are not easily comparable to each other because standards in measuring Internet audience have been varying a lot³². As a result I cannot use them in the estimation process to identify the three candidate Internet effects mentioned above.³³ They offer however a descriptive, albeit incomplete, picture and some qualitative findings.

According to all sources, *La Repubblica* has up to now been by far the most popular newspaper website and also one of the most popular news and information sites for connections from Italy. Figure 2 shows average daily page views per month for *La Repubblica*³⁴, *Corriere della Sera* and *La Stampa*, from January 1999 to December

³² Internet diffusion and use can be measured by number of hosts, by number of Internet accounts or through surveys or panels of individuals (or households). Internet traffic to a website can be measured either through surveys, panels of surfers, website log files and/or through website cookies. Only in March 2002 Audiweb has started to operate, providing complete measures of Internet audience in Italy for advertising purposes. Still it chose to provide two kinds of audience measures: those deriving from a panel of individuals and those deriving from website log files. It set however rules for the collection of each of these data. See www.audiweb.it

³³ Another difficulty when one wants to use data on online news readership in the estimation is that, unless registration and a password is required, it is not easy to identify how many different individuals (or households) chose to access a website in a given day, which would be the equivalent of how many people (or households) bought a copy of the newspaper. So that one has to trust, if at all available, the representativity of panels of individuals (or households) or of those who did not delete cookies. Downloaded pages (also called page views), although the most easily available measures of Internet traffic, do not in general allow to distinguish between the number of individuals (or households) who chose the product and the intensity of use (pages read). In addition data on page views have to be cleaned, as for instance downloading a page twice might be due to the first attempt not being completely successful or automatic refresh of an open window.

³⁴ On the first day of its life, the 14th of January 1997, the website of *La Repubblica* recorded approximately 500,000 page views. During the 19 days trial period in April 1996 it had enjoyed an average of approximately 300,000 page views a day.

2002. Although the panel of observations is very unbalanced and quite incomplete, average daily page views for *Corriere della Sera* appear to be lower than those for *La Repubblica*³⁵ but higher than those for *La Stampa*.

Figure 3 shows instead average daily page views for *La Repubblica*, in each month from January 1999 to January 2001, disaggregated by sectors of the website. In this period, page views relating to the traditional edition of the newspaper grew from 66,447 to 218,813 and were, after the homepage itself, the main component of overall page views (around 20%), with the on-line edition being the third most visited³⁶. So that the possibility of a full access to the content of the paper edition appears to be a very appreciated feature of a daily newspaper's website. In addition, on-line news reading appears to have been growing considerably and to have become a substantial phenomenon well before the year 2001, the end of our sample period.

Figure 2 - Corriere della Sera, La Repubblica & La Stampa online

³⁵ Also other sources suggest the same ranking. In May 2001, for instance, using a panel of online surfers, Nielsen-NetRatings estimated 724,473 unique visitors and 15,804,751 page views for *La Repubblica* while respectively 384,351 and 7,676,761 for *Corriere della Sera*. Exactly one year before through 12,000 random phone-calls to Italians above 14 years of age Between had estimated 1,140,000 online readers for *La Repubblica* and only 540,000 for *Corriere della Sera*.

³⁶ However, it is impossible to say how much of the observed growth in the number of downloaded pages is due to an increase in the number of online readers and how much is instead due to an increased number of pages read by each of them.

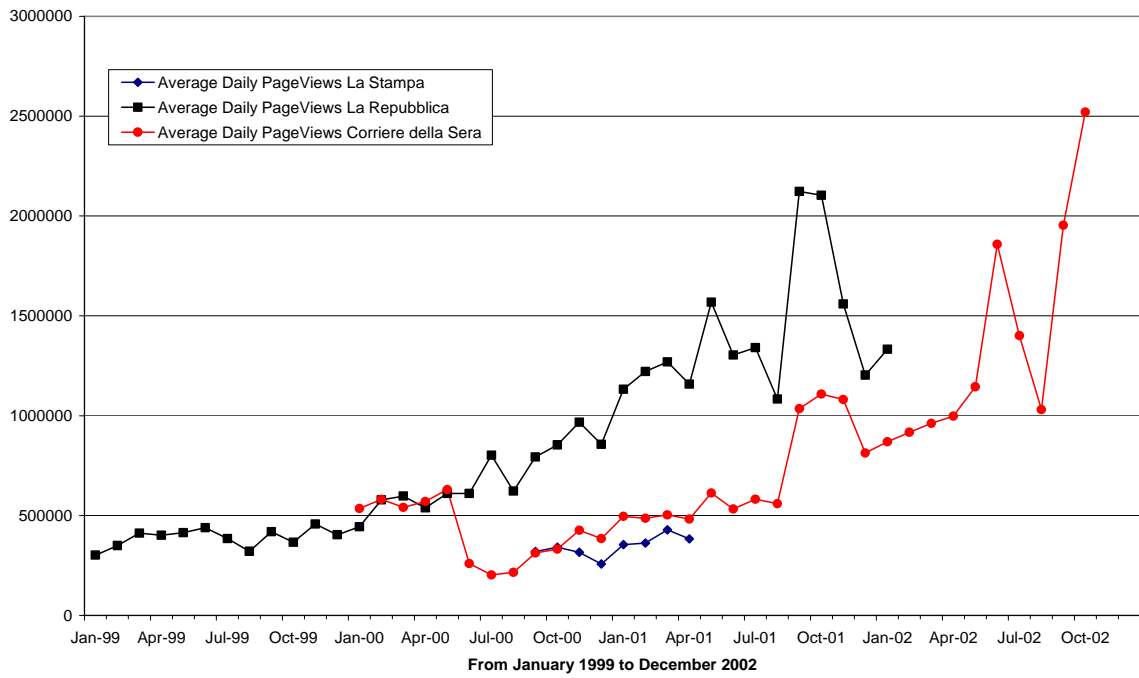


Figure 3 - La Repubblica on line



5. THE MODEL

In order to test for product substitutability or complementarity, I follow Kaiser(2003) and model consumer choice among different newspapers as a choice for a differentiated product, consider website availability as a product characteristic and derive a logit model of demand.

The starting assumption, which is common to fixed coefficients models of product differentiation in general, is the following functional form of consumer i indirect utility from reading newspaper j at time t on day d of the week:

$$u_{ijt} = \alpha(y_{it} - p_{jtd}) + \bar{x}_{jtd}\bar{\beta} + \xi_{jtd} + \varepsilon_{ijt} \quad (1)$$

where y_{it} is the income of consumer i at time t , p_{jtd} is the price of newspaper j at time t on day d of the week, \bar{x}_{jtd} is a vector of observed characteristics (including having a website), ξ_{jtd} is an unobserved (by the econometrician) characteristic, ε_{ijt} is a mean-zero stochastic term, α is consumers marginal utility from income and $\bar{\beta}$ is a vector of taste coefficients.

Such an indirect utility specification assumes a quasi-linear utility function, free therefore of wealth effects, which sounds plausible for daily newspapers. It also assumes that both observed and unobserved product characteristics are the same across all individuals in the market and thus rules out both the possibility of different supplements, promotions and chronicles in different regions and of different prices for different consumers³⁷. Finally, the marginal utility from income and the taste parameters are assumed fixed across consumers and, as a result, consumers heterogeneity enters only through the separable additive random shock ε_{ijt} .

As consumers may decide not to read any of the daily newspapers considered (or any newspaper at all), an outside good is introduced³⁸, consuming which yields to consumer i at time t on day d of the week the indirect utility:

³⁷ Whereas there are in general no discounts in the price to consumers, not even for subscriptions, and local supplements and promotions are not frequent, local chronicles and bundling to local daily newspapers at an unchanged price are quite common.

³⁸ In the absence of an outside good, the model would assume consumers to be forced to choose one of the newspapers. Therefore, it would assume that, if all newspapers opened a website at the same point in time, this would not influence the aggregate sales of all the newspapers, which would be unfortunate, since it would in fact amount to assuming that no substitution takes place between the paper and the online product.

$$u_{iold} = \alpha y_{it} + \xi_{old} + \varepsilon_{iold}. \quad (2)$$

Since the outside good is a composite one, its price and its characteristics are not defined. The price of the outside good is then assumed to be equal to zero³⁹ and all the characteristics are assumed to be unobservable⁴⁰. But as ξ_{old} is not identified, the standard practice is to set it equal to 0, which, as the term αy_{it} eventually vanishes because it is common to all products, is equivalent to normalizing the mean utility from the outside good to zero⁴¹.

Consumers mean utility, δ_{jtd} from reading newspaper j at time t on day d of the week is instead given by:

$$\delta_{jtd} = E_i[u_{ijtd}] = \alpha(y_i - p_{jtd}) + \bar{x}_{jtd}\bar{\beta} + \xi_{jtd} \quad (3)$$

Consumers are then assumed to purchase the newspaper which gives them the highest utility. For convenience, they are assumed to be never indifferent between buying one or another newspaper and never to choose more than one newspaper. The latter assumption is common to most empirical studies on differentiated products markets, the usual justification being that assuming otherwise is econometrically very cumbersome and the assumption is instead, at worst, a reasonable approximation. That is because multiple purchases, though by no means uncommon, are not the rule and in any case even if two products are bought together they are then often consumed at different times, so that the multiple purchase is just an organisational device.⁴² Furthermore, if the potential market size is defined large enough, we might also claim that observed multiple purchases by the same individual are the result not only of his choice but also of somebody else's decision. In particular, if potential market size is defined as total population instead of number of households, the observation that an individual buys two newspapers might, at least to a certain

³⁹ In other words, the consumer is assumed to be choosing between buying one of the above newspapers or not buying it, not between buying one of the newspapers above or buying something else. The decision of whether to buy something is not simultaneous.

⁴⁰ Or equivalently, both the price and the characteristics are assumed to be unobservable and therefore included in ξ_{old} .

⁴¹ So that neither the market shares of the outside good nor those of the inside goods respond to changes in the characteristics or in the price of the outside good, unless time fixed effects are used, as discussed below.

⁴² In this market, the latter justification is, however, weaker than usual, as newspapers become quickly old and buying two newspapers in the morning may indeed be equivalent to buying one newspaper in the morning and one in the evening, but very different from buying one today and one tomorrow.

extent, reflect the fact that he is buying one newspaper for himself and another for another member of his household who asked him to.

Decomposing $\xi_{jtd} = \zeta_{jd} + \zeta_t + \eta_{jtd}$, with η_{jtd} a random shock independent of ε_{ijtd} , allows me to model newspaper-day and time specific unobserved characteristics. Given that the assumption of no correlation between the observed product characteristics and the unobserved product characteristics, which lies at the basis of the random effect specification, does not appear plausible, I consider ζ_{jd} as an unknown parameter specific to each product j on day d of the week, thus leading to a fixed effects model. This choice also allows me to better estimate product differentiation, as in this model the product fixed effects are usually believed to capture also the vertical component.⁴³ In addition, using product-day fixed effects instead of both product fixed effects and day fixed effects has the advantage of leaving room to a different ranking of newspapers for each day of the week, thus allowing vertical product differentiation to vary across days of the week. Moreover, given that unobserved (to me) newspapers' characteristics vary also across day of the week, product-day fixed effects help to identify the Internet effect.

The inclusion of time fixed effects is instead justified by the necessity to control for the change through time in the utility of the outside good. There are many reasons why the latter may change in time. As a result of the appearance of TV, video games, CDs, DVDs, Internet and, more generally, of alternatives to reading a newspaper⁴⁴, the characteristics and price of the outside good might change. Also, changes in the average consumer taste may change the relative utility of the choice to buy the newspaper with respect to any of the activities included in the composite outside good. As its utility is by construction normalised to zero, the absence of time fixed effects or some equivalent control⁴⁵ would raise questions of identification for the estimated coefficients, particularly so in the case of the website effect, which in my model is identified through a dummy variable only.

However, controlling for changes in the utility of the outside good also defines the substitution effect measured by the website dummy variable. In as much as it is

⁴³ See Nevo (2001).

⁴⁴ See Censis (1961-2002) and Censis (2001).

⁴⁵ An alternative to time fixed effects is the use of a polynomial trend, as in Argentesi (2004) and Argentesi&Filistrucchi(2005) or the use of year and month fixed effects, as Kaiser (2003). The time fixed effects are however more flexible in controlling for changes in the utility of the outside good.

possible to assume that the general availability of news on line has the same negative percentage impact on the market shares of all the newspapers in the sample, the substitution effects 1) and 2) discussed above will be captured, among many other things, by the time dummy variables. As a result, the coefficient on the website dummy variable will measure only the substitution effect 3), that is will capture the loss in market share of a traditional newspaper due to people who shift to reading the same newspaper website.

I then assume that ε_{ijt} is i.i.d. across consumers and products and that it is distributed according to a type I extreme value distribution. Assuming ε_{ijt} to be i.i.d. across consumers rules out, in particular, the possibility that individual specific random shocks are correlated across products or equivalently only allows shocks to demand to be correlated across products if they are not individual specific

All the assumptions above lead to a logit model, where the market share of product j at time t on day d of the week are given by:

$$S_{jtd} = \text{Prob} \{ u_{ijt} \geq u_{ikt} \quad \forall_{k \neq j} \}$$

which implies

$$s_{jtd} = \frac{\exp(\delta_{jtd})}{1 + \sum_{k \neq 0} \exp(\delta_{ktd})} \text{ for any newspaper } j \quad (4)$$

and

$$s_{0td} = \frac{1}{1 + \sum_{k \neq 0} \exp(\delta_{ktd})} \text{ for the outside option}^{46}. \quad (5)$$

It should be noted that the presence of an outside good with market share s_{0td} means that observations of newspapers sales are not sufficient to calculate market shares. As a result it is necessary to introduce the concept of potential market size as distinct from the observed market size which would simply be the sum of national newspapers sales. Thus the definitions of market size and market shares are different from the ones commonly used. Potential market size can either be assumed or estimated by parameterising it as depending on some market level data (such as population) which

⁴⁶ Note that the term y_{it} drops out as it is common to all options.

vary across time. Here, as discussed below, I assume potential market size is equal to population above 14 years of age⁴⁷.

For any given characteristic which is expressed by a continuous variable x its own and cross marginal effects on market shares are:

$$\frac{\partial s_{jtd}}{\partial x_{jtd}} = \beta(1 - s_{jtd})s_{jtd} \quad (6)$$

and

$$\frac{\partial s_{jtd}}{\partial x_{ktd}} = -\beta s_{ktd}s_{jtd} \text{ with } k \neq j. \quad (7)$$

So that the own and cross elasticities of the market shares with respect to that characteristic are respectively:

$$\eta_{jjtd} = \frac{\partial s_{jtd}}{\partial x_{jtd}} \frac{x_{jtd}}{s_{jtd}} = \beta x_{jtd}(1 - s_{jtd}) \quad (8)$$

and

$$\eta_{jktd} = \frac{\partial s_{jtd}}{\partial x_{ktd}} \frac{x_{ktd}}{s_{jtd}} = -\beta x_{ktd}s_{ktd} \text{ with } k \neq j. \quad (9)$$

The model thus predicts a different demand, different market shares and therefore different marginal effects and elasticities for each time t and each day d of the week.

If the characteristic is instead a dummy variable the derivatives and elasticities above are not defined. However, defining $\delta_{jtd}(1)$ as δ_{jtd} when $x=1$ and defining $\delta_{jtd}(0)$ as δ_{jtd} when $x=0$, the own effect of the characteristic can be calculated as

$$\frac{\Delta s_{jtd}}{\Delta x_{jtd}} = \frac{\exp(\delta_{jtd}(1))}{1 + \sum_{n \neq 0, J} \exp(\delta_{ntd}(0)) + \exp(\delta_{jtd}(1))} - \frac{\exp(\delta_{jtd}(0))}{1 + \sum_{n \neq 0} \exp(\delta_{ntd}(0))} \quad (10)$$

for any newspaper j , while the cross effect of the characteristic is

$$\frac{\Delta s_{jtd}}{\Delta x_{ktd}} = \frac{\exp(\delta_{jtd}(0))}{1 + \sum_{n \neq 0, k} \exp(\delta_{ntd}(0)) + \exp(\delta_{ktd}(1))} - \frac{\exp(\delta_{jtd}(0))}{1 + \sum_{n \neq 0} \exp(\delta_{ntd}(0))} \quad (11)$$

for any newspaper j and

⁴⁷ An alternative would be using the number of households.

$$\frac{\Delta s_{otd}}{\Delta x_{ktd}} = \frac{1}{1 + \sum_{n \neq 0, k} \exp(\delta_{ntd}(0)) + \exp(\delta_{ktd}(1))} - \frac{1}{1 + \sum_{n \neq 0} \exp(\delta_{ntd}(0))} \quad (12)$$

for the outside option.

Finally, dividing each newspaper market share by the outside good market share, simplifying and taking natural logarithms leads to the following market shares equation to estimate:

$$\delta_{jtd} \equiv \ln(s_{jtd}) - \ln(s_{otd}) = \bar{x}_{jtd} \bar{\beta} + \alpha p_{jtd} + \zeta_{jd} + \zeta_t + \eta_{jtd} \quad (13)$$

As it is well-known to the empirical industrial organization literature⁴⁸, the use of a logit model to estimate demand places restrictive assumptions on own and cross price elasticities or equivalently on own and cross marginal effects of price. The same restrictions are placed on the marginal effects and elasticities with respect to any characteristic which is measured as a continuous variable. In particular, two newspapers with the same market shares will have the same own derivative and also the same cross derivative with respect to any third newspaper. In addition cross derivatives are symmetric. So that conditional on market shares, own and cross elasticities depend only on the characteristic which changes, while in addition all newspapers have the same elasticity of demand with respect to any given newspaper. That is because additive separability together with the i.i.d. structure of the random shocks, when the amount of a positive (negative) characteristic of one newspaper is raised (decreased), requires consumers to substitute towards other newspapers in proportion to market shares, regardless of the other newspapers characteristics⁴⁹. The same restrictions extend of course to the case of a characteristic measured as a dummy variable.⁵⁰

⁴⁸ See for instance Berry (1994), Berry et al. (1995) and Nevo (2000)

⁴⁹ See Berry (1994) and Nevo (2000)

⁵⁰ Although traditionally the most frequently used model specifications have been logit and nested logit, recent research often uses also the more flexible mixed logit models (Berry & al (1995), Nevo (2001), McFadden & Train (2000), Petrin (2002)). Such a model is more general and allows for substitution between products to depend on product characteristics through observable consumers demographics. But it is not solvable analytically and requires estimation by simulation (Nevo (2000)). So that logit or nested logit models not only offer interesting benchmark cases but are still widely used for their computational simplicity or when the implied restrictions on price elasticities and marginal effects are not considered crucial (Brenkers & Verboven (2002), Kaiser (2003), Rysman (2004)), which I believe is the case here.

Whereas the restrictions on own and cross price derivatives and elasticities do not appear to be too much of a problem in this case as I am not directly interested in the effect of price, those on the effects of product characteristics are potentially more problematic. However, I analyse a sample of newspapers, which although differentiated, is quite homogeneous, so that assuming substitution to take place on the basis of market shares is likely to be a good approximation.

Yet even in this context some concerns might be raised with respect to the substitution towards the outside good. In fact, when using, as potential market size, the population above 14 year of age, the highest market share is the one of the outside good⁵¹. As a result, for any increase in a product characteristic which provides positive (negative) utility, most of the consumers are assumed to substitute from (towards) the outside good. However, the characteristic I am interested in is the availability of a website. Then, if a daily newspaper publisher opens a website and there is substitution away from the paper edition of that newspaper, the assumption that most people do not substitute towards other national newspapers but rather substitute towards the composite outside good is not at all restrictive, as in this case the outside good includes the choice of reading news on-line.

Last but not least, considering the availability of a website as a newspaper characteristic in a logit model, introduces a restriction on the sign of the cross marginal effects, in that it assumes the introduction of the website to have a positive effect on the competitors sales. As reported below, to release this assumption I let the utility of a given newspaper depend also on the number of competitors' websites, which I include in the vector of characteristics $\bar{x}_{jid}\bar{\beta}$. Although this does not release the other assumptions of the logit model, it allows for the sign of the cross marginal effect to be decided by the estimation.

6. THE DATA

The dataset I use in the analysis mainly draws from the data collected every year, from 1976 onwards, by the association Accertamenti Diffusione Stampa (ADS) for advertising purposes. Newspapers are free to choose whether to have their data

⁵¹ This would be true even if I used the number of households as potential market size.

certified by ADS or not, but if they choose so they are obliged to provide all the information required and the truthfulness of the reported information is verified by the ADS. Most of the Italian newspapers chose certification, some of them did not, or at least did so only discontinuously.

The information available for each newspaper includes, at various levels of disaggregation, data on sales, prints, gift copies, free subscriptions and paid subscriptions. In particular, they include data on average daily sales in each month and average daily prints in each month and for each different day of the week in each month⁵².

We then added to the database other relevant information, mainly obtained by newspaper publishers themselves, such as the nominal prices of the newspapers, the dates of editor changes and their names, the dates the different supplements first appeared, the list of all promotions with the corresponding periods and the dates the different local chronicles were added to some of the national newspapers or the national newspaper was bundled to a local one.

For the purpose of this study, I also collected the dates of the opening of the newspapers web-sites, the period the traditional newspaper was available on-line for free and, more generally, the dates of major changes to the characteristics of the websites.

I choose to estimate the model on sales data at the newsstand, thus leaving aside the number of paid subscriptions. As in my sample period Internet news are a relatively recent phenomenon and subscriptions are bound to react with lags to any external shock, the effect of news on-line on traditional newspapers would be more difficult to detect if subscription were considered. In doing so I implicitly assume that an observed decline in the average daily sales would not be matched by a counter increase in paid subscription⁵³. In fact, the latter are only a very small part of most Italian daily newspapers circulation⁵⁴, mainly because traditionally copies to subscribers have always been delivered through the general mail service, which

⁵² Thus, for instance, for the Mondays of July 1979, the Tuesdays of that month and so on.

⁵³ This could happen for instance if having a web page makes it easier to subscribe to the paper edition. But subscribers might also, on the contrary, switch to purchase if they learn they can read on the net any issue they miss.

⁵⁴ In 2001 for instance paid subscriptions amounted to only 6,8 % of total circulation for national daily newspapers and to 9% for all daily newspapers certified by ADS . See FIEG (2002).

implies they reach destination in the middle of the morning, too late for people going to work⁵⁵.

By using monthly observations, I would be unable to control adequately for confounding factors when identifying the effect of the website, as I would not, for instance, exploit the fact that weekly supplements are bundled to a given newspaper only on given days of the week and that on that day the price is higher compared to same newspaper in other days and to other newspapers on that day. As I have data on average daily prints for each different day of the week in each month and I can calculate the average daily ratio of sales to prints in each month, I derive data on average daily sales by day of the week multiplying prints by this ratio. The plausibility of the results clearly relies on the assumption that the ratio is constant across days of the week in a given month. This is an assumption that, of course, I cannot test but that I believe reasonable and that allows me to enjoy the greater information provided by more disaggregated data⁵⁶.

Potential total market size was defined as total Italian population above 14 years. This is the usual potential readers definition in studies on newspapers consumption⁵⁷. As estimates of population were available only for the beginning or the end of each year, the data were interpolated linearly to get monthly observations⁵⁸.

Market shares s_{jtd} were thus calculated as the number of sales of newspaper j at time t on day d of the week over total Italian population above 14 years of age at time t ⁵⁹. As discussed above, average daily sales on each day of the week in each month were calculated multiplying the average daily prints on that day of the week by the ratio of average daily sales to the average daily prints in that month. Since for some years and for some daily newspapers the prints (and sales) of the daily newspaper when bundled to the supplement were recorded separately by ADS, average daily sales and average daily prints by month were calculated by averaging with weights given by the effective number of issue reported by ADS, whereas average daily prints by day of the

⁵⁵ See FIEG(2002).

⁵⁶ Alternatively one could use prints as a proxy for sales, assuming the latter to be just a constant proportion, as in Argentesi (2004) and Argentesi&Filistrucchi(2005). Results do not change substantially if average daily prints for each day of the week in a month are used as the dependent variable.

⁵⁷ See FIEG (1982-2002), Censis (1961-2002) and also Kaiser (2003).

⁵⁸ Results are however qualitatively robust to using a constant potential market size during each year.

⁵⁹ Total market size was assumed constant across different days of the week in a month.

week in each month were obtained with weights given by the number of each day of the week in the month⁶⁰.

The outside good market share was calculated as $s_{out} = 1 - \sum_j s_{jtd}$. Clearly it enjoyed the highest market share.

Average nominal prices for each day of the week in each month were obtained by averaging over the official nominal prices of the newspaper with weights given by the number of each day of the week in the month⁶¹. Average real prices were then obtained dividing average nominal prices by the Italian monthly CPI.

Most characteristics included in x_{jtd} were dichotomous and had to be introduced as dummy variables. All of them however changed across time and product. They included dummies for supplements⁶² (both of generalist and women's kind⁶³), for having a Monday issue⁶⁴, for newspaper editors in chief as a proxy for editorial line (some of them switched from one newspaper to the other during the period under consideration), and for games of the "lotto" kind played simply and only by buying the newspaper. I also included the number of competitors' websites as an additional regressor.

Finally, as already mentioned, newspaper-day fixed effects were used as well as time fixed effects.

7. ESTIMATION

Estimating equation (13) as it is leads to substantial autocorrelation in the residuals. The main source of shocks to demand in the market for daily newspapers can be expected to be news itself. Since some events take place either in more than one

⁶⁰ That is they were calculated disregarding strikes, as if the newspapers had always been sold when they were supposed to be. Official days in which newspapers are not sold due to holidays were instead considered.

⁶¹ See note 60.

⁶² In particular, I control for the effect of the supplement on the day it is issued but also for the promotional effect on the other days of the week. See Argentesi (2004)

⁶³ Women's supplements are *Io Donna* for *Corriere della Sera* and *D-Donna della Repubblica* for *La Repubblica*. Generalist supplements are instead *Il Venerdì* of *La Repubblica*, *Sette* of *Corriere della Sera* and *Specchio* of *La Stampa*. The day in which they are issued has for some of them changed through time.

⁶⁴ *La Repubblica* started to have a Monday issue in January 1994, *La Stampa* in January 1992 (though there was a Monday issue of *La Stampa Sera* up to December 1991, when this evening edition of *La Stampa* ceased to be published) and *Il Giornale* in January 1980.

month or in between two of them, the error term η_{jtd} might be auto correlated. If so, the autocorrelation due to news could probably be assumed to be of order one and common to all newspapers.

Yet, there is also another potential source of autocorrelation: the omission of dynamics. Figure 1 above clearly shows that dynamics is relevant, at least in order to explain the diffusion of *La Repubblica*. Dynamics in our model can be due to the presence of consumer habits⁶⁵ and/or the existence of consumption externalities, the latter affecting either consumers' evaluation of the product (that is the indirect utility of consuming it) or consumers' knowledge about the product (that is the choice set). In any case aggregate market shares today would not only be a function of newspapers characteristic and random shocks today, but also of market shares yesterday. Similarly for the ratio of any newspaper market share with respect to the outside good.

I thus estimated the equation above also with the inclusion of lags of the dependent variable, instead of or in addition to an auto correlated random shock, as adding lags of the dependent variable is the usual way to take dynamics into account when estimating a structural model of demand which starts from the specification of an aggregate demand equation. This specification is however not fully consistent with the utility maximization framework at the basis of the aggregate logit model.⁶⁶

If one lag of the dependent variable is introduced, the estimated equation, becomes

$$\ln(s_{jtd} / s_{otd}) = \rho \ln(s_{jt-1d} / s_{ot-1d}) + \bar{x}_{jtd} \bar{\beta} + \alpha p_{jtd} + \zeta_{jd} + \zeta_t + \eta_{jtd} \quad (14)$$

Then (10), (11) and (12) are short-run effects, whereas the long-run effects of the characteristics are unfortunately not defined as including a lag in the equation above only imposes the inter-period marginal effects to be such that

⁶⁵ Dewenter (2002) finds evidence of myopic habits formation while rejecting rational addiction in the market for newspapers in Germany.

⁶⁶ Usually, the problem of dynamics is not recognised in the empirical literature on discrete choice models of product differentiation, which treats observations on the same market at different points in time as observations of different markets. See for instance Nevo (2001) and Brenkers & Verboven (2002). Whereas the issue might not be relevant in a market for durable goods such as automobiles, where those who buy in period t are not likely to buy again in period $t+1$, it certainly is an issue in a market for non durables, such as magazines, newspapers or cereals, where multiple purchases in time by the same consumer can be expected to be the rule rather than the exception.

$$\frac{\partial s_{jdt+T}}{\partial x_{jdt}} = \rho^T \beta s_{jdt+T} + \frac{s_{jdt+T}}{s_{0dt+T}} \frac{\partial s_{0dt+T}}{\partial x_{jdt}} \quad \forall T > 0 \quad (15)$$

and therefore the long-run effects of a permanent change in x to be such that

$$\lim_{T \rightarrow \infty} \left(\sum_{s=0}^T \frac{\partial s_{jdt+T}}{\partial x_{jdt+T-s}} \right) = \lim_{T \rightarrow \infty} \left(\beta \frac{1-\rho^{T+1}}{1-\rho} s_{jdt+T} + \frac{s_{jdt+T}}{s_{0dt+T}} \sum_{s=0}^T \frac{\partial s_{0dt+T}}{\partial x_{jdt-s}} \right) \quad (16)$$

There is therefore more than one structural random utility model which satisfies the condition above. As a result it is not possible to calculate the long-run effect unless we impose some structure on the sources of dynamics. And even so, as the model is nonlinear, assumptions are needed on the behaviour extra sample of the price, the other characteristics, and all the other explanatory variables.⁶⁸

However, if we assume market-shares to be constant through time, then the condition above is satisfied by

$$\frac{\partial s_{jdt+T}}{\partial x_{jdt}} = \rho^T \beta s_{jdt} (1 - s_{jdt}) \quad (17)$$

and

$$\frac{\partial s_{kdt+T}}{\partial x_{jdt}} = -\rho^T \beta s_{jdt} s_{0dt} \quad \forall k \neq j \quad (18)$$

in which case the long-run effects are

⁶⁷ That is because

$$\frac{\partial (\ln s_{jdt+T} - \ln s_{0dt+T})}{\partial x_{jdt}} = \frac{\partial (\ln s_{jdt+T} - \ln s_{0dt+T})}{\partial (\ln s_{jdt} - \ln s_{0dt})} \frac{\partial (\ln s_{jdt} - \ln s_{0dt})}{\partial x_{jdt}} = \rho^T \beta$$

but

$$\frac{\partial (\ln s_{jdt+T} - \ln s_{0dt+T})}{\partial x_{jdt}} = \frac{\partial \ln s_{jdt+T}}{\partial x_{jdt}} - \frac{\partial \ln s_{0dt+T}}{\partial x_{jdt}},$$

so that

$$\frac{\partial \ln s_{jdt+T}}{\partial x_{jdt}} - \frac{\partial \ln s_{0dt+T}}{\partial x_{jdt}} = \rho^T \beta$$

$$\frac{1}{s_{jdt+T}} \frac{\partial s_{jdt+T}}{\partial x_{jdt}} - \frac{1}{s_{0dt+T}} \frac{\partial s_{0dt+T}}{\partial x_{jdt}} = \rho^T \beta$$

$$\frac{\partial s_{jdt+T}}{\partial x_{jdt}} = \rho^T \beta s_{jdt+T} + \frac{s_{jdt+T}}{s_{0dt+T}} \frac{\partial s_{0dt+T}}{\partial x_{jdt}}$$

⁶⁸ See Filistrucchi(2005).

$$\sum_{s=0}^{\infty} \frac{\partial s_{jdt+s}}{\partial x_{jtd}} = \frac{1}{1-\rho} \beta s_{jdt} (1-s_{jdt}) \quad (19)$$

and

$$\sum_{s=0}^{\infty} \frac{\partial s_{kdt+s}}{\partial x_{jtd}} = -\frac{1}{1-\rho} \beta s_{jdt} s_{kdt} \quad \forall k \neq j. \quad (20)$$

Similar problems arise when calculating the long-run effects of a change in a dummy variable. But under the assumption of constant market shares the long-run own effect is

$$\sum_{s=t}^{+\infty} \frac{\Delta s_{jtd}}{\Delta x_{jtd}} = \left(\frac{\exp(\delta_{jtd}(1))}{1 + \sum_{n \neq 0, J} \exp(\delta_{ntd}(0)) + \exp(\delta_{jtd}(1))} - \frac{\exp(\delta_{jtd}(0))}{1 + \sum_{n \neq 0} \exp(\delta_{ntd}(0))} \right) \frac{1}{(1-\rho)} \quad (21)$$

for any newspaper j , while the long-run cross effect is

$$\sum_{s=t}^{+\infty} \frac{\Delta s_{jtd}}{\Delta x_{ktd}} = \left(\frac{\exp(\delta_{jtd}(0))}{1 + \sum_{n \neq 0, k} \exp(\delta_{ntd}(0)) + \exp(\delta_{ktd}(1))} - \frac{\exp(\delta_{jtd}(0))}{1 + \sum_{n \neq 0} \exp(\delta_{ntd}(0))} \right) \frac{1}{(1-\rho)} \quad (22)$$

for any newspaper j and

$$\sum_{s=t}^{+\infty} \frac{\Delta s_{osd}}{\Delta x_{ktd}} = \left(\frac{1}{1 + \sum_{n \neq 0, k} \exp(\delta_{ntd}(0)) + \exp(\delta_{ktd}(1))} - \frac{1}{1 + \sum_{n \neq 0} \exp(\delta_{ntd}(0))} \right) \frac{1}{(1-\rho)} \quad (23)$$

for the outside good.

I estimate the dynamic model above by OLS. As discussed by Nickell (1981), including lags of the dependent variable, or more generally predetermined variables, in a fixed effects model leads to estimates which are inconsistent for $n \rightarrow \infty$ but consistent for $t \rightarrow \infty$. Given that in our case $n=28$ & $t=312$ the relevant asymptotics is that for $t \rightarrow \infty$ and OLS estimates are consistent.

Although they are usually recognised as endogenous and instrumented, I did not instrument prices. Given the already discussed lack of price competition among newspapers in Italy, I claim they can be considered exogenous or at least predetermined. It is a common assumption in discrete choice models of product differentiation to assume that product characteristics are exogenous or

predetermined⁶⁹. Given the evidence provided above, there is no reason to believe prices too cannot be considered econometrically exogenous or predetermined in this case.

There is finally a potential endogeneity issue to be discussed about the decision to open a website. As it is very difficult to find an instrument for the opening of a website, I cannot do much about it, except pointing out that it is anyway a one-time decision, not one that is repeated each period, so that econometrically it is in many periods predetermined.⁷⁰ Again not instrumenting for the website dummy is therefore as much right as not instrumenting for characteristics in any discrete choice model of product differentiation. In addition, as I discuss in Section 9, it is possibly an unavoidable decision, one that is mainly driven by the appearance of a new technology, which would have in any case been adopted, as shown by the data on news websites in Table 3.

8. RESULTS

Results from the OLS estimation of equation (14) are reported below in Table 5 below. In an aggregate logit model the estimated parameters are the taste parameters in the indirect utility function, which are assumed not to vary across consumers. Therefore a negative (positive) coefficient indicates that a given characteristic of the newspaper on average reduces (increases) readers' utility from reading it. But of course it also implies that the characteristic taken into consideration had a negative (positive) impact on the newspaper market shares.

The coefficient for the availability of a website has a negative sign and is significant. Therefore the availability of a website decreases mean consumer utility from reading that newspaper on paper⁷¹, as it appears to have had, in general, a negative impact on its market shares. So that daily newspapers and their websites are to be understood,

⁶⁹ See for instance Nevo (2001) or Brenkers & Verboven (2002).

⁷⁰ Regarding the direction of the possible bias, if those who opened a website did it because their sales were already declining more (less) or where expected to decline more (less) than those who didn't, then the negative effect is probably overestimated (underestimated) and might not even be there (might anyway be there).

⁷¹ This is however different from saying that the introduction of websites decreased consumers' welfare because in order to measure the change in consumers' welfare one would need to measure consumers' mean utility from reading the online newspapers.

at least at the aggregate level, as substitutes rather than complements or independent goods.

Also the estimated coefficient for the number of rivals' websites has a negative sign, though significant only at a 90% confidence level. Thus, the presence of another newspaper's website decreases mean readers' utility from reading a given newspaper. So that there is also a stealing effect from other daily newspapers' websites. Overall, the effect of opening a website is a substitution from all newspapers in the market to that newspaper's website.

The coefficient for real price, though small in size, is negative and significant at a 95% confidence level. The bundling of weekly generalist magazines to some of the newspapers appears to have had a positive impact on market shares both on the day of the week of issue and on the other days of the week, whereas the bundling of weekly women magazines does not appear to have had any effect⁷².

Finally, the possibility to play games such as Lotto simply and only by buying a copy of the daily newspaper appears to yield a positive utility to consumers and therefore to have had a significant positive impact on newspapers market shares.

⁷² See Argentesi(2004).

Table 5 – Logit estimates of taste parameters⁷³

Explanatory variable	Coefficient (standard error)
Website	-0.0323*** (0.0082)
N° of rival newspapers' websites	-0.0162* (0.0085)
Real price	-3.34*10 ⁻¹⁵ ** (1.53*10 ⁻⁵)
Games	+0.0325*** (0.0047)
Generalist supplement (day of issue)	+0.0373*** (0.0096)
Women's Supplement (day of issue)	+0.0212* (0.0116)
Generalist supplement (all days)	+0.0853*** (0.0063)
Women's Supplement (all days)	-0.0075 (0.0127)
ρ	+0.8820*** (0.0051)

dependent variable $\ln(s_{jid} / s_{oid})$; *** 1% **5% * 10%;

number of observations: 8160; number of regressors: 366 ; R^2 : 0.9859

From the estimated taste parameters, using the formulas reported above, I calculate the own and cross effect in number of copies sold of the decisions to go on-line of *Corriere della Sera*, *La Repubblica* and *La Stampa*.

⁷³ Estimated coefficients and standard errors for editors dummies, newspaper-day and time fixed-effects are not reported.

**Table 6 – Average short-run own and cross effects of a website
(number of copies lost in a day)**

Effect of (row) On (column)	Corriere della Sera	La Repubblica	La Stampa	Il Giornale	Outside Good
corriere.it	-19,830 (6,140)	-8,743 (5,766)	-5,041 (3,318)	-3,415 (2,258)	+37,029 (15,172)
repubblica.it	-9,627 (6,050)	-17,988 (5,555)	-5,042 (3,308)	-3,416 (2,254)	+36,073 (14,966)
lastampa.it	-7,567 (5,017)	-8,979 (5,591)	-10,707 (3,315)	-3,486 (2,173)	+30,738 14,514

bootstrapped standard errors in parenthesis

**Table 7 – Average approximated long-run own and cross effects of a website
(number of copies lost in a day)**

Effect of (row) On (column)	Corriere della Sera	La Repubblica	La Stampa	Il Giornale	Outside Good
corriere.it	-168,123 (53,022)	-74,123 (50,087)	-42,744 (28,814)	-28,957 (19,609)	+313,947 (132,555)
repubblica.it	-81,623 (52,525)	-152,509 (47,963)	-42,751 (28,721)	-28,959 (19,579)	+305,841 (130,702)
lastampa.it	-64,152 (43,510)	-76,131 (48,491)	-90,774 (28,616)	-29,553 (18,876)	+260,610 (126,434)

bootstrapped standard errors in parenthesis

Table 6 reports the average short-run effects on sales, whereas the average approximated long-run effects are reported in Table 7. Also reported are bootstrapped standard errors for these averages obtained by 1,000 draws with repetition from the data⁷⁴. The opening of an own website is estimated to have caused a short-run loss in sales of 19,830 to *Corriere della Sera*, of 17,988 to *La Repubblica* and of 10,707 to *La Stampa*. These losses are on average approximately 3.1% of their sales (with a bootstrapped standard error of 0.9%). The estimated long-run losses are instead 168,123, 152,509 and 90,774 respectively, on average approximately 26.4% of their sales. Also losses due to a rival's website are substantial: around 1.5% (s.e. 0.95-0.99%) in the short-run and 12.8% in the long-run.

⁷⁴ Given that for each product the model predicts a different effect at each time t on each day of the week d the reported estimates are averages over more than 400 observations. The latter is one of the reasons why the bootstrapped standard errors are so high.

Clearly, losses in sales imply losses in sales revenues. However, as first pointed out by Corden(1952) and Reddaway(1963), a newspaper publisher maximizes profits obtained by selling both newspapers and advertising slots on them, taking into account possible indirect externalities between the two markets, particularly the one whereby the more readers a newspaper has the highest the demand for advertising space⁷⁵. Consistently Chapter 2 find a significant coefficient for circulation in the aggregate demand equation for advertising. As a result, the estimated loss in sales is likely to have lead ceteris paribus to a loss in advertising revenues on paper. Table 8 below reports the average profit margin per printed copy for each year in the period 1997-2001. The margin is calculated by dividing the total annual revenues from sales and advertising of each newspaper⁷⁶ in my sample by the number of copies sold, subtracting from the revenue per copy of each newspaper the average cost per copy in paper and other non durable material⁷⁷ for daily newspapers with an average circulation higher than 200,000 a day⁷⁸ and then averaging across the four newspapers.

**Table 8 – Average profit margin
(per printed copy)**

Year	Average profit margin
1997	1,640
1998	1,695
1999	1,884
2000	2,135
2001	1,775

Source: FIEG, ADS and Deloitte&Touche&FIEG
unit of measure: 1995 Italian lire

⁷⁵ The daily newspaper market is therefore a two-sided market. See Argentesi&Filistrucchi(2005).

⁷⁶ These are reported in FIEG (1986-2002).

⁷⁷ As in Argentesi&Filistrucchi(2005) I choose costs net of both labour costs (which include journalists and editors) and other services costs (which include also freelance journalists) as they should not affect the marginal cost of a copy.

⁷⁸ These are reported in Deloitte & Touche & FIEG (1993-2002). They also report the average cost across national newspapers. However, given that the other national newspapers are very small and might thus have very different costs, I prefer to use the average cost for daily newspapers with circulation higher than 200,000. The latter however also include sport newspapers such as *La Gazzetta dello Sport* and business ones such as *Il Sole24 Ore*.

An approximation to the short and long-run losses in profits on the traditional market can then be calculated by multiplying the estimated average daily losses in sales by the average profit per copy. The estimated losses in profits per newspaper issue are the ones reported in Tables 9 and 10.

Table 9 – Average short-run own and cross effects of a website from 1997 to 2001 (profits lost in a day)

Effect of (row) on (column)	Corriere della Sera	La Repubblica	La Stampa	Il Giornale
corriere.it	-51,505,421	-22,412,560	-15,218,082	-9,709,789
repubblica.it	-25,029,742	-46,206,001	-15,236,930	-9,721,968
lastampa.it	-25,161,181	-22,558,397	-31,448,533	-9,772,163

unit of measure: 1995 Italian lire

Table 10 – Average approximated long-run own and cross effects of a website from 1997 to 2001 (profits lost in a day)

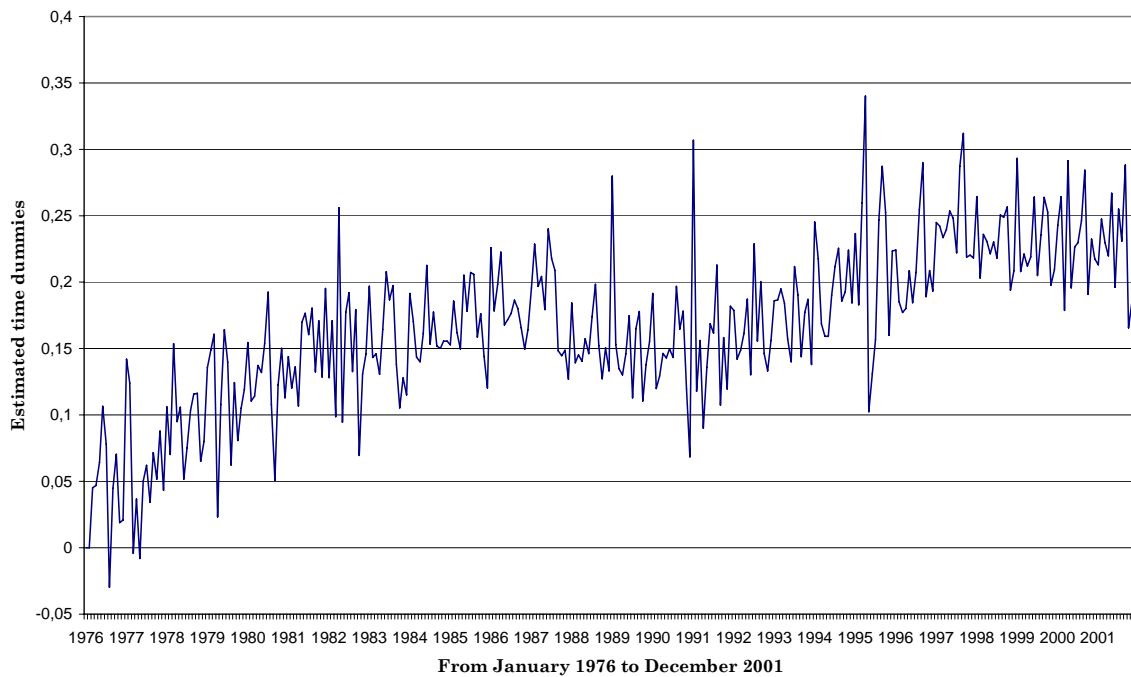
Effect of (row) on (column)	Corriere della Sera	La Repubblica	La Stampa	Il Giornale
corriere.it	-436,680,350	-190,021,251	-129,024,034	-82,322,866
repubblica.it	-212,210,598	-391,750,071	-129,183,838	-82,426,127
lastampa.it	-213,324,988	-191,257,703	-266,631,281	-82,851,700

unit of measure: 1995 Italian lire

As discussed above, thanks to the use of time fixed-effects, in as much as it is possible to assume that the general availability of news on line has the same negative percentage impact on the market shares of all the newspapers in the sample, the ones reported in Tables 6 and 7 are the estimated losses in sales of a traditional newspaper due to people who shift to reading the same newspaper website or a competitor's website (effect 3 discussed in section 1). I cannot instead identify the other substitution effects (effects 1 and 2), that is those due either to people allocating less time to reading (and thus not buying newspapers) in order to surf the web or to people not buying newspapers as they prefer to read news via Internet. These are however captured, among many other things, by the time dummy variables. Figure 4 shows a graph through time of the estimated time fixed effects. Although in the whole sample period they are not a monotonic function of time, they appear to have been slowly

declining since the second half of 1997⁷⁹, just as internet news have been growing considerably (see Table 3 above). The implied increase in the utility of the outside good might thus be due also to the appearance of Internet.

Figure 4 - Estimated changes in the utility of the outside good



9. CONCLUSIONS

All in all, Internet appears to have had a negative impact on the sales of the four main national daily newspapers in Italy. So that news on line and daily newspapers appear to be substitute goods at least at the aggregate level. But of course it is not possible to rule out that for some people they are not only independent goods but even complements, in which case my analysis simply suggests that the number of those who consider them substitutes is higher than those for whom they are complements. Also the estimated long-run, albeit approximated, effect does not support the idea that they will disappear, but rather predicts a substantial drop in sales, all other things being equal (including the absence of on-line fees).

⁷⁹ This might be due also to the fact that in November 1997 costs of phonecalls to connect to the Internet were cut substantially as a consequence of a specific government decree which aimed at increasing Internet use in the country. More or less in the same period many portals started to offer free internet access, e-mail and web space.

These findings are qualitatively in line with those of Simon (2005) for the magazine market in the US and those by Gentzkow (2005) for the daily newspaper market in Washington DC. They are also not inconsistent with Kaiser (2003) who analyses the women's magazine market in Germany. I believe the reason why I find such a significant negative effect lies in the particular feature of the Italian daily newspaper market in the period I consider, as publishers were making available online for free the exact articles published on paper. As a result the degree of substitutability between the traditional newspapers and its website was at its maximum, as suggested also by Simon (2005). For women's magazines in Germany instead the features of the websites seem to suggest a lower degree of substitutability and possibly leave more room to complementarity between the two products. The reason why my estimates are higher than Gentzkow (2005) might instead be, in addition to analysing a different market, that he cannot fully exploit the time dimension in order to identify the effect of websites.

Some caution is needed when discussing the implication of the finding that for a daily newspaper opening a website leads to a loss in sales. As discussed in the previous section such a loss will surely lead not only to a loss in sales revenues but also to a loss in advertising revenues. Yet opening a website might still have been a profitable choice or at least a rational one. If so, possible explanations for why traditional newspapers publishers opened websites and even put online for free the exact content of the paper edition could therefore be a) the prediction (or at least the expectation) that they would be able to raise on-line advertising revenues that compensate or more than compensate the costs of on-line publishing, the loss in paper sales and that in advertising revenues of the paper edition⁸⁰ or b) the attempt to establish a position in the new market or to build up consumers loyalty, especially among young people, in the expectation of a shift of news consumption from paper to the web and with the objective to set a fee for newspapers on-line once they succeeded in this. Even if predicted (or expected) not to be profitable, because overall on-line revenues do not cover the costs of on-line publishing, the loss in paper sales and in advertising, the choice to open a website might still have been a rational one, if c) publishers expected in any case a shift of consumption to the new media and therefore chose to minimize loss by attracting to their website part of the readers who would anyway have

⁸⁰ There might also be an additional loss in advertising sales if also online and on-paper advertising are substitutes, an issue which has not been analysed yet in the empirical literature.

switched to on-line reading. The latter explanation is in particular consistent with the estimation of a negative effect of rival newspapers' websites.

These reasons, though not necessarily only one of them, might explain why *La Repubblica* set up a fee for reading online the paper edition from January 2002, five years after the first opening of the website, and why its example was soon followed by many other daily newspapers, including *La Stampa* and, in part, *Corriere della Sera*. More generally, this choice appears part of a new business strategy of daily newspapers in Italy after 2001⁸¹, a strategy which seems to build on a) attempting to reduce substitutability, while increasing complementarity by adding additional related content and services to the website, and b) trying to get additional on-line revenues, not only through fees but also by enjoying the higher advertising value of those on-line readers who register in order to access on-line the paper edition of the newspaper.

⁸¹This tendency is not only a feature of the Italian market. From September 2005 the New York Times started to charge visitors to access part of its online content: the editorials and the archive. The announcement set the end of the New York Times exception in the U.S.

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