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The Impact of Weekly Supplements

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Demand Estimation for Italian Newspapers: The Impact of Weekly Supplements*

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Abstract

This paper looks at a form of non-price competition that has taken place in the Italian newspaper market, whereby weekly supplements are sold with the newspaper at a higher price. I estimate the impact of this selling strategy using a logit and a nested logit model of demand on a panel of Italian newspapers. I show that supplements increase the readership both in the weekday of issue and in the average weekday. This suggests that supplements are a way to attract new readers for the newspaper. This promotional effect is due both to business stealing and to market expansion.

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1 Introduction

The Italian newspaper market has always been characterized by a low level of price competition, both at the national and at the local level. This is partly due to the fact that until the end of the Eighties prices of newspapers were regulated, and were therefore uniform across newspapers. Even afterwards, however, there did not seem to be a strong competition in prices, since prices have had a quite stable pattern and price increases have always been quite simultaneous across newspapers. However, starting from the end of the Eighties, new forms of non-price competition have taken place. In particular, the practice of selling supplements and inserts together with newspapers has become increasingly widespread. The success of this practice is proved by the fact that, according to a recent survey conducted by Censis, 36,5% of the people declare that they buy a newspaper for the supplements it contains.[1] This so-called "supplements war" has had an important impact on the structure of competitive interactions in this market. In this paper I will test the empirical relevance of this phenomenon by estimating a model of newspapers demand on a panel of national Italian newspapers.

Typically, different types of supplements are packaged with the newspaper in different days of the week. In addition to these weekly supplements, there are other occasional initiatives, such as language courses, encyclopedias released over a number of issues, guides to business and investment, games with prizes (like Bingo or lotteries), books, cassettes and so on. These types of supplements and inserts differ not only for their content, but also for the selling strategy adopted: some of them are provided with the newspaper for free, others are sold as a package with the newspaper at a higher price, others can be purchased optionally at an additional fee.

While the promotional feature of free supplements like inserts with specialized information (travels, music, business, etc.), guides and games is evident,[2] it is more of a puzzle to understand the rationale of the pricing strategy used for weekly supplements, which are sold as a package with the newspaper at a higher price.[3] If indeed the introduction of a supplement could attract some readers that would not buy the newspaper otherwise, the fact of bundling it with the newspaper and sell it at a price which is higher than the usual price may discourage part of the established readership.

I argue that this bundling strategy can be seen as a promotional device:

[1] This figure is provided in CENSIS, 2001.

[2] Inserts with specialized information (travels, music, business, etc.) seem to be aimed at integrating and enriching the editorial content of the newspaper, and therefore at making it more valuable to readers. Encyclopedias and guides are probably aimed at inducing individuals that would buy the newspaper only occasionally or never to purchase it regularly during a certain period in order to collect all the installments. Therefore the promotional feature seems to be the prevailing one, given also that these initiatives are largely unrelated with the editorial content of the newspaper. As for games with prizes, they were very successful in increasing sales, and therefore very effective as a promotional device.

[3] The order of magnitude of the price increase of the newspaper in the day of issue of the magazine was of 25% in the first phase, and up to 50% subsequently.

people who would not buy the newspaper do indeed purchase it because they are attracted by the supplement. Then, because of the implicit learning costs of reading a newspaper (which might consist in the fact of getting to know where to find the different types of news, of getting used to the format, to the position of the different sections and more generally to the editorial line of a newspaper), the new readers attracted by the supplement might continue to purchase that newspaper afterwards, increasing in this way its readership. Therefore bundling would be a way in which the publishers try to extend the group of readers for the newspaper by providing an almost unrelated product capable of attracting new customers that would not purchase that newspaper otherwise. In order to formalise this idea, in Appendix 3 I provide a numerical example showing how bundling can be used as a promotional device.[4]

In an oligopolistic setting, this idea could be reinterpreted in terms of switching costs: being captured because of the bundling device, consumers become more reluctant to patronize another firm. Therefore, once a publisher has managed to induce new consumers to buy its newspaper, it will enjoy some brand loyalty that will reinforce its market power.

This idea differs from the traditional explanations for commodity bundling that have been provided in the economic literature. The most common explanation for bundling is price discrimination: loosely speaking, selling two products as a package would increase monopoly profits by allowing to implicitly charge different prices for different goods to consumers with different reservation values for the two goods. This idea was first expressed by Stigler (1968), articulated through numerous examples in a widely cited work by Adams and Yellen (1976), and generalized by Schmalensee (1984) and McAfee, McMillan and Whinston (1989).

My alternative explanation does not rely on the existence of static price discrimination reasons for bundling. More precisely, bundling may be profitable as a promotional device even in the case it was not profitable as a price discrimination device in the short run (see Appendix 3). The publisher of a newspaper may indeed decide to bundle the newspaper with the supplement in one period instead of pricing them independently (even though the latter strategy would be more profitable in the short run) if it expects to attract new readers for the newspaper and therefore to gain more profits in following periods. Therefore bundling could be seen as an optimal price discrimination device in the long run.

An interesting issue is also why the newspapers prefer to sell the newspaper and the supplement only as a bundle and do not give instead the possibility of buying the newspaper alone, which means that they adopt a pure bundling strategy instead of a mixed bundling strategy. In the above mentioned literature on bundling it is usually argued that mixed bundling is a superior strategy because it is a more flexible tool of price discrimination. However, Anderson and Leruth (1993) show that in an oligopolistic setting mixed bundling may not

[4] Another possible reason behind the introduction of magazines might be advertising revenues. However, this is explanation is not at odds with the one proposed in this paper, as the two could well coexist.

be optimal because it entails competition on many fronts or products. In the example of Appendix 3 I also provide an example where pure bundling might be more profitable than mixed bundling. This is due to the fact that by allowing also to buy the newspaper alone the newspaper firm would lose profits on the supplement because some readers would not buy the bundle anymore.

The econometric task amounts to understanding the impact of supplements on newspapers' circulation and in particular to testing the hypothesis that bundling may be used as a promotional device. I estimate the impact of supplements using a logit choice model of demand on a panel of the four biggest newspapers in Italy from 1976 to 2000, which is based on a data set that I built at the European University Institute. I compare the result obtained using the multinomial logit model with the one obtained under an alternative specification, namely a nested logit model. The latter assumes that consumers first decide whether to purchase a newspaper or not and then choose among the existing newspapers (which constitute a nest).

I show that the supplements have a positive impact not only on circulation in the day of issue, but also on the own average circulation, which means that there has been a promotional (or spillover) effect. I then address the issue of whether this promotional effect comes from market expansion or from business stealing by computing the marginal effect of the introduction of supplements on other newspapers' circulation and on the outside good. The relative magnitude of these two effects depends on the model adopted: in the multinomial logit model the market expansion effect dominates over the business stealing effect, suggesting that the effect of magazine introduction was to attract new readers rather than stealing readers to each other (at least for the newspapers considered). However, in the nested logit specification, which takes into account the fact that a reader of a newspaper is more likely to substitute with another similar newspaper than with the outside good (i.e. buying no newspapers at all), the business stealing effect is more important than in the logit case, and is even bigger in terms of copies than the market expansion effect.

My work is related to the empirical literature on the estimation of demand with differentiated products[5] and in particular to Kaiser (2003), who analyzes the impact of the introduction of websites on German women magazines and to Petrin (2002), who examines the effects of the introduction of new products (with an application to minivans) using a random-coefficients model of demand.

This paper is also related to the recent empirical work on bundling, namely to Crawford (2001) and Gandal et al. (2003). These papers analyse the price discrimination explanation for bundling by estimating the correlation of consumer valuations (which should be negative in order for this explanation to work), whereas I test a different explanation, namely that bundling can be a promotional device (or long-run price discrimination device).

The paper is organized as follows. In Section 2 I describe the data set used, present some descriptive statistics, and provide illustrative evidence of the effect

[5] For a discussion of the estimation issues of the Logit model and its applications see Werden et al. (1996).

of interest. Sections 3 and 4 discuss the empirical methodology and the related estimation issues respectively. Results are presented in Section 5. In Section 6 I show additional results on the magnitude of the business stealing effect and of the market enlargement effect. Section 7 concludes and discusses directions for future research. The Appendix contains a description of the data set, tables and figures, and a numerical example motivating my theoretical hypothesis.

2 Data

I perform the analysis using a data set which is mainly based on the data collected by the Associazione Diffusione Stampa (ADS). The ADS data set covers the majority of Italian newspapers and magazines and provides therefore a quite complete picture of this market over the last 25 years.[6]

I restrict my analysis to the national newspapers of general information. This market seems to be distinguishable both from the market of business newspapers and from that of sport newspapers. Moreover, the national newspapers of general information seem to belong to a different market than local newspapers, which mainly cover local news and are therefore directed to a different kind of readership.[7]

Among the national newspapers of general information, the two leading ones in terms of circulation are *Repubblica* and *Corriere della Sera*, while *La Stampa* has a lower market share and *Il Giornale* is well below *La Stampa*.[8],[9] There is also a fringe of smaller newspapers which account for less than 10% of the market of national newspapers of general information, and therefore I choose to disregard them in the present analysis.

The series of monthly average daily printed copies for the four newspapers considered are presented in Figure 1 in the Appendix 2. Among these, only *Il Giornale* has never had any weekly magazine. *Corriere della Sera* and *Repubblica* started to introduce regular weekly magazines from 1987, respectively *Sette* on Saturdays from September 1987 (moved to Thursday from November 1992) and *Venerdì* on Fridays from October 1987.[10] In 1996, they both started to issue also a magazine for women (*Corriere della Sera* in March and *Repubblica* in May). *La Stampa* introduced a weekly magazine of general information

[6] For a complete description of the data available, see the Appendix 1.

[7] These distinctions have been made clear by the Italian competition authority in several occasions (see for example the case 3354/95 *Ballarino vs. Grandi Quotidiani*).

[8] If we consider these four newspapers as belonging to a single market, *Corriere della Sera* would have a market share of 36% in terms of circulation, *Repubblica* 32%, *La Stampa* 20% and *Il Giornale* 12% (as of year 2000).

[9] Other national newspapers which were or are politically-oriented (controlled directly or indirectly by political parties) had in the past periods of very high circulation (e.g. *L'Unità*, the newspaper of the left-wing party). Unfortunately, the political newspapers are not present (at least not continuosly) in the ADS database.

[10] There is a number of other magazines and inserts that are distributed with the newspaper for free, many of which are not issued on a continuative basis or are only issued in some areas. Given the huge number and variety of these supplements, it is not possible to account for all of them. Here I only consider the supplements that are sold with the newspaper at an additional price.

similar to the one of the two other competitors (*Specchio*) only from January 1996 and, after four years in which it was sold at a charge together with the newspaper, it started to be distributed for free in September 2000. Table 1 below summarizes the dates of first issue of each magazine and the corresponding weekday. Figure 2 in the Appendix 2 shows the series of prices of newspapers with and without the magazines of general information.

Table 1: Dates of first issue of magazines

	Corriere	*Repubblica*	*La Stampa*
General magazine	Sat. from 9/87 Thu. from 11/92	Fri. 10/87	Sat. 1/96
Women magazine	Sat. from 3/96	Tue. from 5/96	—

2.1 Illustrative evidence on the effect of supplements

A preliminary descriptive analysis on the data series of monthly average printed copies in the weekday of issue of the respective magazines for *Repubblica*, *Corriere della Sera* and *La Stampa* (the newspapers which introduced a weekly supplement) seems to suggest that at least for the first two newspapers the supplements were very successful, meaning that in the weekday of issue the sales have increased (of course the effect varies over time). Figure 3 shows the daily average number of copies printed on Fridays in each month for the whole period. The dark line represents the Fridays in the absence of the magazine, whereas the light line is the number of printed copies of the magazine sold together with the newspaper.[11] The graph seems to suggest that the introduction of *Venerdì* had a relevant and positive impact on the number of printed copies of *Repubblica* on Fridays.

Figures 4 and 5 show the series for average printed copies on Saturday and on Thursday for *Corriere della Sera*. As to the period in which *Sette* was issued on Saturday, it seems to have increased the printed copies both with respect to the previous period and with respect to the times in which the newspaper was sold alone. Moreover, its impact seems greater when it was sold on Thursday (see Figure 5). One possible explanation for this is that, given that this supplement is very similar in contents and format to *Venerdì* (and they both provide a weekly guide to TV programs and to the main events of the following week), the fact of issuing one day before the other gives a competitive advantage that is reflected in a higher number of copies sold. As far as the women magazine is concerned, this magazine, after a peak in the first months, does not seem to have affected the trend of *Corriere della Sera* in a very strong way.

Figure 6 shows the average printed copies on Saturday for *La Stampa* before and after the introduction of the magazine *Specchio*. After a huge peak in the

[11] From October 1987, that is from the introduction of *Venerdì*, the Friday issue of the newspaper started to be filed separately by ADS, because it contained also the magazine. It was filed together with the other days of the week only when, for some reason (holidays, strikes) the newspaper was issued without the magazine.

first few months, circulation does not seem to have significantly increased after the introduction of the magazine.

Despite the fact that the tables seem to suggest that there has been a positive effect of the introduction of the supplement on the sales of the newspaper in the day of issue, one could reasonably argue that there might be other reasons for this observed increase in the number of printed copies. For instance, it could be that the overall number of printed copies of the newspaper has increased, and therefore the increase does not involve that day only. Alternatively, it may be that the sales of all newspapers, and not only the sales of the newspaper under consideration, have increased in that day. Therefore, in order to isolate the effect of the supplement, ideally we would like to know what would have happened to the number of copies had the supplement not been introduced. A first indication can be obtained by comparing the number of copies when the newspaper was sold with the supplement with the number of copies when the newspaper was sold alone, as we did in Figures 3-6. Unfortunately, the number of observations for the times in which the newspaper was sold alone is very little, and does not allow to make a full comparison.

One possible way to deal with this problem is to compare what happens to the number of copies printed in the day of issue of the supplement with the number of copies printed in another day by the same newspaper (or in the same day by another newspaper), which is assumed to be representative of what would have happened had the supplement not been introduced. This is reminiscent of the Differences-in-Differences strategy used in the empirical literature to estimate causal effects in panel data (see for instance Card and Sullivan, 1988, and Card, 1990).

For the moment, let us focus on the case of *Il Venerdì* of *Repubblica* (I have replicated the same type of analysis also for the supplements of *Corriere della Sera* and *La Stampa* and their results are briefly discussed below). In order to identify the causal effect of the supplement on Friday copies, we will compare what happened to the number of copies printed by *Repubblica* with what happened to the number of copies of other comparable newspapers (for the reasons explained above, I will use *Corriere della Sera*, *La Stampa* and *Il Giornale*), which are used as a proxy of what would have happened to *Repubblica* absent the supplement.

In order to be able to take what happened to the copies sold on Fridays by the other newspapers as a proxy of what would have happened to Friday sales of *Repubblica* had it not introduced the supplement, we have to assume that the impact of the supplement would have been the same for every other newspaper. In other words, in the Differences-in-Differences exercise, we have to assume that there is no *specific* effect of the supplement on *Repubblica*. This identifying assumption cannot of course be tested because the introduction of that particular supplement only took place in that newspaper.

In our setting, there is an additional assumption to be made, namely that the issue of the supplement in one newspaper does not influence the sales of the other

newspapers.[12] Of course, this is quite a strong assumption in this context where we have competing newspapers. This is one of the reasons why the evidence presented in this section should be only taken as illustrative. However, this preliminary exercise is useful to get an idea of the effect of interest by looking at the data. We will then investigate the impact of supplements and the issue of business stealing in the context of the structural model in the next section.

If the assumptions discussed above hold, we can identify the causal effect of *Venerdì* of *Repubblica* on the weekday of issue by computing the difference between the number of printed copies of Friday of *Repubblica* the month before and the month after the introduction of the supplement, and then subtract the difference between the number of printed copies of Friday of the three other newspapers before and after. Results of this exercise are in Table 7. We observe that the causal effect identified in this way seems to be very strong just after the introduction of the supplement (there is a big jump in correspondence of the introduction of the supplement) and then remains mostly positive for many years until mid-Nineties, when it becomes negative.[13],[14] The magnitude of this impact is even stronger than it appears at first sight, because we have to take into account that in the months just before the introduction of the magazine the circulation of the newspaper had already grown a lot (probably because of the effect of "Portfolio", a game like Bingo). Therefore the introduction of the supplement seems to have had a strong (and long-lasting) impact on the number of copies printed in the day of issue.

In order to disentangle the two differences (the difference for the Fridays of *Repubblica* before and after and the difference for the Fridays of the other newspapers before and after), I also plotted them separately (Table 8). From this table we can see that the number of copies on Friday experienced a sharp increase after the introduction of the supplement, and the difference with the month before the introduction started to be positive (and remained positive approximately until 1995). On the other hand, the same difference for the other newspapers increased steadily and started to be positive in 1998.

The same kind of exercise made with respect to other newspapers can be replicated by comparing the Friday copies of *Repubblica* with the copies printed in the other days by the same newspaper, which are therefore taken as a proxy for what would have happened on Friday had the supplement not been introduced. The same reasoning made above holds *mutatis mutandis*. In this setting the identifying assumption is that the effect of *Venerdì* of *Repubblica* would have been the same for any day of the week. The other underlying assumption is that

[12] This is not an issue if there is the possibility of taking as a comparison a reality which is not influenced by the phenomenon of interest, as it is the case in Card (1990) who compares what happened to the unemployment rate in Miami after the Mariel immigration with what happened in other comparable US cities (which therefore are not likely to be influenced by that migration wave).

[13] In order to explain the initial success of the supplement, we should also consider that the introduction of these supplements is generally preceded by big promotional campaigns on the media.

[14] The drops in 1988 and 1989 correspond to months where the supplements was not issued due to strikes or other reasons.

the introduction of Friday has no effect on the other days, which is actually part of what we want to investigate. We will keep this assumption here and discuss it in more depth later.

The results of the Differences-in-Differences exercise with respect to the other days of the week are shown in Figure 9. This table suggests that the causal effect was positive and very high after the introduction of the supplement, and continued to be positive (even if with a non-monotonic trend) afterwards.

The evidence illustrated in this section seems to confirm the idea that the introduction of the supplement increased the circulation of the newspaper in the weekday in which the supplement is issued. A further issue is to determine whether this increase was to some extent spread over the other days of the week, supporting thus the hypothesis that the supplement had a spillover effect on other weekdays of the newspaper.

A first way to see the impact of *Venerdì* of *Repubblica* on the copies sold in the other days is by disaggregating the two differences in the Differences-in-Differences exercise with respect to the other days of the week (see Figure 10). Ideally we would expect to observe that the difference for Fridays after and before the introduction of the supplement decreases over time (because it is reasonable that after an initial boom of sales there is a progressive decline and stabilisation) and instead that the difference for the other days after and before the introduction of the supplement increases over time, meaning that the issue of a magazine on a certain day of the week has a positive externality (maybe delayed in time) on the other days of the week as well. However, it is not easy to isolate this effect because there are many other events that might have influenced the circulation of *Repubblica* on the other days, not last the introduction of similar supplements by other newspapers. Indeed, the trends of the series on Table 10 do not have a clearcut interpretation in this sense.

One possible way to deal with this issue is to compare the number of printed copies by *Repubblica* in the other days of the weeks except Friday with the corresponding number of the other newspapers. However, we should be aware of some problems when comparing the number of printed copies of *Repubblica* with that of the other comparable newspapers in order to derive implications about the impact of *Venerdì* of *Repubblica* on the copies sold in the other days of the week of *Repubblica*. First of all, as I said above, the introduction of *Venerdì* was almost simultaneous with that of *Sette* by *Corriere della Sera* and was eventually followed in by the introduction of other magazines which might have had a negative impact on the number of copies sold by *Repubblica* in other weekdays except Friday. Moreover, it is not easy to determine what is the delay with which the positive effect of *Venerdì* on Friday could have been spread to the other weekdays. Given these warnings, it may however be useful to make a Differences-in-Differences exercise between the average number of copies printed by *Repubblica* in all the weekdays except Friday and the average number of copies printed by the three other newspapers in all the weekdays except Friday. The results are shown in Table 11. The fact that the Differences-in-Differences is negative may partly be due to the fact that the sales of *Repubblica* had a sharp increase in the first months of 1987, which were also the ones just before

the introduction of the magazine. Given that in that period we had a peak in the number of copies printed, it is not surprising that the difference between the number of copies sold after (and before) that period is negative. Therefore, even though it seems that the D-D is higher in the years after the introduction of the supplement (approximately until 1995), it would be difficult to conclude that there has been a positive effect of the supplement on the other days of the week.

However, the interpretation of this evidence does not provided clearcut results, and it may therefore be useful to do further work with these or other techniques in order to give support to the idea that the introduction of the supplement may have a positive impact on the sales of the other weekdays due to the fidelisation of readers.

Similar results are obtained for the case of *Corriere della Sera* and *La Stampa.*[15] As to *La Stampa,* the effect of the supplement on the weekday of issue, both with respect to other newspapers and other weekdays, seems to be very strong at the beginning, but with a sharp decrease after the first year. There is then a progressive decline until the year 2000, when the supplement started to be given for free. The effect on other weekdays is not clearly observable, but the same observations made in the case of *Repubblica* hold.

Also in the case of *Corriere della Sera*, there seem to be a strong effect on the weekday of issue, both with respect to other newspapers and other weekdays of the same newspaper. This effect seems to be stronger when the weekday of issue was moved from Saturday to Thursday (one day before the issue of the magazine of *Repubblica*![16]). Here the effect on other weekdays seems to be stronger than for the two previous newspapers.

We now have to turn to an econometric analysis in order to correctly identify and measure the effects of interest controlling for other factors that may affect newspaper circulation.

3 The structural model

In order to determine whether the magazine affected the circulation of the newspaper in the other days of the week and the circulation of the competing newspapers, I consider a framework that takes into account the determinants of the demand for newspapers.[17] Therefore I estimate a differentiated product model of demand using the panel data on the average daily number of copies printed in each weekday of each month for *Repubblica*, *Il Corriere della Sera*, *La Stampa,* and *Il Giornale.*[18] Under this approach, the magazine is considered as a quality

[15] These results are not included in the paper but are available upon request.

[16] Since these magazines also contain a TV guide for the incoming week, the "first-move advantage" can be an important element of success.

[17] This framework could also be used for other types of analyses, like measurement of market power and merger analysis.

[18] The data for the monthly average of daily copies by weekdays (e.g. the average number of copies of Mondays in March 1988) are available in this dataset only for the printed copies, and not for sales. I also replicated the analysis with the data on sales, and the results were

characteristic of the newspaper, and its impact on demand is estimated using a multinomial logit model of product differentiation.

The utility of consumer i from purchasing product j at time t is a function of observed and unobserved characteristics ($\mathbf{x}_{jt}$ and ξ_{jt} respectively), price (p_{jt}), and unknown parameters. The following functional form is assumed:

$$u_{ijt} = \mathbf{x}_{jt}\boldsymbol{\beta} + \alpha p_{jt} + \xi_{jt} + \epsilon_{ijt} \tag{1}$$

where ϵ_{ijt} is an i.i.d. extreme-value distributed error term.

Notice that in this specification the vector of taste parameters $\boldsymbol{\beta}$ and the price coefficient α are assumed to be constant across consumers. This assumption of the logit model has strong implications on the pattern of substitution among products. In particular, it implies that consumers substitute away in proportion to market shares regardless of the characteristics of the products. The full random coefficients model, recently developed by Berry, Levinsohn and Pakes (1995) and following literature, overcomes this problem by treating the taste parameters as consumer-specific, allowing therefore for a more flexible pattern of substitution. However, given that for the present analysis own- and cross-price elasticities are not of primary interest, I use the (fixed-coefficient) logit model, whose estimation algorithm is computationally much easier to implement. Moreover the logit model allows to better exploit the panel structure of the data, which is very important in my data set.[19]

Given the panel structure of data, the unobservable component ξ_{jt} can be decomposed as

$$\xi_{jt} = \gamma_j + \varepsilon_{jt} \tag{2}$$

where γ_j is a product-specific component and ε_{jt} is an i.i.d. error term varying across products and time. The product-specific component γ_j is assumed to be an unknown parameter specific to each product, which leads to a fixed-effect model.

Consumers are assumed to purchase one unit of the good that gives them the highest utility.[20] Consumer mean utility δ_{jt} from consumption of good j at time t is

$$\delta_{jt} = \mathbf{x}_{jt}\boldsymbol{\beta} + \alpha p_{jt} + \xi_{jt} \tag{3}$$

The logit model leads to the following form of market share for product j at

similar. However, since these data do not contain information on weekdays, they do not allow to distinguish the impact of the supplement on the day of issue from the impact on other days and other newspapers.

[19] For computational reasons, in random coefficients models different years are treated as different markets (see for example Nevo, 2000), which makes it impossible to use standard panel data techniques.

[20] The implicit assumption, common to most empirical studies on differentiated product markets, is that consumers purchase at most one product. This assumption seems reasonable in the case of newspapers, where multiple purchases are likely to be negligible, especially if the unit of analysis is the individual and not the household, as it is the case here. Moreover, subscriptions and corporate buys of newspapers, which are typically multiple purchases, are very low in Italy (around 7% for daily newspapers in 2001, source FIEG).

time t (choice probability):

$$s_{jt}(\delta_{jt}) = \frac{\exp(\delta_{jt})}{1 + \sum_{k \neq 0} \exp(\delta_{kt})} \tag{4}$$

where s_{jt} is the number of copies printed by newspaper j at time t relative to the total market size. Market size is defined as the total population in Italy older than 14 years at time t.

The specification of the demand system is completed with the introduction of an outside good, whose utility is generally normalized to zero, so that the market share for the outside good is

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

The estimation equation for the market share of product j at time t is obtained by taking logarithms and subtracting the log of the market share of the outside good from the log of the market share of each product, i.e.:

$$\begin{aligned} \ln(s_{jt}) - \ln(s_{0t}) &\equiv \ln\left(\frac{\exp(\delta_{jt})}{1 + \sum_{k \neq 0} \exp(\delta_{kt})}\right) - \ln\left(\frac{1}{1 + \sum_{k \neq 0} \exp(\delta_{kt})}\right) \\ &= \delta_{jt} = \mathbf{x}_{jt}\boldsymbol{\beta} + \alpha p_{jt} + \xi_{jt} \end{aligned} \tag{6}$$

The dependent variable is therefore the (log) market share of newspaper j at time t relative to the market share of the outside good, which is calculated as $s_{0t} = 1 - \sum_j s_{jt}$.

The logit model illustrated above implicitly assumes that the substitution pattern across products and with the outside good is driven by market shares only. This means that, for given market shares, consumers are equally likely to substitute toward other similar newspapers than toward the outside good (buying nothing). In reality, however, it seems plausible to assume that the reader's choice is twofold: first, she chooses whether to buy a newspaper at all, then which one to buy among those available on the market. This implies that, for given market shares, consumers substitute more toward other similar newspapers than toward the outside good (which include other types of newspapers as well).

The idea that consumer tastes might be correlated across products can captured by the nested logit model of demand, which groups products according to some observable characteristics which are expected to make them closer substitutes for consumers. I therefore assume that the outside good is the only component of the first nest, whereas the four newspapers considered all belong to the other nest.

Under this assumption, consumer utility is:

$$u_{ijt} = \mathbf{x}_{jt}\boldsymbol{\beta} + \alpha p_{jt} + \xi_{jt} + \zeta_{igt} + (1 - \sigma)\epsilon_{ijt} \tag{7}$$

which is the same as (1) except for the term ζ_{igt}, which represents consumer utility common to all products of group g, and for the error term, where $\sigma \in [0, 1)$

is a parameter that measures the correlation of utility within each group (if $\sigma \to 1$ products within a group are perfect substitutes, whereas if $\sigma = 0$ they are independent and we are in the logit case).

The demand equation for the nested logit model is: [21]

$$\ln(s_{jt}) - \ln(s_{0t}) \equiv \mathbf{x}_{jt}\boldsymbol{\beta} + \alpha p_{jt} + \xi_{jt} + \sigma \ln(s_{jt|g}) \tag{8}$$

where $s_{jt|g}$ is the share of good j within group g. Since the last term is endogenous, it needs to be instrumented, an issue that I will discuss in the next section.

4 Empirical specification

In order to estimate the market share equations (6) and (8), I use the data on the average daily number of copies printed in each weekday of each month (for instance on the Mondays of July of 1989) from 1976 to 2000 included for the four newspapers mentioned above. This allows to use information on price variability across newspapers within the week,[22] and also to distinguish the impact of the supplement on the day of issue from the impact on other days.

The presence of weekly magazines is considered as a product characteristic, and is therefore included in the vector of product characteristics $\mathbf{x}_{jt}$. I distinguish between magazines of general information and women magazines. The vector of product characteristics $\mathbf{x}_{jt}$ includes therefore:

- dummies for the weekdays in which the own magazine is issued: this variables represent the impact of the magazine on the day of issue, which tells us whether the magazine is a successful one or not;
- a dummy for the introduction of the weekly magazine of general information;
- a dummy for the introduction of the women magazine.

  The last two variables are meant to capture the effect of the introduction of the magazine on the overall circulation of the newspaper, and measure therefore the "promotional effect" (or spillover effect).

For each newspaper, I also add a dummy for the launch of the website, a dummy for the games with prizes, the number of local sections, the changes of editors, the issue of the Monday page, and dummies for other events like elections, sport events, and months in order to deseasonalise the data. I also add a time trend in order to control for a possible trend of growth of the whole market, or a general shift in consumer tastes.

[21] For a treatment of the nested logit model see Berry (1994), and for applications Ivaldi and Verboven (2003) and Verboven e Brenkers (2002).

[22] I included in the dataset the time series of prices in different days of the week, which were different from each other just because of the supplements.

Given that the residuals in both models seem to be serially correlated, I estimate a fixed effect logit model with Newey-West standard errors. Therefore the error structure is assumed to be heteroskedastic and possibly autocorrelated up to 12 lags (12 months).[23]

Given that the data are monthly average printed copies by weekday for each newspaper, the fixed effect should be a newspaper-weekday fixed effect rather that a newspaper fixed effect. This allows for a different ranking of newspapers across weekdays, which is very convenient when considering the impact of magazines that are issued in different days of the week by different newspapers.[24]

Notice that price endogeneity is not a big concern in this framework because prices were regulated until the end of the Eighties and even afterwards there was not much price variability across newspapers. From Figure 2 we can see that the pattern of cover prices does not seem to change much after the liberalization in 1989. (Nominal) prices remain quite stable over time and do not seem to react simultaneously to demand shocks. Therefore prices can be considered at least predetermined.[25]

A problem of identification arises instead in the nested logit model, since the within market shares $s_{jt|g}$ are endogenous. As commonly done in the literature,[26] I instrument them with the characteristics of the other products belonging to the same product group (launch of websites, of supplements, and games).

5 Results

The framework adopted allows to disentangle several effects of the introduction of supplements. The estimation results for the logit and the nested logit model are presented in Table 2 in Appendix 2.

First of all, for both types of supplements it is possible to see whether they lead to an increase in the circulation on the weekday in which they are issued. This is the first step of the analysis, because the promotional impact of magazines can only arise if they are actually successful, that is if on the day the newspaper comes out with the magazine the number of copies increases. If this is the case, then one can look at whether this increase of sales arises to the other weekdays as well, which is the effect of interest.

Under both the specifications presented in Table 2 the coefficient for the

[23] Results of estimates obtained under the assumption of autocorrelation of order one (AR(1) fixed effects) are very similar to the ones shown below and are available upon request. I opted for the current specification because it does not require autocorrelation to be of order one, but allows instead for a more flexible correlation pattern.

[24] Notice that the vector of fixed effects ξ is identified separately from the coefficients on characteristics because in my framework the latter are time-variant (see Berry, 1994 p. 256 and Kaiser, 2003).

[25] I also ran two separate regressions, one for the period where prices were regulated and one for the following period, and the results do not seem to differ too much.

[26] See for example Berry (1994), Ivaldi and Verboven (2000), and Kaiser (2003).

day of issue of the magazine of general information is positive and strongly significant. This suggests that the introduction of this type of supplement has been a successful practice in terms of circulation, at least in the weekday in which it is issued.

But these results tell us even more. Specifically, the fact that the coefficient of the dummy for the introduction of the magazine of general information is positive and significant in both regressions suggests that the supplements had an impact not only on the day of the week in which they are issued, but also on other days, which is the promotional effect we were looking for. Therefore this kind of supplement seems to have had a positive impact on average circulation for the newspapers considered. This finding seems to confirm the hypothesis that in this case bundling might have been used as a promotional device, namely to gain a new group of readers that are first attracted by the bundled magazine but may continue to purchase the newspaper alone afterwards. Notice that this explanation does not exclude other additional motivations for bundling: selling the magazines with the newspapers might also have increased advertising revenues (because of increased advertising space on high-quality color paper), but my results show that for sure there was a positive impact on circulation.

Whether this increased circulation comes from people who were not used to buying a newspaper or from readers of competing newspapers is an issue that will be discussed in the next section.

The results for women magazines do not suggest such a strong positive effect. The coefficient corresponding to the weekday of issue is positive in both models, but not very significant in the nested logit specification. Moreover there does not seem to be a significant effect on all weekdays, suggesting that women supplements does not have a significant promotional effect. Therefore the reason behind the introduction of women supplements may be other than an attempt to attract new readers, and is probably more linked with advertising revenues, which are likely to be very important for this kind of magazines.[27]

The other coefficients have the expected sign and are very precisely estimated. The price coefficient is negative: estimated own elasticities are around 0.37 in the logit model and 0.26 in the nested logit model. Cross elasticities are estimated in a range from 0.008 (*Corriere della Sera*) to 0.002 (*Il Giornale*) in the nested logit, and are a bit smaller in the logit model. These estimates of elasticities are consistent with previous studies: for example, Bucklin, Caves and Lo (1989) estimate own elasticities which range from 0.26 to 0.55, whereas Dertouzos and Trautman (1990)'s estimates are around 0.44.

The coefficient relative to the number of local sections is positive, indicating that adding local sections is a successful strategy. This can help explain the increasing trend towards expansion in local markets by big national newspapers, made both via launch of new local sections and via bundling with existing local newspapers. Also the games like Bingo that were introduced by some news-

[27] Unfortunately, it has not yet been possible to obtain data on advertising revenues and volumes. This would allow to investigate other possible reasons to explain the profitability of supplements, especially for the women magazines whose content is advertising in a big proportion.

papers in the Nineties seem to have been very successful. Another interesting result concerns the launch of websites, which seems to have a negative impact on printed newspapers.[28] This result contrasts with those of Kaiser (2003), who finds that there is no significant crowding out by the online version in the German market for women magazines. This difference can partly be explained with the fact that in Italy the online version was very similar to the printed one, which was not the case for German women magazines. And my findings can also explain the fact that, after a period where the online version was free-of-charge, some newspapers (namely those whose websites were more successful) started to charge readers for online access to full content.

Finally, notice that the correlation coefficient in the nested logit model is 0.63, indicating that there is a quite high degree of substitution between the newspapers considered, and therefore the nested specification seems more appropriate.

6 Market enlargement or business stealing?

The results discussed in the previous section show that the magazines of general information increased the readership of the newspapers which introduced them. This promotional effect might be due both to the fact that magazines attract readers of rival newspapers (business stealing effect), and to the fact that new readers start to buy a newspaper instead of not buying any newspaper at all (market enlargement effect). In order to disentangle these two effects one should look at the marginal effect of supplement introduction on other newspapers and on the outside good. The estimates of these effects are recovered from the estimates of the parameters shown in Table 2.

I compare the marginal effects obtained under the logit specification with those obtained under the nested logit specification. As I will show, the nested model produces a smaller estimate of the marginal effect on the outside good (market expansion) with respect to the logit model, because of the closer substitution between newspapers belonging to the same group.

Given that the promotional effect seems to arise mainly for magazines of general information, I only consider this kind of supplements and disregard women magazines in what follows.

For a generic characteristic x_{1j}, the own marginal effect is given by the first derivative of the market share of newspaper j with respect to this characteristic. For the logit model the own marginal effect is:[29]

$$\frac{\partial s_j}{\partial x_{1j}} = \beta_1(1 - s_j)s_j$$

where β_1 is the parameter associated to characteristic x_{1j}.

[28] Filistrucchi (2003) analyses the impact of website provision on printed newspapers on the same dataset that I use.

[29] The formula of the market shares is given by eq. (4) for the newspapers and eq. (5) for the outside good.

The cross marginal effect, that is the effect of characteristic x_{1j} on another newspaper l is instead

$$\frac{\partial s_l}{\partial x_{1j}} = -\beta_1 s_l s_j$$

whereas the effect on the outside good is

$$\frac{\partial s_0}{\partial x_{1j}} = -\beta_1 s_0 s_j$$

Given that the characteristic of interest is a dummy (having or not a weekly magazine), the marginal effect must be computed in discrete terms, by taking the difference between the predicted market share when the dummy is one and the predicted market share when the dummy is zero. The own marginal effects is in this case:[30]

$$\frac{\Delta s_j}{\Delta x_{1j}} = \frac{\exp(\beta_1 + \mathbf{x}_j\boldsymbol{\beta} + \alpha p_j + \xi_j)}{1 + \exp(\beta_1 + \mathbf{x}_j\boldsymbol{\beta} + \alpha p_j + \xi_j) + \sum_{k\neq 0,j}\exp(\delta_k)} + \tag{9}$$

$$-\frac{\exp(\mathbf{x}_j\boldsymbol{\beta} + \alpha p_j + \xi_j)}{1 + \exp(\mathbf{x}_j\boldsymbol{\beta} + \alpha p_j + \xi_j) + \sum_{k\neq 0,j}\exp(\delta_k)}$$

where $\mathbf{x}_j$ is the vector of all observed characteristics of newspaper j but x_{1j}.

The cross marginal effect of the dummy x_{1j} of newspaper j on newspaper l's market shares is instead

$$\frac{\Delta s_l}{\Delta x_{1j}} = \frac{\exp(\mathbf{x}_l\boldsymbol{\beta} + \alpha p_l + \xi_l)}{1 + \exp(\beta_1 + \mathbf{x}_j\boldsymbol{\beta} + \alpha p_j + \xi_j) + \sum_{k\neq 0,j}\exp(\delta_k)} + \tag{10}$$

$$-\frac{\exp(\mathbf{x}_l\boldsymbol{\beta} + \alpha p_l + \xi_l)}{1 + \exp(\mathbf{x}_j\boldsymbol{\beta} + \alpha p_j + \xi_j) + \sum_{k\neq 0,j}\exp(\delta_k)}$$

The computation of the own marginal effect of supplements and of cross marginal effects on other newspapers and on the outside good allows therefore to disentangle the overall promotional effect in a business stealing effect, measured by the cross effects on other newspapers, and a market enlargement effect, measured by the cross effect on the outside good.

Before commenting on the results of the different marginal effects, two observations are required. As discussed above, one of the disadvantages of the logit model is that it places restrictive assumptions on the substitution pattern of consumers. In particular, consumers are assumed to substitute products only according to market shares. If two newspapers had the same market share, equation (9) implies that the own marginal effect of characteristic x_{1j} would be

[30] I omit the t subscript for simplicity.

the same on both newspaper. Moreover, the cross marginal effect with respect to any third newspaper would be the same, as can be seen in equation (10).[31]

Another remark should be made about the marginal effect (for the logit model) of supplements on the market share of the outside good. Given that we use as the potential market size the number of individuals above 14 in Italy, and given that substitution is driven by market shares, the marginal effect on the outside good is by far the largest compared to the effect on rival newspapers. I therefore compute also the marginal effect relative to the number of printed copies of each newspaper.

Table 3 in Appendix 2 shows the marginal effect of the introduction of supplements of general information in their weekday of issue in terms of printed copies gained or lost and in terms of relative printed copies. The impact of magazines in the day of issue is very strong for all the newspapers considered, ranging between 50% of printed copies for Repubblica to 54% for Corriere della Sera. This exercise allows to disentangle the market enlargement effect, that is the effect on the outside good, from the business stealing effect, that is the effect on other newspapers. Although the former is much bigger than the latter in terms of printed copies, they are very similar in relative terms. It should be noticed that the business stealing effect from *Il Giornale*, the only newspaper which does not have any supplement, is generally bigger than from the others. Moreover, the magazine of *La Stampa* had a weaker impact on competitors in terms of relative copies.

Similar remarks hold for the effect of supplements on weekdays other than the weekday of issue of the magazine, which is precisely the promotional effect discussed above (see Table 4 in Appendix 2). This effect is of course smaller than the effect on the weekday of issue, but it is still of a considerable amount, around 35%. Here as well in terms of printed copies the effect on the outside good looks much bigger than the effect on rivals, suggesting that the market enlargement effect is stronger than the business stealing effect. Also on other weekdays than the weekday of issue, the relative business stealing from *Il Giornale* is bigger than from other newspapers.

Results for the marginal effect of supplements in the nested logit model are shown in Tables 5 and 6 in Appendix 2. These results should partly correct for the large effect on the outside good observed in the logit model, because here the four newspapers are considered as belonging to a group and therefore the results allow for a bigger substitutability between them. Table 5 shows he marginal effect of the introduction of supplements of general information in their weekday of issue in terms of printed copies gained or lost and in terms of relative printed copies. As in the logit case, the own effect of magazines on printed copies is around 50%, but here the business stealing effect is bigger than

[31] This problem can be overcome by considering supplements not as the same characteristic for all newspapers, but as a different characteristic for each. In other words, the characteristic would not be "having a supplement of general information" (as it is the case in this first part of the analysis), but instead "having a supplement of general information like *Sette* of *Corriere della Sera*", or "having a supplement of general information like *Venerdì* of *Repubblica*", or "having a supplement of general information like *Specchio* of *La Stampa*".

in the logit case, around 10-15%. Notice again that business stealing is larger from *Il Giornale*, the only newspaper which does not have a weekly magazine.

As to the effect of magazines in other weekdays, also in the nested logit case the own effect is more than 30%, and the business stealing effect is around 9%. Here as well the magazine of *La Stampa* has a weaker impact on competitors both in the weekday of issue that in other weekdays.

Therefore both a market enlargement effect and a business stealing effect are present, and they jointly determine the positive effect of magazines on newspapers. In the logit model, the former effect largely dominates over the latter in absolute terms. This is not the case in the nested logit model, which allows for a higher substitutability between the newspapers considered with respect to the outside good which is assumed to belong to a different group. Overall, weekly magazines seem to have been beneficial for the newspapers which decided to launch them because, not only some business stealing took place, but there was also an important enlargement of the readership of newspapers. Indeed, there has been a negative impact on *Il Giornale*, the only national newspaper which never introduced such magazines, and possibly on other minor or local newspaper that I have not considered in the present analysis.

7 Conclusion

I study the impact of the strategy of bundling a supplement together with the newspaper at an additional fee. Estimating a differentiated product demand model on a panel of the four biggest Italian newspapers both with a logit and with a nested logit specification, I show that the magazines of general information are generally successful in terms of increased readership both in the weekday of issue and in the average weekday. Therefore the introduction of magazines seems to have had a long-run impact on overall sales, indicating that these magazines are seen by consumers as valuable quality characteristic and that their introduction positively affects the performance of a newspaper in terms of copies sold. This seems to confirm the hypothesis that in this case bundling was used as a promotional device, namely to capture people who would not buy the newspaper but start to purchase it because they are attracted by the supplement.

In order to determine to what extent the impact of magazines is due to business stealing and to what extent it is instead due to market expansion, I compute the marginal effect of each supplement both on rival newspapers and on the outside good. The results show that both a business stealing effect and a market enlargement effect are present. The relative magnitude of these two effects depends on the model adopted: in the multinomial logit model the market expansion effect dominates over the business stealing effect, suggesting that the effect of magazine introduction was to attract new readers rather than stealing readers to each other (at least for the newspapers considered). However, in the nested logit specification, which takes into account the fact that a reader of a newspaper is more likely to substitute with another similar newspaper than

with the outside good (i.e. buying no newspapers at all), the business stealing effect is more important than in the logit case, and is even bigger in terms of copies than the market expansion effect.

Therefore the overall effect of this kind of supplements seems to be partly due to an enlargement of the readership to a new target of readers, who started to buy a newspaper attracted by the magazine, and then kept on purchasing it afterwards. However, there appears to be also a business stealing from other newspapers, and in particular from other national newspapers which did not introduce any supplement, and which experienced a significant drop in circulation. In the present analysis I show the negative impact on *Il Giornale*, but it would be interesting to consider also the impact of supplements on minor national newspapers and on local newspapers, which also probably suffered a loss from that.[32]

A feature that is not yet embodied in my model is the dynamics of newspaper demand. A further step will therefore be to account for consumer habits by adopting a dynamic panel framework,[33] which would allow to model issues of learning and switching costs that seem very important in the market for newspapers and particularly when looking at promotional effects.

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[32] In 1995 a complaint was brought to the Italian antitrust authority against *Repubblica* and *Il Corriere della Sera* for the practice of selling supplements with newspapers. The authority concluded that this practice did not constitute an abuse of dominant position neither in the market of national newspapers nor in the market of local newspapers (see case n. 3354/95 *Ballarino vs. Grandi Quotidiani*).

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Appendix 1: The data

The data set is mainly based on the data collected by the Associazione Diffusione Stampa (ADS). The ADS database contains information on more than 40 newspapers, most of which are local, entirely on paper from 1976. I have so far transformed these data on an electronic format only for the seven major national newspapers, namely *Repubblica*, *Corriere della Sera*, *La Stampa*, *Il Giornale*, *Il Sole-24Ore*, *Il Corriere dello Sport* and *La Gazzetta dello Sport*.

The information available for each newspaper includes data on:[34]

a) Printed copies

- Average daily number of copies printed
  - in each year
  - in each month (for instance in July 1989)
  - in each different weekday of each year (for instance in all the Mondays of 1989)
  - in each different weekday of each month (for instance in all the Mondays of July of 1989)

b) Circulation (copies distributed or sold)

- average daily number of copies distributed or sold either in Italy or abroad
  - in each year
  - in each month
- average daily number of copies sold (by newspaper agents) in Italy[35]
  - in each year
  - in each month
- average daily number of subscriptions in Italy[36]
  - in each year
  - in each month
- average daily number of free copies in Italy
  - in each year
  - in each month

c) Number of issues printed in each month (only from 1987 onwards)

[34] In addition to the information on copies sold and printed at a national aggregate level, there are also more disaggregated data on local circulation, divided by regions and provinces.

[35] From 1987 onwards, information is available also on the average daily number of copies sold directly by the newspaper in Italy in each month and in each year.

[36] From 1991 onwards, a distinction was introduced between paid subscriptions, free subscriptions, and enrollment fee subscriptions.

In the days where the supplement is issued together with the newspaper, it is filed on a separate sheet, and I had therefore to include this information for each of the supplements. Therefore, in order to aggregate all the information on every day of the week, I had to reconstruct all the averages by using also the information on the monthly number of issues both for the newspaper and for the supplement. Fortunately, this information on the number of issues started to be included in the data set in 1987, which is exactly the year where the first supplements appeared.

The database has been completed with other information on the dates of the first issues of all the regular supplements, the list of all promotions with the corresponding periods, the series of prices from 1976, the dates in which the local sections were added to some of the national newspapers, the dates in which the editors of each newspaper have changed, and the dates of periodic events that may influence the circulation of newspapers such as elections, football cups, Olympic games etc.

Appendix 2: Figures and tables

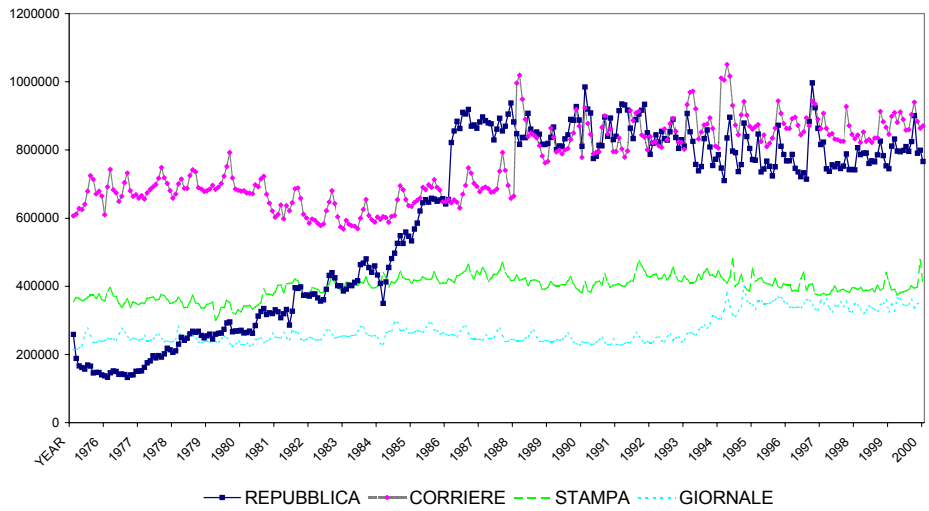

Figure 1: Monthly averages of daily printed copies

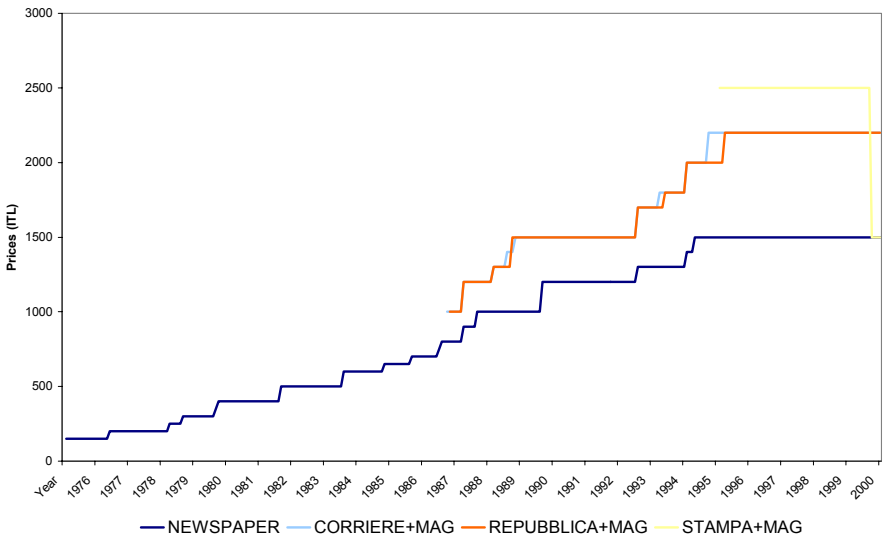

Figure 2: Prices of newspapers with and without the magazines of general information.

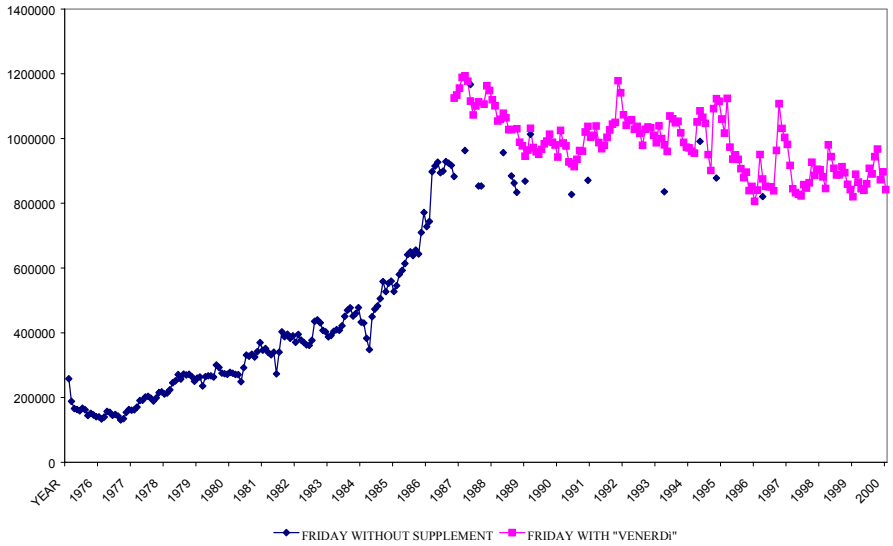

Figure 3: Monthly average printed copies of La Repubblica on Friday with and without the magazine "Il Venerdì" (the observations in blue after the introduction of the supplement are months in which the newspaper was issued without the supplement because of strikes or holidays)

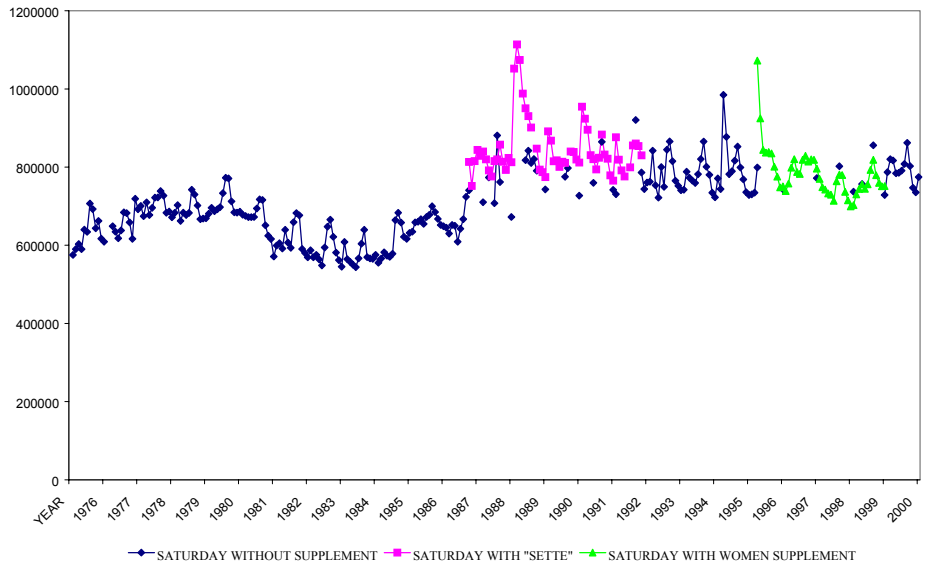

Figure 4: Monthly average printed copies of Il Corriere della Sera on Saturday with and without the magazines "Sette" and "Io Donna"

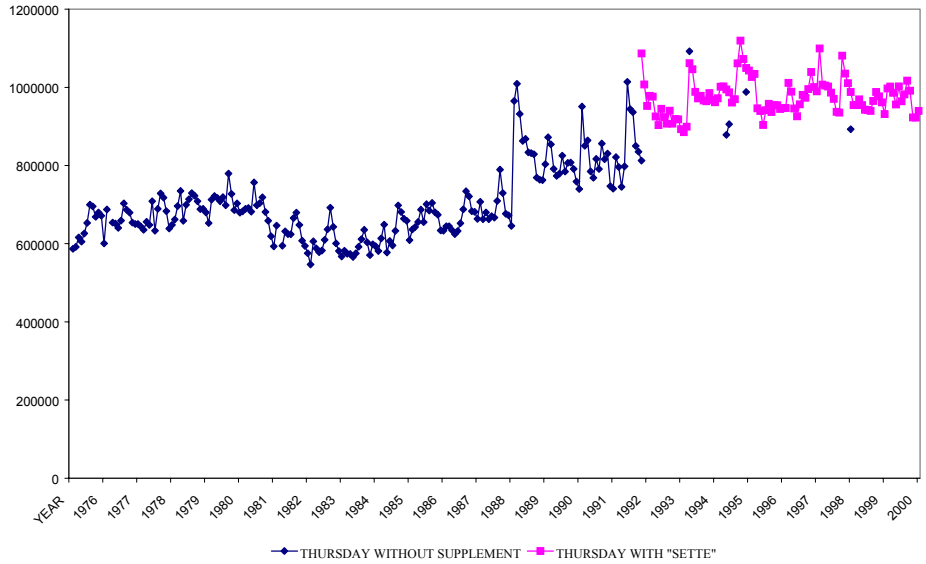

Figure 5: Monthly average printed copies of Il Corriere della Sera on Thursday with and without the magazine "Sette"

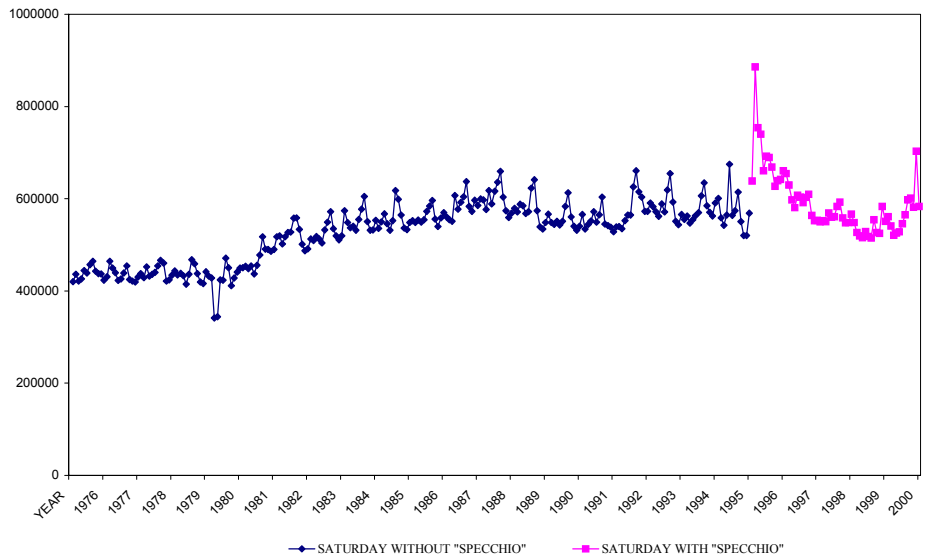

Figure 6: Monthly average printed copies of La Stampa on Saturday with and without the magazine "Specchio".

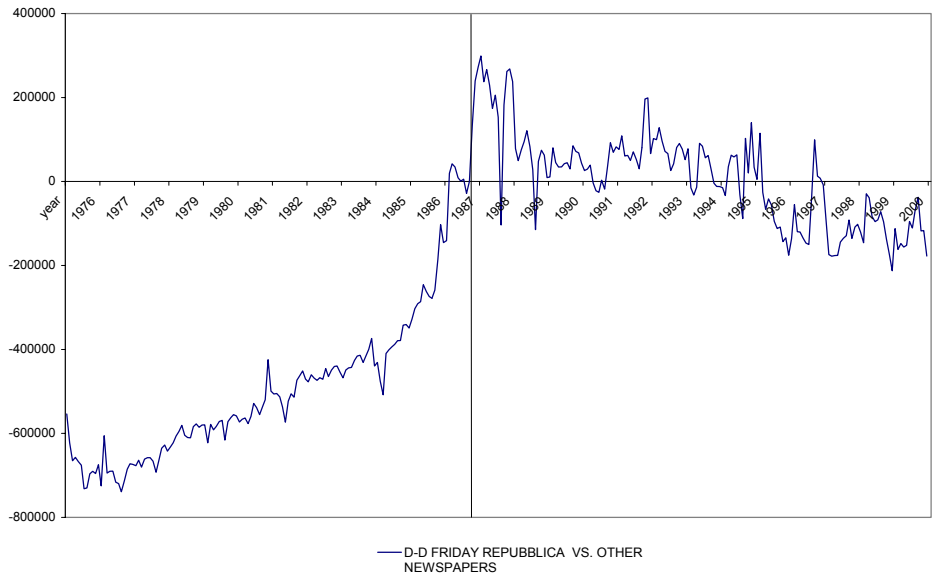

Figure 7: D-D Friday Repubblica vs other newspapers before and after the introduction of the supplement

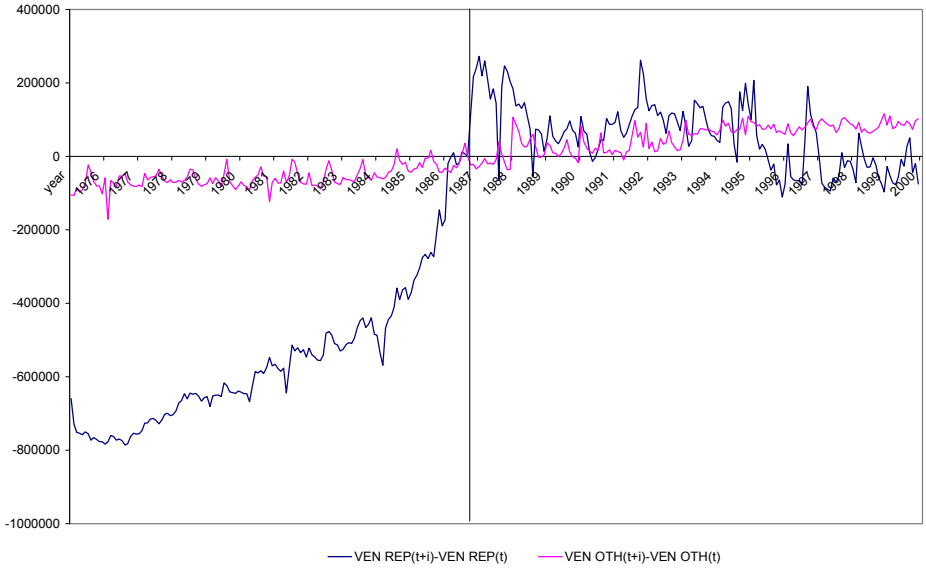

Figure 8: D-D disaggregated Friday Repubblica vs other newspapers before and after the introduction of the supplement

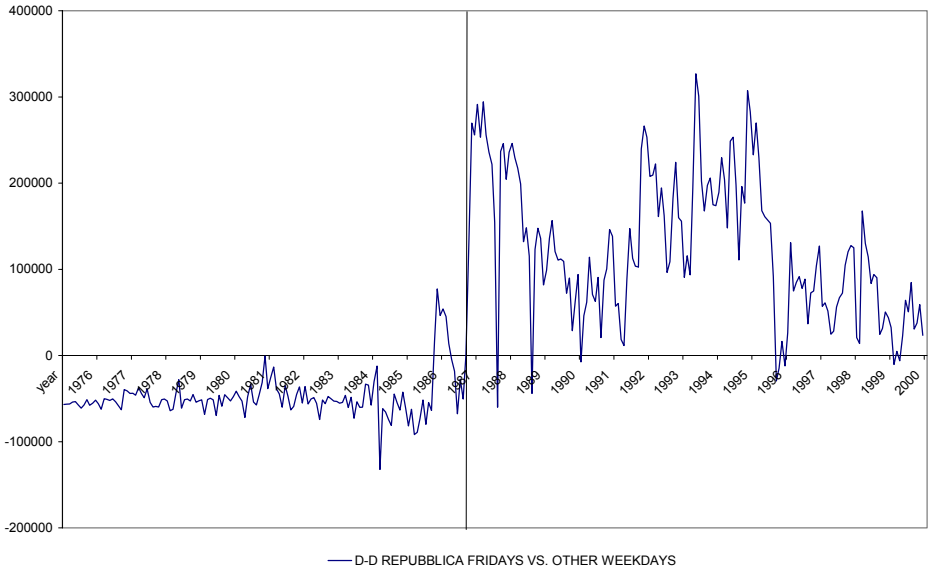

Figure 9: D-D Repubblica Friday vs other weekdays before and after the introduction of the supplement

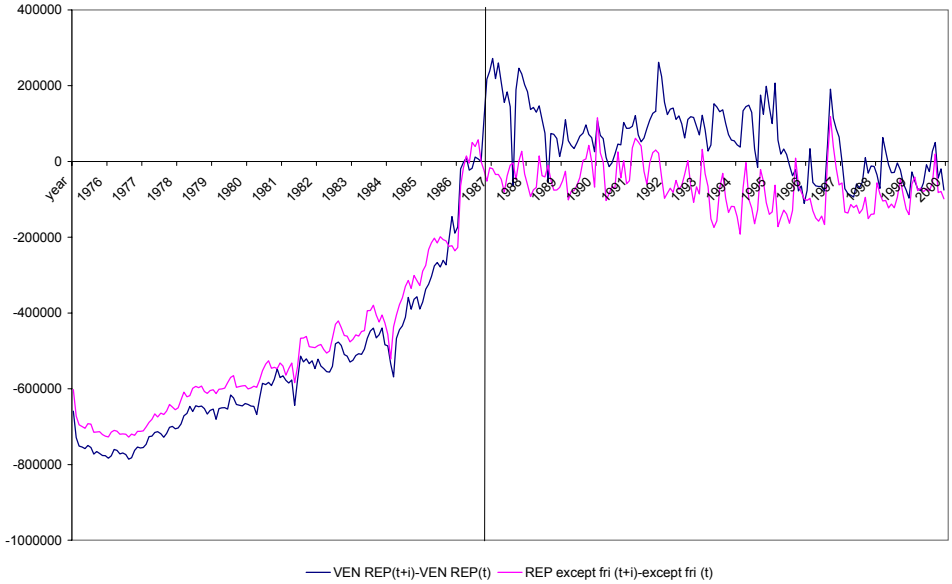

Figure 10: D-D disaggregated Repubblica Friday vs other weekdays before and after the introduction of the supplement

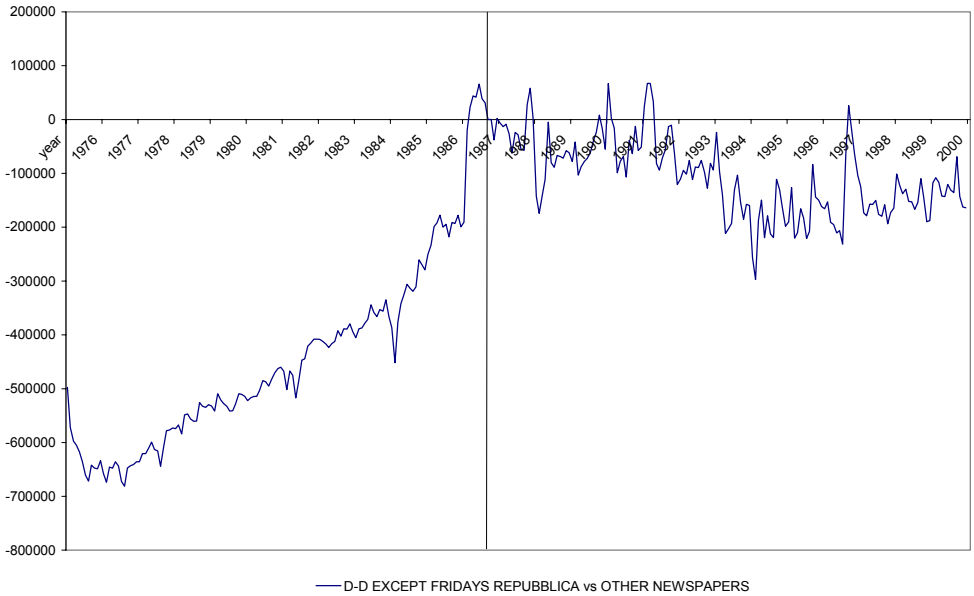

Figure 11: D-D except Friday Repubblica vs other newspapers before and after the introduction of the supplement

Table 2: Estimation results

	Logit fixed effects	Nested Logit fixed effects
Own supplement (day)	0.320***	0.124***
	(0.046)	(0.027)
Own supplement	0.424***	0.170***
	(0.041)	(0.030)
Own women supplement (day)	0.191***	0.051*
	(0.044)	(0.026)
Own women supplement	0.031	- 0.005
	(0.025)	(0.023)
Real price	- 0.030***	- 0.009***
	(0.004)	(0.002)
Number of local sections	0.043***	0.016***
	(0.006)	(0.004)
Games with prizes	0.215***	0.132***
	(0.032)	(0.019)
Website	- 0.083***	- 0.054***
	(0.026)	(0.015)
Time trend	Yes	Yes
Constant	- 4.748	-3.961
Correlation coefficient σ		0.633
N. of obs.	8088	8088
N. of groups	28	28

Note: The dependent variable is log market shares (see equations (6) and (8)). Standard errors are in parentheses. Other control variables are included in the regression, such as dummies for sport events, elections, change of editors etc.

Table 3: Logit model: Impact of supplements in the weekday of issue (printed copies and relative printed copies)

		Corriere	*Repubblica*	*Stampa*	*Giornale*	Outside
Corriere	copies	499359	-8062	-5780	-3302	-482215
magazine	relative	0.5452	-0.0103	-0.0106	-0.0115	-0.0106
Repubblica	copies	-8740	489421	-5582	-3158	-471941
magazine	relative	-0.0104	0.5027	-0.0103	-0.0112	-0.0104
Stampa	copies	-5188	-4713	310184	-2169	-298114
magazine	relative	-0.0066	-0.0065	0.5261	-0.0061	-0.0064

Table 4: Logit model: Impact of supplements in weekdays other than the weekday of issue (printed copies and relative printed copies)

		Corriere	*Repubblica*	*Stampa*	*Giornale*	Outside
Corriere	copies	287870	-4821	-3378	-1862	-278184
magazine	relative	0.3482	-0.0059	-0.0061	-0.0065	-0.0060
Repubblica	copies	-4761	263721	-3098	-1712	-254150
magazine	relative	-0.0057	0.3359	-0.0056	-0.0060	-0.0056
Stampa	copies	-3344	-3021	185962	-1285	-178312
magazine	relative	-0.0038	-0.0038	0.3553	-0.0038	-0.0038

Table 5: Nested Logit model: Impact of supplements in the weekday of issue (printed copies and relative printed copies)

		Corriere	*Repubblica*	*Stampa*	*Giornale*	Outside
Corriere	copies	465504	-122457	-89197	-50763	-203087
magazine	relative	0.5077	-0.1559	-0.1644	-0.1752	-0.0044
Repubblica	copies	-128946	446651	-81437	-45551	-190717
magazine	relative	-0.1532	0.4593	-0.1496	-0.1585	-0.0042
Stampa	copies	-82252	-73333	320059	-36155	-128020
magazine	relative	-0.1059	-0.1011	0.5450	-0.1013	-0.0027

Table 6: Nested Logit model: Impact of supplements in weekdays other than the weekday of issue (printed copies and relative printed copies)

		Corriere	*Repubblica*	*Stampa*	*Giornale*	Outside
Corriere	copies	262150	-71930	-52800	-28451	-114853
magazine	relative	0.3176	-0.0882	-0.0954	-0.0998	-0.0024
Repubblica	copies	-70706	245035	-45640	-24921	-103768
magazine	relative	-0.0850	0.3129	-0.0822	-0.0858	-0.0022
Stampa	copies	-47390	-42649	179583	-18560	-70984
magazine	relative	-0.0545	-0.0544	0.3433	-0.0543	-0.0015

8 Appendix 3: A numerical example of bundling as a promotional device

The idea that the introduction of a supplement sold together with the newspaper could be a profitable way to attract readers for the newspaper itself can be illustrated by an example with a discrete distribution of consumer types. Let us first consider a situation where a monopolist sells a newspaper at time t_0 and at time t_1 introduces a supplement sold with the newspaper as a bundle in order to attract new readers. Under the assumption that reading a newspaper makes readers used to it, consumers who have bought the newspaper in t_1 will have a higher willingness to pay in a following period t_2.This can be seen as a sort of learning cost for the reader of a newspaper. Therefore the supplement attracts new readers that will become repeat-purchasers of the newspaper afterwards.

Let us examine an example that shows why bundling can be profitable as a promotional device.

Suppose that in period t_1 the monopolist produces good N (newspaper) and a supplement S. There are five types of consumers, whose reservation values for the good are:

	N	S
A	110	92
B	90	5
C	30	10
D	50	100
E	4	146

It is easy to show that here bundling is not profitable as a price discrimination device in a single period. In t_1 the optimal price with bundling would still be $p_1^{N+S} = 150$ and profits 450, whereas with independent pricing prices would now be $p_1^N = 90$ and $p_1^S = 92$, and total profits are 456 ($\Pi_1^N = 180$ and $\Pi_1^S = 276$).[37]

After having shown that in this example bundling is less profitable than independent pricing from a static point of view, we now show that bundling may be more profitable in a dynamic sense, namely as a promotional device.

We then have to show that:

1. Bundling is better than independent pricing in a two-period setting. In the absence of static price discrimination motivations for bundling, this implies that the only reason that makes bundling profitable is its promotional effect, namely the fact that it allows to attract readers in the second period;

2. Bundling is the best promotional device: show that bundling is more profitable than a price cut.

Bundling vs. independent pricing As explained above, in a one-period setting profits with bundling are 450 and with independent pricing they are 456.

[37] I assume zero cost of production.

I assume that if a consumer buys good N in period t_1, his willingness to pay for that good in period t_2 is increased by 40. The maximization problem of the newspaper firm is solved by determining first the optimal (two-period) pricing strategy with bundling and with independent pricing, and then comparing the corresponding outcomes.

- BUNDLING

  In a two-period setting, the best bundling strategy entails selling the bundle at price 150 in t_1, and good N alone in t_2. With this pricing strategy, only consumers A, D, and E buy the bundle in t_1, and consumers reservation values in t_2 are therefore:

	N
A	150
B	90
C	30
D	90
E	44

Therefore the optimal price in period t_2 is $p_2^N = 90$ and profits are 270. Overall profits in the two periods are 720.

- INDEPENDENT PRICING

  In a two-period setting, the best strategy with independent pricing entails selling good N at price 90 to consumers A and B in t_1. Consumers reservation values in t_2 are:

	N
A	150
B	130
C	30
D	50
E	4

Therefore the optimal price is $p_2^N = 130$ and profits are 260. Notice that with independent pricing consumers A and B are the only ones who purchase good N, because there is no market enlargement. Overall profits with independent pricing are 716.

Therefore in this two-period setting, bundling is more profitable because the overall revenue the firm gets if it decides to bundle in period t_1 is 720, whereas it is 716 if it chooses to sell the two goods independently. This is due to the fact that bundling allows to attract a new consumer in the last period (consumer D), and this effect more than compensates the lower profits obtained in the short run.

There are therefore five types of consumers in this example. Type A consumers are "captive", in the sense that their willingness to pay for the newspaper is very high and they buy it with or without the supplement. Type B has instead a very low valuation for the supplement and is not willing to pay a higher

price for the bundle, therefore he does not buy the newspaper if sold together with the magazine. Consumer C does not buy the newspaper anyway, whereas consumers D and E buy it only if bundled with the supplement, because they have a very high valuation for the latter. The difference between D and E is that the former has a high enough valuation for N and once it learns to read it he keeps on buying it in following periods; this consumer represents the market enlargement or business stealing effect.[38] Consumer E is instead a one-shot buyer, attracted only by the supplement.

The crucial question is now whether bundling is the best promotional device: would it not be more profitable to lower the price of N in t_1 instead of bundling? We now show that in this example bundling is more profitable than price cutting as a way to attract new readers.

Bundling vs. price cutting In order to show that bundling is the best promotional device, we now compare it with a price cutting in period t_1.

Solving the problem backwards, it is easy to see that the firm obtains the highest profit in t_2 when consumer D has bought in t_1, because in this case it can price at 90 and get profits of 270, selling to A, B, and D. Therefore in t_1 the firm wants to attract consumer D, and it can do it by either a strategy of bundling or a price cut.

In period t_1, profits with bundling are 450, as explained above. If instead the firm wants to attract type D consumers with a price cut, it has to lower the price of N to 50 and earn $\Pi_1^N = 150$. The price of S is instead $p_1^S = 92$ and the corresponding profits are $\Pi_1^S = 276$. Overall profits in t_1 with a price cut are 426. Therefore bundling is more profitable than price cutting as a way to attract new readers.

Pure bundling or mixed bundling? One could argue that pure bundling is not the most profitable bundling strategy, because the firm could get higher profits in t_1 by adopting a mixed bundling strategy, i.e. selling both the bundle and good N alone. By doing so, in our example the firm could sell the bundle to A, D, and E, getting a profit of 450, but could also sell good N alone to consumer B (who did not purchase with pure bundling), getting an additional profit of 90.

We can modify the example to show that pure bundling may indeed be the most profitable strategy. The intuition is that by giving the opportunity of selling good N alone you also lose some consumers that would purchase the bundle otherwise, and the result is that total profits are lower.

In order to show this, I modify the example in the following way:[39]

[38] In order to disentangle these two effects we should adopt a duopolistic setting. This would also allow to consider the possibility that the firm who introduces the supplement loses forever those readers who are not willing to buy the bundle (type B in the example). This may happen if these readers are captured by a rival newspaper in period t_1, and their willingness to pay for this newspaper increases so that they stick to it in period t_2.

[39] In this second example there is scope for price discrimination with bundling even in the short run, because first-period profits with bundling are 555 whereas with independent pricing

	N	S
A	110	92
B	90	5
C	30	10
D	50	135
E	4	181

The optimal t_2 profits are the same as in the previous case, so with bundling in t_1 the firm wants to price so as to attract consumer D. The strategy of selling the two goods independently with a price cut on N gives the same results as in the previous case (optimal prices and profits are the same).

I now have to compare the profits of a pure bundling strategy with those of a mixed bundling strategy. With pure bundling, the optimal bundle price is 185, and consumers A, D, and E buy giving profits of 555. With mixed bundling, the firm could sell the bundle at 185 and good N at 90. Therefore D and E buy the bundle and A and B buy good N alone (because A gets a higher surplus by purchasing A alone at the price of 90 than by purchasing the bundle at 185). This would give the firm profits of 550, lower than the profits it would get with pure bundling.

they are 476. However, short-run price discrimination is not the only driving force of the dominance of bundling in the two-period setting, as there is an additional gain from bundling in the second period (second period profits are 270 with bundling and 260 with independent pricing) due to the fact that this strategy allows to attract new readers.