Market Definition in Printed Media Industry: Theory and Practice[1]

Elena Argentesi[2] and Marc Ivaldi[3]

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Abstract

This paper first discusses how the market is delineated in some recent antitrust cases in the printed media industry. It evaluates the extent to which the main features of the industry are incorporated into the analysis and affect market definition. In addition we argue that an econometric analysis that does not incorporate these features can lead to biased estimates of elasticities. As demand substitution is a crucial element for defining market, bad estimates of elasticities could blur the boundaries of relevant markets. Second we propose a simple model that encompasses these features and in particular the two-sidedness of the market. Thirdly, we review some empirical papers that analyze the issue of demand estimation in printed media. Finally, we perform a statistical estimation on a dataset of magazines in order to provide a measure of the possible bias that could arise in the estimation of elasticities when one does not use a proper model.

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[2] Affiliation: University of Bologna, Dipartimento di Scienze Economiche, Piazza Scaravilli 2, 40126 Bologna (Italy). Tel. +39 051 2098661. Fax +39 051 2098040. Email: argentesi@economia.unibo.it.
[3] Affiliation: University of Toulouse (IDEI), EHESS and CEPR. Address: Université de Toulouse 1 Sciences Sociales, Institut D'Economie Industrielle, 21 Allée de Brienne, 31000 Toulouse (France). Tel. +33 (0)561 128592. Fax. +33 (0)561 128637. Email: ivaldi@cict.fr.

1. Introduction

Rapid technological change in media markets emphasizes the importance of delineating relevant markets in this industry by and large and in the press industry particularly. Indeed, the degree of substitutability among different newspapers, but also between newspapers and internet sites, or different kinds of television or cable channel is a key element in competition analysis.

Recent theoretical advances[4] stress the two-sided feature of this industry, which should affect market definition. Media outlets compete not only for readership or audience, but also for advertisers, which in turn are attracted by the possibility of reaching potential consumers. The advent of new media and the recent technological advances in information transmission have an impact on the degree of substitutability between different media, and also on the ways in which advertising messages are conveyed to the public. Therefore the evolution of media markets creates closer interconnections between different media services with regard to both the circulation side and the advertising side. In this context, antitrust agencies and regulators should take into account the changing features of these markets when addressing issues of market definition and assessing the degree of substitutability between different media outlets.

At least three notions then should drive the definition of relevant markets in the press industry. The first one, as we just said, is two-sidedness. The markets for news and advertising are closely linked by inter-market network externalities. Our conjecture is that, failing to consider this link may lead to a biased estimation of own- and cross-price elasticities. Secondly, product differentiation (both horizontal and vertical) is a crucial factor in readers' choice, and must be properly accounted for in order to obtain accurate cross-price elasticities. Finally, in part as a result of the application of the first two notions, a correct estimation of the potential market size is required. Indeed, the competitive constraint imposed by the substitutability between printed media and other media like television or internet, which do not belong to the same relevant sub-market of printed media, might have significant effects on the levels of elasticities.

Note that the delineation of relevant markets is a competition policy notion aimed at identifying the competitive constraints faced by a firm or a group of firms. It is not a concept developed or employed by microeconomic theory. The objective of market definition is to search for the smallest set of products competing between them in order to guide the antitrust investigation. In the search process, three competitive constraints can play a role: demand substitution, supply substitution and potential competition.[5]

Here we mainly focus on demand substitution. The usual criterion adopted by antitrust agencies to evaluation the strength of this competitive constraint is by means of the so-called SSNIP (Small but Significant Non-transitory Increase in Prices) test. According to this test, a set of products (or geographical areas) are considered as belonging to the same product (or geographic) market if a hypothetical monopolist on this market could profitably rise prices above the current level by a given amount

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[4] See Rochet and Tirole (2003, 2004).
[5] See European Commission (1997).

(usually 5-10%) in a non-transitory way.[6] If this is the case the set of products considered constitutes a separate market because consumers do not substitute away after a price increase. On the other hand, if the price increase would not be profitable, there are other products that are substitutes to the ones considered, and demand would be partly conveyed to these products if prices increase. In this case, the set of products considered for market definition should be enlarged to include also closer substitutes of the previous set of products. The SSNIP test should be performed on this wider market and the exercise should continue with further enlargements of the market until the SSNIP test gives a positive answer, i.e., a price increase by a hypothetical monopolist would be profitable.

The type of reasoning that is behind the SSNIP test should drive the analysis of the assessment of market definition. In practice however, the SSNIP test is not implemented. It serves as a guide to obtain indirect evidence on the effects of a price increase. One of the main pieces of information that are clearly involved in the mechanism of SSNIP test and can be used to draw inferences about the effect of a price increase on demand are own- and cross-price elasticities. Indeed own-price elasticity allows us to evaluate the profitability of a price increase because it measures the decrease in demand due to a price increase. Cross-price elasticity is obviously important to evaluate the competitive constraints provided by other products. It is particularly useful in the case where the magnitude of own elasticity would suggest that a price increase by a hypothetical monopolist would not be profitable and then it is necessary to find the closer substitutes to proceed with further steps of the SSNIP test.

Own- and cross-price elasticities can be estimated on the basis of a correctly built and estimated econometric model. Therefore econometric models are an important tool for the implementation of the SSNIP test. As we further discuss, the peculiar features of the media markets that we previously pointed out call for special considerations when formulating an econometric model for this industry.

The objective of the paper is fourfold. First, we discuss the approach adopted to delineate markets in some recent antitrust cases and evaluate the extent to which two-sidedness and the other above-mentioned elements have been incorporated into the antitrust analysis. We argue that an econometric analysis that does not incorporate both sides of a media market can lead to biased estimates of elasticities. We then propose a simple econometric model that encompasses the three distinctive features of this industry outlined above. Thirdly, we review some empirical papers that analyze the issue of demand estimation in printed media. Finally, we perform a statistical estimation on a dataset of magazines in order to show the possible bias that could arise in the estimation of elasticities when one does not use the proper model.

The paper is organized as follows. In the next Section we review the approaches to market definition adopted in some recent decisions by competition agencies. In Section 3 we sketch an econometric model that would allow estimating the demand on both the readers' and the advertising sides. In Section 4 we discuss the growing empirical literature on printed media. In Section 5 we show results from the estimation exercise and we conclude in Section 6.

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[6] For a discussion on the SSNIP test and its implementation, see Motta (2004), ch. 3. See also, for an econometric application, Ivaldi and Lörincz (2005).

2. Case Review

Here we present the arguments that antitrust authorities have considered in practice for defining media markets in recent cases, both in Europe and in the United States. In particular we focus on the extent to which the peculiar characteristics of the printed media industry have been incorporated into the antitrust investigation. The objective is to evaluate whether the actual practice introduces a bias in the analysis in the light of the recent theoretical developments. For instance, as we argue below with reference to a specific case, this is a crucial issue particularly when the assessment of relevant markets relies on econometric tools. We show that the econometric analysis might be biased if the specific characteristics of the industry (and particularly two-sidedness) are not accounted for.

The definition of relevant markets in printed media industries should take into account the distinctive features of competition in this industry. First of all, there is competition between newspapers belonging to the same product group. A first task consists therefore of assessing the strength of substitution between different types of product in terms of content (titles of general information versus specialized titles, for instance), quality (tabloids or quality press), and frequency.

Another important dimension of printed media is their geographic and spatial location. The majority of titles have a local scope, and therefore the extent to which there are overlaps between different titles affects the strength of competition in the local markets.

Finally, the boundaries of the relevant market depend also on the competitive constraint provided by other, non-newspaper media, namely other printed media, television, or internet. The assessment of these boundaries should also account for the rapid growth of new forms of information transmission that are provided by technological change.

The analysis of these elements constitutes the core of the analysis of relevant markets in most antitrust decisions in the EU. For some recent merger cases in the written press industry, the European Commission analyzes relevant markets according to the criteria mentioned above. In the *Recoletos / Unedisa* case,[7] for example, product categories are defined according to frequency (daily and non-daily publications), content (general information, sport and financial papers), and quality of the publication (tabloids or quality press). In the case of magazines, further divisions is made according to content. The same criteria for product market definition are used in other decisions of the Commission, for example in the cases *Gruner+Jahr / Financial Times / JV* and *Newspaper Publishing*.[8]

The same approach is adopted by the Italian antitrust authority: in the *Ballarino / Grandi quotidiani* decision. In subsequent decisions,[9] the market of daily newspapers of

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[7] Case No. IV/M.1041 - RECOLETOS / UNEDISA, 01/02/1999.
[8] Cases No. IV/M.1455 - GRUNER+JAHR /FINANCIAL TIMES/ JV, 20/04/1999 and No. IV/M.423 - NEWSPAPER PUBLISHING, 14/03/1994 respectively.
[9] See Provv. n. 3354 Ballarino/ Grandi quotidiani (26/10/1996), Provv. n. 4822 Italia Oggi Editori / Il Sole 24 Ore (20/3/1997) and following decisions.

general information is considered as separate from the market of daily business or sport newspapers.[10]

The geographic dimension applies to cases involving local newspapers. In some recent cases in the U.K., the Competition Commission devotes an important part of the relevant market analysis to the assessment of competition in local markets. In the decision *Regional Independent Media Ltd and Gannett UK Ltd/ Johnston Press plc/ Guardian Media Group*, the competition assessment focuses on the local area analysis, as the titles involved compete primarily for a local readership. In particular, the decision identifies "overlap areas", i.e., areas in which at least one newspaper of each of the publishers involved achieves a household penetration rate of 10 per cent or more. The analysis is conducted by looking at the likely competitive impact of the proposed transfers in any given overlap area, taking also into account "core areas", which represent "that part of a newspaper's circulation or distribution area in which the bulk of its copies are circulated or distributed".

In the above-mentioned *Ballarino / Grandi quotidiani* decision (as well as in subsequent decisions), the Italian antitrust authority defines local and national publications as belonging to two separate (albeit adjacent) markets. This is motivated by the observation that the information provided in local papers has mostly a local scope, and therefore their readership is different from that of national titles. However, it should also be taken into account that national newspapers have progressively increased the coverage of local events by introducing dedicated sections in the newspaper or, more recently, by bundling the national paper with a local one. Moreover, many of the newspapers with a national circulation have "core areas" (as defined above) that coincide with local areas like regions or big cities. Therefore the overlapping between national and local papers seems to have increased over the last decade, and this should be taken into account in future antitrust decisions.

Therefore, at least from a demand-side perspective, printed media markets are usually segmented in relatively tiny sub-markets according to their frequency, content, and local characterization.

Both the European Commission and national antitrust agencies have considered the substitutability of printed media with other media services in determining the competitive constraints faced by the firms under consideration. Written press is usually regarded as distinct from other media products. In the *Recoletos / Unedisa* case, the Commission argues that written press offers a product that is not substitutable with TV and radio services in terms of the range and depth of information provided. Similarly, the UK Competition Commission, in the *Newsquest Ltd / Independent News and Media plc* case, explains that, albeit there is some competition to local newspapers coming from other forms of printed media (advertising-only publications, niche titles, directories and direct mail), non-printed media cannot generally be regarded by readers as realistic substitutes. Note, however, that these considerations are based on qualitative analyses. No empirical analysis is performed to evaluate precisely the competitive impact of other media on the press industry.

So far we have dealt with aspects of the printed media market that are related to the demand side. However, as pointed out in the *Candover / Cinven / Bertelsmann-Springer* decision, a strict demand approach "would lead to the definition of a multitude

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[10] In Italy, there is no such thing as tabloids: daily newspapers are differentiated on the basis of their geographic circulation (local or national) and political orientation, but not so much on a "vertical" dimension.

of relevant markets of imprecise boundaries and small dimensions", because "from a demand-side point of view, it is rare that two publications be viewed as perfect substitutes". Therefore, another dimension of market definition that has been considered in antitrust cases is the supply side. In the *Recoletos / Unedisa* case, supply-side considerations are used to evaluate the substitutability between different titles, and in particular to assess the profitability for a publisher of launching a new title. Supply-side considerations are particularly relevant in cases that concern specialized publications, as in the *Candover / Cinven / Bertelsmann-Springer* case, where elements like image and reputation of a title, its expertise in a given area, "an image of accuracy, reliability and comprehensiveness in the information supplied"[11] are identified as the elements required to launch a publication. Supply-side substitution is also considered in some UK cases, as for example in the *Johnston Press / Trinity Mirror* case.

Finally, another important dimension along which newspapers compete are advertising revenues. The recognition of the two-sidedness feature is present in most antitrust decisions on the written press. In the *Recoletos / Unedisa* decision, it is stated that "newspapers editors operate in two broad markets: the market for written press, in which the consumers are the buyers of the newspaper as a source of information and the market for advertising space, in which the consumers are the advertisers who buy space in order to promote sales."

For this reason, the analysis of competition between newspapers in the advertising market often proceeds in parallel with the analysis of the readers' market. The substitutability between newspapers from the point of view of advertisers is closely linked to the proximity of titles from the point of view of readership. In other words, as it is made clear in the *Newspaper Publishing* decision, different categories of newspapers "provide different channels through which to reach different socioeconomic groupings of readers", and cannot therefore be considered substitutes from the point of view of buyers of advertising space. Therefore in many decisions of the European Commission the markets for advertising space are defined according to the type of readers to which each publication is addressed.

Similarly, the Italian antitrust authority has identified advertising on printed media as a separate market with respect to advertising on television media, on the basis of the differences in the advertising message and on the targeted audience between the two types of media.[12] In particular, television is described as more effective to convey "persuasive" advertising messages, whereas printed media would be more suitable for "informative" advertising. A further distinction has been made between advertising on daily and non-daily publications, which are considered as two separate (albeit adjacent) markets from the point of view of the audience (more targeted for periodical publications, wider for daily titles). The advertising market has been segmented even further in the *Class Editori / Sole 24 Ore* case,[13] where advertising on daily papers specialized in business and financial information has been considered as a separate market with respect to advertising on newspapers of general information. In the opinion of the Italian antitrust authority, complementarities seem to outweigh substitutabilities because of the different characteristics of readerships between the two types of publications.

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[11] Quoted from Case No. COMP/M.3197 - CANDOVER / CINVEN / BERTELSMANN-SPRINGER, 27/07/2003.

[12] This distinction can be found in the case *Publitalia 80 / S.P.E. / S.P.I.* (Provv. n. 2517, 1/12/1994).

[13] Provv. n. 3336, *Class Editori / Il Sole 24 Ore*, 19/10/1995.

An alternative definition of advertising markets is proposed by the European Commission in the decision *Recoletos / Unedisa*, where it is suggested that the sale of advertising space in the written press could be considered as a single market.[14] This approach is motivated by the consideration that the written press as a whole generally attracts the most educated segments of society, and therefore it is already a specific public. The second reason adduced to justify this approach is the fact that advertising space is often bought by large agencies that resell it to single customers and are therefore more likely to purchase space in different media outlets rather than in specialized publications only.

However, some qualifications of this issue are needed. First, even if it is true that daily newspapers of general information on average attract a more highly educated public than television, this is unlikely to be true for other types of publications like specialized magazines (think of the tabloid kind of magazines, for instance). Second, the fact that there are large-scale buyers of advertising space does not imply that different outlets are substitutable from the point of view of advertisers. These points therefore stand against considering the entire printed media as a single market from the point of view of advertising demand.

A narrower market definition is adopted in many US cases, for example in the decision *US vs Donrey Media Group* (C.n. 95-5048), where local daily papers are considered as a separate market both on the readers' market and on the advertising market. From the point of view of readers' demand, even if it is true that some services provided by newspapers compete with radio, TV, or other publications, the decision says that this does not mean that these other media can be considered as belonging to the same market. The same definition is applied also to the advertising market: the court considered that a small price increase in the local daily newspaper market would not be constrained by other media. In particular, an expert testified that most print advertisers would not switch to television or radio for a price increase of less than 20%, which suggests a limited substitutability from the side of advertising demand.

The UK Competition Commission performs very detailed analyses of competition in local advertising markets. It conducts surveys in order to assess the substitutability between different titles from the point of view of buyers of advertising space. In the case *Newsquest Ltd / Independent News and Media plc*, a regression analysis is also performed. The exercise aims at understanding the price mechanisms implemented by newspapers with respect to advertisers, and in particular at explaining the large variability in advertising rates across advertisers. An OLS regression of realized advertising rates on circulation (measured by copy volume) shows that for the titles considered higher market shares are associated with higher advertising rates. This finding is consistent with the direction of the inter-market network externality that links the readers' market to the advertising market.

The Competition Commission performs an analysis of market definition on the advertising market also in the recent case *Archant Limited / Independent News and Media Limited* (22/9/2004). A SSNIP test is invoked and quantitative survey data are used in order to assess whether a price increase by the merged entity could be profitable. Even considering the possibility of price discrimination, the Commission concludes that a price increase would not be profitable, and consequently defines the relevant market as the local one, even if a wider range of titles than the local ones are taken into account.

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[14] It should be noted, however, that the Commission did not conclude on the definition of these markets because under either market definition the concentration considered did not give rise to antitrust concerns.

Apart from limited regression analysis, market definition in printed media does not seem to have relied much on econometric analysis. The assessment of competition and substitutability between titles is conducted through qualitative considerations and survey methods rather than through the estimation of own and cross-elasticities.

One recent exception is a case involving *SOCPRESSE / Groupe Express-Expansion*, two publishers of magazines and newspapers in France. On this occasion, the French competition authority sought to define the boundaries of the market for weekly magazines of general information and conducted an econometric analysis to ascertain whether this definition should include a larger number of titles than the definition used in previous decisions. The objective was to estimate the cross-elasticities between different titles in order to decide which ones were to be included in the market definition.

The econometric methodology consisted in estimating a regression based on a panel of the time series of market shares of circulation and cover prices with magazine fixed effects. More formally, the estimating equation is:

$$s_{it} = \alpha_i - \beta p_{it} + \varepsilon_{it},$$

where s_{it} represents the market share of circulation for magazine i at time t, α_i is a time-invariant fixed effect for each magazine, p_{it} is the magazine's cover price, and ε_{it} is the error term. The estimated price coefficient of this regression, as well as the price coefficient of an aggregate demand function are then used to compute cross-price elasticities.

The estimation results are not reported in the decision, but it is said that the estimated elasticities are small. The Commission concludes that, since the different titles appear to be differentiated and imperfect substitutes, it is difficult to delimit the exact boundaries of the market.

These very low estimates of elasticities could be the outcome of an inadequate econometric specification. First, the specification does not control for other variables that might have an impact on readers' demand. Some observable magazine characteristics, like the number of pages, the presence of dedicated sections and the age of the title should be regarded as important explanatory factors of readers' demand.[15] In other words, it seems that a missing variable problem is not correctly addressed.

Second, the estimation may be biased due to identification problems. Since there is no particular reason to think that prices are exogenous or predetermined, the estimation methodology described in the decision may lead to a biased estimation of the price coefficient due to endogeneity. One solution to the endogeneity problem would be to instrument the prices, possibly with some cost-related variables.

Finally, the two-sided nature of the market for printed media requires considering both sides of the market in the estimation model. A model that does not take into account the link between readers' demand and advertising demand is potentially misspecified and may lead to biased estimations of price coefficient and

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[15] These are some of the explanatory variables that Kaiser (2003) included in the demand equation for women magazines in Germany, together with the launch of online versions. In addition, Argentesi (2004) includes the presence of inserts, the changes in the editorial line, and exogenous events like sport events or elections that might have an impact on newspapers' circulation as explanatory variables in the estimation of demand for Italian newspapers.

related elasticities. Therefore, a structural model for the printed media industry (and for media industries in general) should include two demand systems, one for each side of the market, and link them with appropriate parameters. We propose and illustrate such a model in the next section.

3. An Econometric Framework

The aim of an empirical model for market definition is to provide estimates of demand parameters and in particular of the price sensitivity parameters which are crucial to determine the substitution pattern between titles. As we have already discussed, an econometric model for the printed media industry should be based on three main elements: two-sidedness; product differentiation (both vertical and horizontal); definition of total market size (outside good).

Some further qualifications of the latter issue are needed. The logit model of demand, which is one of the most widely used econometric model for antitrust purposes, requires the specification of an outside option reflecting the choice of none of the products considered (the "inside" products). The existence of an outside good allows for the possibility that a homogeneous price increase of all the products considered decreases the aggregate quantity demanded. However, the introduction of an outside good imposes a measure of the market share for this good, which usually is not directly observed. Since the share of the outside good is the difference between the total (potential) size of the market and the combined shares of the inside goods, the potential market must be large enough to allow for a positive share of the outside good. The definition adopted for the total potential market size can have a significant impact on the estimation results. Therefore, one should test the robustness of the results using different specifications of the total market (and therefore of the outside option). One way to do that is to start with the largest possible definition and then restrict it on the basis of the estimated cross-price elasticities.

In printed media industry, the potential market on the readers' side is commonly defined as the total population above the age of 14 (an alternative being the number of households above the age of 14). On the advertising market, the largest possible market size would include all the media, i.e., TV, radio, internet, press. As we discussed in the previous section, narrower definitions might be more appropriate given the limited substitutability between different media services.

The model proposed below generalizes a framework introduced by Argentesi and Filistrucchi (2004). Market definition on both the newspaper market and the advertising market requires an estimation of own- and cross-price elasticities of demand which should be derived from the parameters of two distinct (but interconnected) demand models. It is therefore necessary to estimate both the demand for the newspaper by readers and the demand for advertising space by advertisers. We propose to estimate a system of logit demands (or nested logit if this is more appropriate to the market characteristics) where the two demand systems are linked by an inter-market network externality (which may be positive or negative).

More specifically, readers' demand for magazine j is assumed to depend on some observable characteristics of the magazine, on cover price, and on advertising quantity in the following way (the superscript N indicates newspaper or readers as opposed to advertising, which is indicated with A later on):

$$\ln(s_j^N) - \ln(s_0^N) = \mathbf{x}_j^N \beta^N - \alpha^N p_j^N + \gamma^N y_j^A + \xi_j^N,$$

where $\mathbf{x}_j^N$ is a vector of characteristics that can include age (the longevity of a publication can explain the loyalty of readers), number of content pages (i.e., non-advertising pages), special sections, promotions, inserts, changes of editors; p_j^N is the cover price of the newspaper (in real terms); y_j^A is the quantity of advertising contained in magazine j and ξ_j^N is an unobservable component that can be interpreted as a fixed effect.

Similarly, advertising demand can be written as

$$\ln(s_j^A) - \ln(s_0^A) = \mathbf{x}_j^A \beta^A - \alpha^A p_j^A + \gamma^A y_j^N + \xi_j^A.$$

Here the vector of product characteristics can include variables related to the composition of audience (income, education, etc.), variables about the quantity of content pages of the publication, or other characteristics like the format, colour pages and so on. Similarly to readers' demand, here y_j^N is magazine j's circulation, which may impact on advertising demand.

The parameters γ^N and γ^A capture the link between the two markets. Readers' demand is affected (either negatively or positively) by the amount of advertising, and the demand of advertising space is affected by the circulation of the magazine. Therefore there is a problem of endogeneity when estimating either demand system. Failing to consider the link with the other market (through the corresponding parameter γ) leads to biased estimates of elasticities. Estimating a model like the one proposed here should overcome this problem and lead to a correct identification of the price sensitivity parameters which are the basis of any analysis of market definition.

Still the identification issues due to the potential endogeneity of prices and quantities in both equations might remain. The usual to overcome this problem is by applying an instrumental-variables procedure. The possibility of finding suitable instruments for the variables of interest is often constrained by data availability. In the next section we further discuss this issue in the context of some recent empirical applications.

4. A Review of the Literature

Despite the growing body of theoretical literature on competition and pricing in two-sided markets, initiated by the work of Rochet and Tirole (2003, 2004) and Armstrong (2004), there is still little work on the empirical implications of these theories and few empirical tests of two-sidedness.

To our knowledge, the issue of market definition has not been explicitly considered in any recent paper. There are however a few recent empirical papers which analyse the printed media industry taking into account its peculiar features. Some of them, in order to explain the price structure in this market, focus in particular on the

estimation of the two-sided demand faced by printed media publishers. This is the case of the paper by Kaiser and Wright (2004), whose objective it is to conduct an empirical examination of the structure of price-cost margins between the two sides of the market. They estimate an adapted version of Armstrong (2004) model of competition in a two-sided market where magazines are horizontally differentiated. The model is then tested on a dataset of German magazines. The model rests on the assumption that there are only two media outlets, which limits the applicability of the model to real-world situations where it is often the case that there are more than two titles competing. The theoretical model gives rise to a system of two demand equations, one for the advertising market and one for the readers' market. The latter is assumed to depend on the quantity of content pages of the magazine (as opposed to advertising pages), on its cover price, on the quantity of advertising and on a transportation cost, which depends on the location of consumers in the characteristics space. Advertising demand similarly depends on the size of the readership, on advertising rates, and on the intrinsic preference of advertisers for either of the two magazines.

The model is completed with the conditions for profit maximization for the magazine firm. The methodology consists of estimating the two demand systems and plugging the parameters obtained into the first-order conditions for profit maximization, under the assumption that the two firms are symmetric.[16] Solving the system of FOCs gives the mark-up equations that are the expressions of central interest.

The central result of the theoretical model concerns the structure of these margins. The model holds that "equilibrium cover prices are marked up above marginal cost to the extent of product differentiation on the readership side, but discounted to reflect the externality generated on the advertising side of the market from a magazine attracting more readers" (Kaiser and Wright, 2004, p. 6). Therefore if advertisers value readership a lot, a magazine may prefer to set a low cover price to attract readers. The same reasoning holds for the mark-up on advertising rates. If readers have a high valuation for advertising, then the mark-up might be lower than the standard one.

The estimation results for readers' demand suggest that the relative number of content pages is an important factor in determining the size of the readership. The effect of advertising quantity is much weaker, but is weakly positive. The coefficient of cover prices is not significantly different from zero, which might suggest that cover prices are not an important determinant in the readers' choice. As to advertising demand, circulation seems to have an important effect on the share of advertising of one magazine versus the other. Again, the price coefficient is not statistically different from zero.

The parameter estimates of the two demand systems allow inferring the implied price-cost structure in this two-sided market. In particular, it is useful to decompose the margins in the standard mark-up coming from horizontal differentiation and the additional term which represents the network effect. Estimates of the two network effects suggest that the network externality on the equilibrium cover price is much bigger than the externality on the equilibrium advertising price. In other words, the readers' side is subsidized by the advertising side. However, the authors recognize that, since the estimates of the price sensitivity of demand are not precisely estimated, the results obtained should only be interpreted as illustrative of the role that the network effect can play in determining the price-cost structure in two-sided markets.

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[16] This assumption is a necessary simplification due to the impossibility of identifying all the parameters of the general model with a limited dataset.

There are two more observations that are worth mentioning about the methodology used in this paper. The first one concerns the specification of the model, and in particular the issue of identification. In both demand equations, there is an issue of endogeneity both with respect to prices and quantity, which is reinforced by the two-way causation between advertising and readership. This problem is solved by using variables about other titles published by the same firm as instruments. For example, the size of the readership in the advertising demand equation is instrumented with the average readership of the same publisher on other magazines. This choice rests on the assumption that cost factors are common across titles published by the same publishing house. This identification strategy seems to be justified in this context by the high correlation that instruments show with the explanatory variables and by the fact that orthogonality of instruments with the residuals of the equation of interest cannot be rejected. However, this choice of instruments might not be appropriate in other contexts where the publishers do not have many comparable publications. Other possible instruments that have been proposed in the literature are input cost or the (exogenous) characteristics of other firms.[17] In any case, the choice of the appropriate instruments should depend on data availability and on the specific characteristics of each market.

The other observation regards the limitations implied by the assumptions of the theoretical model. As we have already mentioned, the applicability of the model is limited to cases where there are only two newspapers competing in the same market. Furthermore, the model assumes that the total number of readers and the total number of advertisers is fixed. This assumption does not allow for an outside option: All readers buy one magazine and all advertisers buy space in one magazine. This implies that there is no scope for market expansion or market reduction, and therefore implicitly that demand is globally inelastic to prices. In this respect, recall that in the above-mentioned case *SOCPRESSE / Groupe Express-Expansion* in France, the authority performed an estimation of global price elasticity, which shows that the average price of magazines would have a strong impact on the demand for magazines, which seems to be a piece of evidence contrasting with the assumption of Kaiser and Wright (2004).[18]

A related paper, Kaiser (2004), builds a model of profit maximization in the German magazine market. The theoretical model is composed of an equation for readers' demand, a behavioural equation for advertising rates, and a first-order condition for profit maximization. Readers' demand is estimated with a nested logit model, assuming that demand depends on content and the share of advertising pages as in Kaiser and Wright (2004). This specification takes into account the link between the readers' market and the advertising market. Moreover, it overcomes the two problems of that paper mentioned above. First, it considers the existence of an outside good, because the nested logit model explicitly allows for the possibility that consumer do not buy anything. Second, it can be applied to markets with more than two competitors.

However, compared to Kaiser and Wright (2004), Kaiser (2004) puts much more structure on the formulation of the advertising side. Advertising prices are assumed to

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[17] As motivated in Berry (1994) and Nevo (2001), the characteristics of products produced by other firms are appropriate instruments because they are correlated with price through the condition for profit maximization, but are assumed to be exogenous to the model.

[18] To estimate cross-elasticities in the *SOCPRESSE / Groupe Express-Expansion* case, the methodology adopted by the *Conseil de la Concurrence* requires estimating the price elasticity of the aggregate demand in this market. This estimation is based on a time-series regression which explains the consumption of magazines by global consumption and by the evolution of relative cover prices of magazines with respect to some consumer price index.

be a function of previous period circulation and a vector of observed and unobserved characteristics of the magazine and of the readership. Advertising quantity is instead assumed to be fixed.

The model is closed by a first-order condition for profit maximization. The only choice variable of the magazine firm is assumed to be cover price, because advertising rates are assumed to adjust in the way described above and advertising quantity is fixed. The first-order condition leads to a mark-up formula for cover prices which has similar characteristics to the one of Kaiser and Wright (2004), with the difference that here there is only one mark-up instead of two. Cover price deviates from the usual mark-up formula by a term that depends on the circulation elasticity of advertising demand: the less elastic advertising demand is to circulation, the more cover price deviates from the standard mark-up formula.

An interesting result that comes from readers' demand estimation is that consumers seem to have a taste for advertising. This would confirm the importance of considering advertising content in order to avoid possible biases in the estimation of readers' demand, at least for magazines. This would also confirm the theory of the "circulation spiral" of Gabszewicz, Laussel and Sonnac (2002), whereby the circumstance that readers like advertising and advertisers look for readers leads to equilibria where both the readers' market and the advertising market are fully monopolised by a single firm. However, Kaiser (2004) seems to draw opposite conclusions from his results. Given the structure of the price cost margin, an increase in cover price by a merging firm would have a negative impact on advertising and would not be always profitable. This conclusion, however, does not seem to take into account that, if the externalities linking the two markets are both positive, the circulation spiral effect might lead to an increase of market power *on both markets*, ending at the extreme case to monopolization.

Estimating market power is the objective of the paper by Argentesi and Filistrucchi (2004), who perform an empirical analysis on the Italian newspaper market. As in the previous two papers, the model consists of three main elements: a demand equation for readership, a demand equation for advertising, and a profit maximizing condition. The paper is aimed at estimating the strength of competition in the market by comparing the estimated price-cost margins under the alternative hypotheses of oligopolistic competition and collusion with some measure of observed costs in order to assess which is the true structure of the market.

The specification of the two demand systems is similar to the one proposed in this paper, except for the fact that in the basic version advertising is not included as an explanatory variable in readers' demand. This assumption is made for simplicity but it is also justified by the fact that the publications considered are national newspapers of general information, where the role of advertising quantity in determining demand does not seem to be as crucial as for magazines. Newspapers' demand is estimated with a logit model, which captures the feature of product differentiation that characterizes this market.

The link between the two markets is due to the fact that advertising demand is function of circulation. Advertising demand is not assumed to follow a specific behavioural function as in Kaiser (2004) model, but is estimated with a logit model. This requires a definition of total market size, which raises the issue, already mentioned, on the definition of boundaries of the advertising market. In particular, it should be assessed to what extent other media provide a substitute to the newspapers considered

from the point of view of advertisers, which is an important issue for market definition analysis.

The profit maximization condition on cover prices gives an expression for mark-up similar to the ones derived in the papers previously discussed. The implication is that the optimal cover price is lower than the standard mark-up because of the impact of the advertising market, which reduces the incentive to increase price because this would reduce the readership and as a consequence advertising demand.

All the three models discussed above constitute attempts to incorporate the two-sidedness of the market into the econometric analysis of printed media markets. Gronnevet and Steen (2004) in a recent paper consider another possible source of bias that can arise in the estimation of demand in these industries. The source of endogeneity stems from the choice of a newspaper's political line. Choosing whether to adopt a political profile or not is considered as a strategic decision for the newspaper. Given that the political line is a potential determinant of newspaper demand, one would be tempted to include a political dummy in the demand estimation. However, since the choice of the political profile is endogenous, this would raise problems of identification. The authors propose therefore a two-step estimation procedure which allows solving this endogeneity problem.

All the models presented in this section provide different ways to estimate demand taking into account the distinguishing features of printed media markets. Correct demand estimation is the basis for a sensible analysis for market definition, because the latter relies on elasticity estimates to draw conclusions on the degree of substitutability between media outlets. As we have seen, the biases in the demand estimation can have different sources, and market definition analysis should rely more and more on econometric analyses that encompass the complexity of these interacting factors.

5. An Econometric Illustration

We use a dataset on French magazines and construct a demand system based on a nested logit model of readers' demand.[19] The nested logit model assumes that there are two levels in the choice of consumers: A consumer first chooses among the available magazines; then he has to decide between buying a one-year subscription and buying the magazine each week at the newsstand. The first decision also includes the option to choose an "outside" magazine or another type of printed media. The model is motivated by evidence suggesting that there are relevant differences among the publications considered in terms of the ratio subscriptions/unit sales. In particular, the magazines could be broadly grouped in three classes according to the proportion of subscriptions with respect to newsstand sales. Figure 1 displays these three groups. Clearly the three magazines La Vie, Pélerin, and Valeurs Actuelles are mainly distributed through subscription. In contrast, Marianne, Paris Match, VSD and Figaro Magazine are bought each week at newsstands by customers. In between there are magazines having more balanced distribution schemes. These three groups correspond to different types of magazines. Magazines distributed by subscription have a smaller and more specific
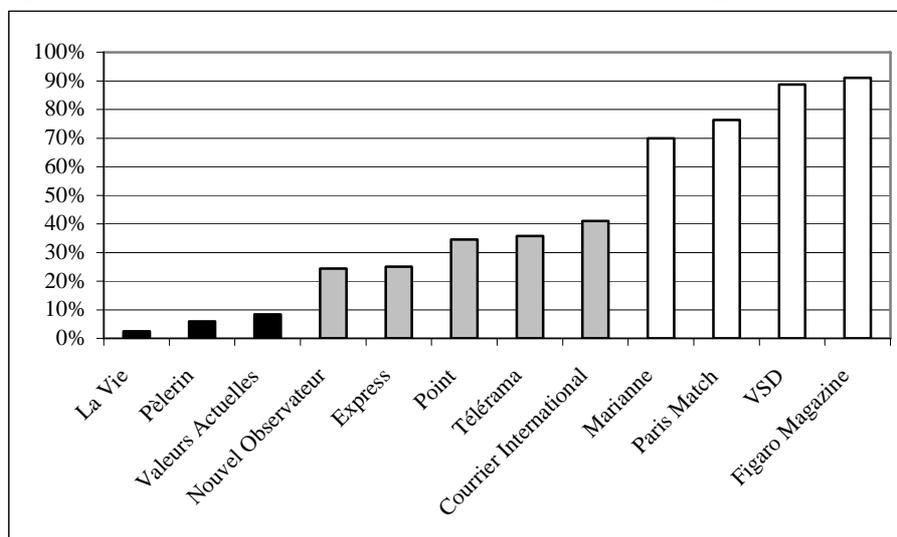
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[19] See Ivaldi and Verboven (2005) for further details on this model.

audience, while magazines usually sold per unit have a much broader audience and have a reputation of building their image around scoops or strongly emotional events.[20]

After estimating the model without considering the advertising market, we estimate the same system by using a measure of advertising revenues as an instrument and show how elasticity estimates change due to the above-mentioned endogeneity problem.

The dataset consists of a panel of eight French magazines from 1996 to 2001.[21] For each magazine, the dataset contains information on circulation, subscriptions, sales at newsstand, free distribution, cover prices, subscription fees, and revenues (both total and from sales only). The difference between the total turnover and the total sales from subscriptions and unit purchases is roughly a measure of revenues from advertising. By dividing this measure by the number of free copies, we derive a proxy for the price of advertising per free distribution.

Figure 1: Share of Unit Purchases in Total Sales (Average – 1996-2001)

The demand model is specified as:

$$\ln(s_j) - \ln(s_0) = \mathrm{x}_j \beta - \alpha p_j + \sigma \ln(s_{j|m}) + \xi_j ,$$

where s_j is the market share of magazine j in the whole market, s_0 is the market share of all alternative magazines (namely, the outside alternative measured by the total number of magazines sold in France), $s_{j|m}$ is the market share of magazine j in the group

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[20] This is not true for Figaro Magazine which is sold as a supplement with the weekend edition of the daily newspaper "Le Figaro."

[21] Four magazines – Courrier International, Marianne, Pélerin and Télérama – have been excluded from the dataset used for estimation either because of lack of data or because they are not strictly comparable to the included magazines. For instance, Télérama is considered as TV magazine rather than a news magazine.

of magazines sold under subscription or unit purchase, x_j is a set of exogenous variables to measure the specific reputation of each magazine by means of a dummy variable for each magazine, a dummy to signal the distribution mode, the number of issues per year and a time trend, and p_j is the unit price or the subscription price (per issue) according to the chosen mode of purchase. The parameter α measures the sensitivity of the representative customer's utility to prices, while the parameter vector β provides a measure of the sensitivity of the representative customer's utility to quality. The parameter σ indicates how demand is affected by the differentiation in terms of distribution systems. Finally, ξ_j is a random term measuring the effect of unobservable variables that enter the mean value of each magazine.[22]

We build a system of two equations, one for the demand of magazine *j* sold under subscription and one for the demand of magazine *j* sold under unit purchase. We estimate the model using three stages non linear least squares under two alternative set of instruments. In the first case, the set of instruments include all exogenous variables and the previous year's circulation. Given the paucity of this dataset, this is basically the only way to care for the endogeneity problem. In the second set of instruments, we replace the previous year's circulation by our proxy for the price of advertising revenues, its lagged value and the number of free and complimentary copies.

We have selected this last set of instruments in order to minimize the objective function and to increase the identification of parameters of interest. In both cases, the parameter σ is significant and well identified. Its estimated value (0.52 with a t-ratio of 1.95 under the second set of instruments) shows that the differentiation in terms of purchase or distribution mode matters. However, the parameter α which is not significantly different from zero under the first set of instruments becomes significant under the second set of instruments. Moreover the first stage R-square which is a measure of the goodness and relevance of instruments increases with the estimation made with the second set of instruments.[23]

The results for the estimated own- and cross-elasticities provided in Tables 1 and 2 are striking. Note in particular that, when advertising is used as an instrument, the range of values taken by the own price elasticities increases. In the first case, i.e., when advertising is not used as an instrument, the range of values for elasticities is between 0.20 and 0.36 while elasticities takes values between 0.67 and 1.22 when advertising is an instrument. Not only the average value of own price elasticities increases but also the spread of values. Note also that the demand of some magazines becomes elastic.

Estimated values for all cross-price elasticities increase drastically, providing much more room for substitution between magazines. The values of cross-elasticities are three to four times higher when advertising is included as an instrument than when it is not.

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[22] This model is discussed by Ivaldi and Verboven (2005) in detail.

[23] The estimated value of α is equal to 0.36 (with a t-ratio of 2.01) under the second set of instruments and 0.11 (with a t-ratio of 0.34) under the first set of instruments. Detailed results are available from the authors.

Table 1: Own Price Elasticities for Some French Magazines

	Estimation without advertising as an instrument	Estimation with advertising as an instrument
La Vie	-0.24	-0.81
	(0.000)	*(0.000)*
Le Figaro Magazine	-0.36	-1.22
	(0.001)	*(0.003)*
Le Nouvel Observateur	-0.31	-1.06
	(0.000)	*(0.001)*
Le Point	-0.28	-0.95
	(0.000)	*(0.001)*
L'Express	-0.28	-0.95
	(0.001)	*(0.002)*
Paris Match	-0.20	-0.67
	(0.002)	*(0.005)*
Valeurs Actuelles	-0.36	-1.22
	(0.044)	*(0.148)*
VSD	-0.20	-0.67
	(0.018)	*(0.060)*

Note: Each cell provides the estimated value of the elasticity and, in parentheses and italics, the empirical standard deviations.

Table 2: Cross Price Elasticities for Some French Magazines

	Estimation without advertising as an instrument	Estimation with advertising as an instrument
La Vie	0.000	0.001
	(0.000)	*(0.000)*
Le Figaro Magazine	0.041	0.137
	(0.001)	*(0.003)*
Le Nouvel Observateur	0.008	0.025
	(0.000)	*(0.001)*
Le Point	0.006	0.020
	(0.000)	*(0.001)*
L'Express	0.008	0.027
	(0.001)	*(0.002)*
Paris Match	0.026	0.087
	(0.002)	*(0.005)*
Valeurs Actuelles	0.001	0.002
	(0.000)	*(0.001)*
VSD	0.009	0.031
	(0.001)	*(0.002)*

Note: Each cell provides the estimated value of the elasticity and, in parentheses and italics, the empirical standard deviations.

These results are just illustrative of the bias that can arise in the estimation of elasticities if the feedback effect between the two sides of the market is neglected. It would be better to specify a full econometric model which encompasses both sides of the market simultaneously, in the spirit of the framework advanced in Section 3. Nonetheless, the estimation exercise proposed in this section gives some support to the conclusions we have drawn before and invites to estimate a two-sided markets type model to define the relevant market.

Meanwhile going from the first set of estimates to the second set when advertising is used as an instrument could modify the policy conclusion. If demands for magazines were inelastic and if magazines were not substitutes, the relevant market could shrink to the magazine itself. In terms of the antitrust policy, a merger in this industry would not be investigated, and its impact would not be perceived, in the same way. Recall that mergers between complements are not harmful. In terms of the regulation policy, the monitoring of each magazine could be tightened up in order to avoid abuse of dominance on its own market.

6. Conclusions

This paper discusses the issue of market definition in the context of printed media markets. The issue is crucial for two reasons. First, technological progress is rapidly changing the boundaries of media markets making the exercise more complex and sensible. Secondly, media markets are characterized by peculiar features that should be taken into account in the analysis of market definition and market power. In particular, the econometric models that are increasingly used to implement the SSNIP test should incorporate the elements of two-sidedness that are intrinsic to these markets.

We review some recent antitrust cases and show to which extent these characteristics of printed media markets have been taken into account. The importance of considering these peculiar features increases with the use of econometric models in antitrust analysis. Failing to consider them may lead to biased estimates of own- and cross-elasticities. We illustrate the bias that can arise in the estimation of elasticities with an econometric exercise on a dataset of French magazines. We compare two alternative specifications of readers' demand for magazines, one without advertising and one where advertising is used as an instrument, and show that neglecting the effect of advertising may have a relevant impact on the estimated elasticities.

A proper econometric model for the estimation of elasticities waits to be built. We propose a framework to model the two-sided demand that characterizes printed media markets. Alternative methodologies are also conceivable and we discuss some approaches that have recently been proposed in the literature. Given the topicality of the issue of market definition in media industries and the need of finding appropriate econometric models to implement it, further research is needed to capture the complexity of this industry.

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