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Assessing Unilateral Merger Effects in a Two-Sided Market: An Application to the Dutch Daily Newspaper Market*

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Abstract

We compare different methods to assess unilateral merger effects in a two-sided market by applying them to a hypothetical merger in the Dutch newspaper industry. For this, we first specify and estimate a structural model of demand for differentiated products on both the readership and the advertising side of the market. This allows us to recover price elasticities and indirect network effects. Following Filistrucchi, Klein, and Michielsen (2010) marginal costs are then recovered from an oligopoly model of the supply side. We use these estimates of price elasticities, network effects and marginal costs to compare different methods that can be used to evaluate merger effects: We perform a concentration analysis based on the Herfindahl Hirschmann Index, a Small Significant Non-Transitory Increase in Price test, measure Upward Pricing Pressure, and conduct a full merger simulation.

JEL Classification: L13, L40, L82.

Keywords: Two-sided markets, newspapers, advertising, network effects, merger simulation, SSNIP, UPP, HHI.

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1 Introduction

The newspaper market is a typical example of a so-called two-sided market: Publishers sell content to readers and advertising slots to advertisers, while taking into account that the demand for advertisements in a newspaper depends positively on its circulation and readers might be affected by the number (or concentration) of ads in the newspaper (Anderson and Gabszewicz, 2008).[1]

There has recently been a surge in merger cases involving two-sided platforms. Famous cases include the Google/DoubleClick merger, the merger between Dutch flower auction houses, the one between Dutch yellow page directories, and the recently proposed merger between Deutsche Börse and NYSE Euronext.[2]

Network effects play a central role in two-sided markets, and like all markets characterized by network effects two-sided markets show a tendency towards concentration. This is due to the fact that the network, and more precisely its size, is valuable to consumers (or at least to those on one side of the market). In such an environment, firms (and often also consumers) may also gain from the increased concentration.

When it comes to assessing a proposed merger in such a market, competition authorities are, as a rule, required to assess whether a horizontal merger is likely to raise concerns with respect to unilateral or non-coordinated effects (i.e., whether the merger might increase the market power of the merging firms) and with respect to coordinated or collusive effects (i.e., whether the merger might make it more likely that collusion takes place in the market). With regard to the assessment of unilateral merger effects, competition authorities have traditionally devised different methods to address the issue. For instance, initial screening has traditionally been based on the analysis of the market shares of the merging parties and of (the changes in) the Herfindahl-Hirschman Index (HHI). This often meant that mergers among firms with market shares below a given threshold and mergers characterized by a post merger HHI and a change in the HHI below certain thresholds have been almost automatically approved. For mergers judged to be worthy of further investigation, full merger simulations have only seldom been conducted. More often, preference has been given to a SSNIP-type test, where it is asked whether the merging firms

[1] The issue of whether and to what extent readers like or dislike advertising in a newspaper is an open one. Whereas Argentesi and Filistrucchi (2007) find no effect of advertising on the number of readers of daily newspapers in Italy and Fan (2010) reaches the same conclusion for US daily newspapers, Kaiser and Wright (2006) and Kaiser and Song (2009) find that advertising increases readers demand for magazines in Germany. Interestingly, when estimating demand non-parametrically, Sokollu (2010), finds that advertising has a non-linear effect on demand for magazines in Germany.

[2] The cases are NMa case 5901/Bloemensveiling Alsmeer–Flora Holland, NMa case 6246/European Directories–Truvo Nederland, and DG-Comp case 11/948 Deutsche Börse/NYSE Euronext, respectively.

would find it profitable to raise prices post merger by a given threshold price increase, usually 5 or 10 percent, if rivals were assumed not to react.[3]More recently, Farrell and Shapiro (2010) proposed to use the concept of Upward Pricing Pressure (UPP), which measures the tendency to increase prices post merger due to the internalization of the cross effects between the merging products when one allows for a benchmark level of efficiency gains from the merger, again 5 or 10 percent. The UPP concept has been modified by Salop and Moresi (2009) and has been generalized to GeUPP in Jaffe and Weyl (2011). Importantly, it has been adopted in the 2010 US merger guidelines. The debate has centered around whether pricing pressure indexes only represent an improvement with respect to market concentration analysis or may substitute also for merger simulation.

In any case, these tools for assessing unilateral merger effects have mainly been developed for single-sided markets. Yet, as explained in Wright (2004), analyzing a two-sided market as if it were a single-sided market may lead to mistakes and unintended consequences in the application of competition policy. This is mainly because firms' pricing decisions do not only depend on own- and cross-price elasticities of demand on both sides of the market, as they would in a single-sided market with a multi-product firm, but also on the own- and cross-elasticities of demand on one side with respect to demand on the other side, i.e. the network effects.

For example, in the newspaper market, when considering to increase the subscription prices after a merger, newspapers will take into account that such an increase will not only have a negative effect on subscription revenues through its negative effect on circulation, but also a negative effect on advertising revenues as decreased circulation leads to a decline in the demand for advertising. For the same reason, such an increase in price might lead to a decline not only in readers' welfare but also in advertisers' welfare (the former effect is partly offset if readers are ad-averse, and enhanced if instead they are ad-loving). This not only makes a price increase less likely, but it also has an impact on the social desirability of the merger.

When it comes to assessing unilateral merger effects, it has been known for some time already that, in a market characterized by positive (direct) network effects, it is not necessarily the case that a higher concentration will be detrimental to consumer welfare. On the one hand, higher concentration is likely to

[3]SSNIP stands for "Small but Significant and Non-transitory Increase in Price". Originally, the SSNIP test was devised for market definition and as such asks the question of whether a hypothetical monopolist would find it profitable to raise the price by 5 or 10 percent. This is why the test is sometimes called the Hypothetical Monopolist Test. Note that in the original context of the test it is somewhat more natural to assume that the prices of the products not owned by the hypothetical monopolists remains unchanged. See Section 6 for further discussion.

lead, in the absence of efficiency gains, to a higher price; on the other hand, it is also likely to correspond to a higher utility derived from the good and a higher willingness to pay for the good. Since consumer welfare is usually conceived as dependent on the difference between the willingness to pay of consumers and the price they pay, the net effect will depend on whether the price increases more than the willingness to pay, and *vice versa*.

In a two-sided market, the issue is more complex than in a market with only a direct network effect. This is due to the presence of (often two) indirect network externalities that link two distinct demands and that need not necessarily both be positive. Therefore, the question arises whether the two-sided nature of the market increases or decreases the tendency of merging firms to raise prices after the merger and, in an economic approach to competition policy, whether a higher price necessarily leads to a higher loss in consumer welfare and in turn higher allocative inefficiency.

In this paper, we investigate different ways to assess unilateral merger effects in a two-sided market by applying them to an hypothetical merger in the Dutch newspaper market. We first specify a structural model of demand for differentiated products on both the readers and the advertisers side of the market. We use it to recover price elasticities, indirect network effects and, following Filistrucchi, Klein, and Michielsen (2010), also marginal costs. We then compare, in a typical two-sided setting as the newspapers one, different approaches to the assessment of unilateral merger effects: HHI, SSNIP, UPP and a full merger simulation that is again based on the model.

Turning to the literature, theoretical work on mergers among two-sided platforms is still scarce. Most of the policy implications derived from the theory stem from the comparison between oligopoly and monopoly equilibria. A paper specifically focused on mergers is Chandra and Collard-Wexler (2009) who present an economic model of the newspaper market and show that it is not necessarily the case that a monopolist will choose to set higher prices than competing duopolists on either side of the market, provided that readers are heterogeneous with respect to the value they bring to advertisers and the less valuable readers are also those who are more price-sensitive. A recent paper by Leonello (2010) analyzes mergers in a similar setting. Her model also has differentiated products à la Hotelling on both sides of the market and two oligopolistic platforms merging into a monopoly. She finds that, even in the absence of efficiency gains, because of the existence of indirect network effects, merging platforms have the incentive to keep their prices low after the merger on at least one side of the market. Finally, Malam (2011) proposes a model of differentiated products à la Salop (1979) on both sides of the market, but

where the side consuming content does not pay. He finds mergers (to monopoly) among ad-sponsored platforms have a competition-intensifying effect, which offsets the incentive to increase prices on the advertiser side.

The theoretical literature distinguishes between the price level (roughly the sum of the two prices) and the price structure (roughly their ratio) and shows that, in general, in a two-sided market a merged firm will tend to raise the price level, but it is also likely to change the price structure.[4] In fact, a two-sided market is often defined as a market in which not only the price level, but also the price structure matters for the profits of the firm. Consequently, not only the price level, but also the price structure determines consumer welfare, and more generally total welfare. The literature shows that more concentration leads in general to a less efficient price level, but not necessarily a less efficient price structure. As a result, it is not clear whether higher concentration and more market power lead to a welfare loss, not even if one focuses attention on consumer welfare.

Also the empirical literature on mergers involving two-sided platforms is still scarce. Evans and Noel (2008) point out that, as the Lerner pricing formula does not hold in such markets, traditional merger simulation models are wrongly specified if applied without modifications to two-sided or multi-sided platforms. They also perform an analysis of the merger between Google and DoubleClick, which is actually the first empirical analysis in the literature of a merger in a two-sided industry. They show that relying on conventional methods would have led to significantly different results than using methods that explicitly incorporate the two-sided nature of this market. Nevertheless, they only perform a calibration exercise due to a lack of data. Chandra and Collard-Wexler (2009) assess mergers in the Canadian newspaper market, but their analysis is mainly an *ex post* merger evaluation of the effects of the merger. They use a two-sided Hotelling model to explain their finding that greater concentration did not lead to higher prices for either readers or advertisers. Yet, they do not build and estimate a structural econometric model and therefore, their framework cannot be used to simulate mergers.

In our merger simulation, we follow Filistrucchi, Klein, and Michielsen (2010) who build a structural econometric framework to simulate the effects of mergers among two-sided platforms selling differentiated products and competing à la Bertrand on each side of the market. Their framework extends the supply model of Argentesi and Filistrucchi (2007) to the more general case of a two-sided market with

[4] We use the word "roughly", because in a two-sided market without a transaction among users of the platform one needs to reduce the two prices to the same unit of measurement by appropriate weights. In a newspaper market, the price level is equal to the per copy revenues from both the readership and the advertising side, while the price structure is the ratio of the revenues from both sides.

two network effects.[5] For this reason it differs also from Van Cayseele and Vanormelingen (2009) who analyze mergers in the Belgian newspapers market and, consistently with their empirical findings, assume no effect of advertising on readership. Jeziorski (2011) studies instead mergers between US radio stations. In his model, listeners do not pay a monetary price to listen to the radio but advertising generates a nuisance cost. Our model is more general in that customers on both sides, readers and advertisers, pay a price to access the platform. Finally, Fan (2010) analyzes mergers among US newspapers. Whereas the framework of Filistrucchi, Klein, and Michielsen (2010) is more general than hers when it comes to to analyzing merger effects on prices, as it allows for advertising to affect readers, her model allows her to account for endogenous changes in the quality of the newspapers after the merger, if data on quality are available. As such data are not in our data set, we abstract from quality changes due to the merger.[6]

This paper proceeds as follows. In Section 2 we identify the main features of the Dutch market for daily newspapers. Section 3 describes the data set. In Section 4, we specify a model of demand for both sides of the market. Section 5 reports estimation results and estimated elasticities. In Section 6, we turn to the hypothetical merger and present results from a concentration analysis, a SSNIP-type test, UPP measures, and results from the full merger simulation. Section 7 summarizes our findings and concludes.

2 The Dutch market for daily newspapers

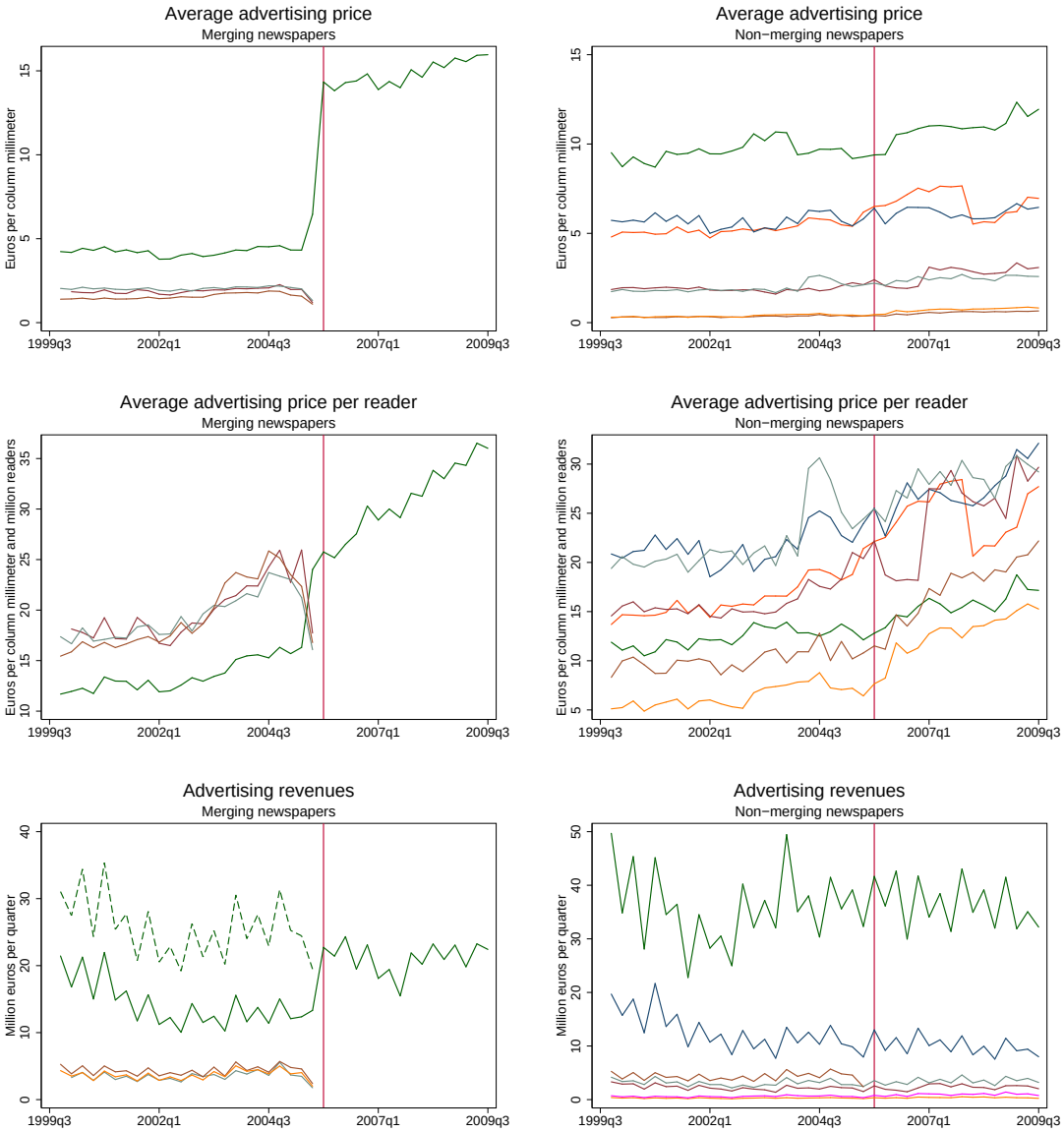
The Dutch market for daily newspapers shows patterns that are typical for a newspaper market in the first decade of the 21st century. In Filistrucchi, Klein, and Michielsen (2010), we document that in this period, real newspaper prices have increased, while at least some input prices such as wages and print costs have not. Readership demand has decreased, which is most likely due to the increased availability of online news. Also, free newspapers have entered, but it is not clear whether this has caused a significant decrease in readership in the other daily newspapers. Finally, the total amount spent on advertising has remained constant.

To put our merger simulation into perspective, we now describe it in a bit more detail. There are eight important national level newspapers, Algemeene Dagblad, De Telegraaf, De Volkskrant, Het Financieele

[5] Also Song (2011) extends the framework used by Argentesi and Filistrucchi (2007) to two network effects and then uses it to test for collusion in the Italian newspaper market. He then estimates markups for German magazine and shows that magazines typically set copy prices below marginal costs and earn profits from selling advertising pages.

[6] In practice, although in many circumstances it would probably be relevant, the assessment of unilateral merger effects does not tackle the issue of product repositioning or, if it does, the analysis is mainly qualitative.

Figure 1: Effects of the 2005 merger: Advertising side

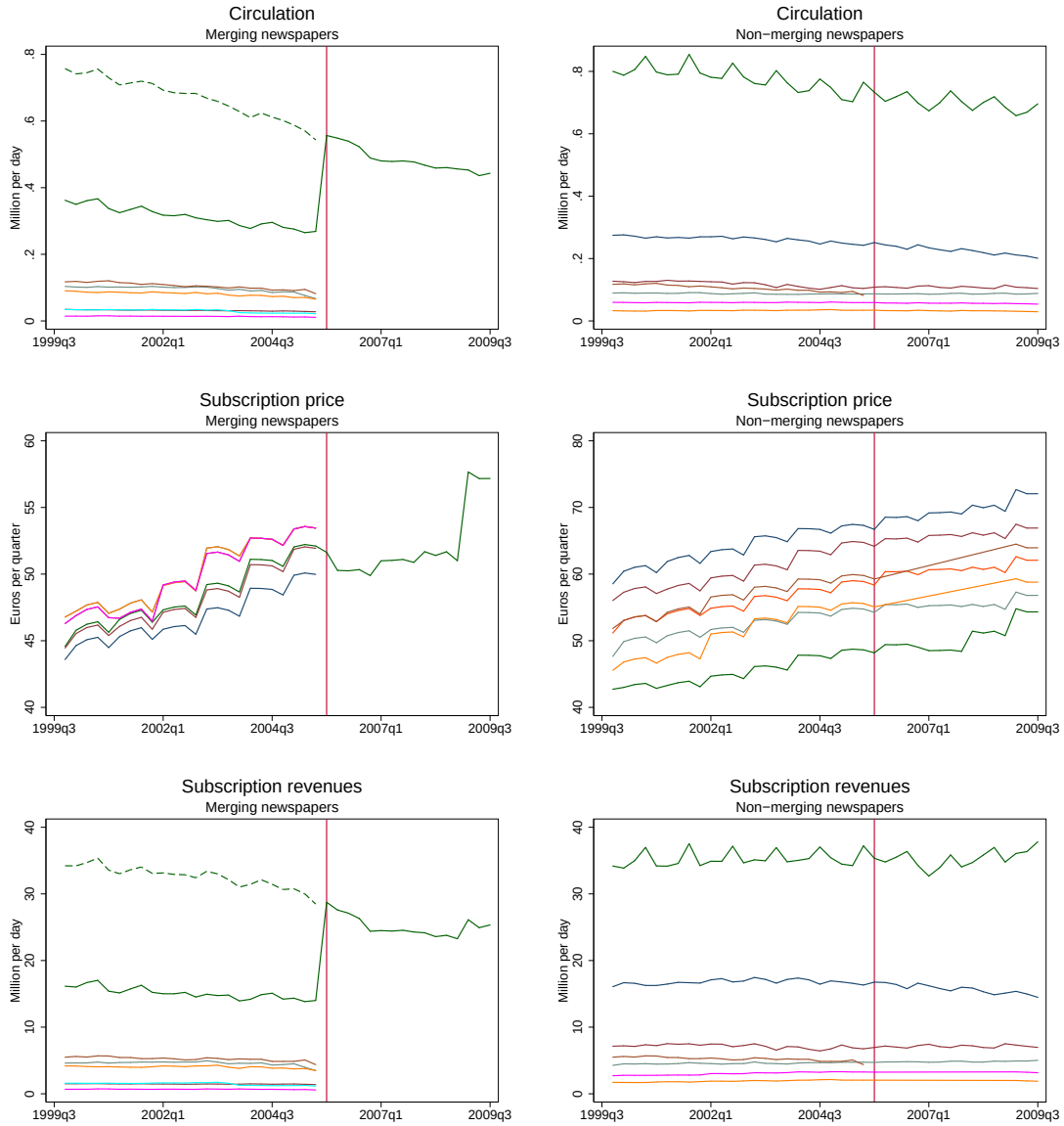


Dagblad, Het Parool, NRC Handelsblad, nrc.next, and Trouw. Besides, there are 2 important free newspapers, Sp!ts since the fourth quarter of 2001 and Metro since fourth quarter of 2006.[7] They distribute a significant number of copies in public areas such as train stations.

In 2005, Algemeene Dagblad merged with 7 regional newspapers, and their editions were replaced by regional editions of Algemeene Dagblad. 63 percent of the shares of the newly formed AD NieuwsMedia were from then on owned by PCM, and 37 percent by Wegener. The effects of this are shown in Figure 1 and Figure 2.

[7] We model them as part of the outside good when estimating readership demand and allow the value of the outside good to increase with time. Also the increased value of not buying a newspaper and reading news online is captured by the dependence of the value of the outside good on time.

Figure 2: Effects of the 2005 merger: Readership side



Then, in 2009, PCM bought the remaining shares in AD NieuwsMedia from Wegener and at the same time De Persgroep Nederland, also owning de Volkskrant, NRC Handelsblad, nrc.next, Het Parool and Trouw, bought 51 percent of PCM. This merger needed to be approved by the Dutch competition authority (NMa). The NMa imposed as a condition on De Persgroep Nederland to sell NRC Handelsblad and nrc.next. The reason for this was that otherwise, PCM would dominate the market for quality newspapers in Amsterdam as it owns Het Parool, Trouw and De Volkskrant.

In the merger simulation below we first simulate the effect of this remedy and then, starting from this, the effect of a merger between NRC Handelsblad, nrc.next, and De Telegraaf, Gooi- en Eemlander, Haarlems

Dagblad, Leidsch Dagblad, and Noordhollands Dagblad.[8]

3 Data

Our most important data source on the readership side is yearly circulation data at the level of 512 municipalities, which we obtained from Cebuco. These are merged with data on subscription prices. We use subscription prices because unlike in other countries, almost all of the copies (91 percent according to our data) are sold in the form of subscriptions.

For the advertising side, we obtained quarterly data from Nielsen on the amount of advertising, which is measured in column millimeters, and the advertising revenues of each newspaper according to list prices. From these, we calculate the (weighted) average list price per column millimeter. Nielsen also provided us with data on the total number of pages of the newspapers, and information on the format, which is measured by the number of column millimeters per page.

We allow the demand for advertising in a newspaper to depend on the characteristics of the readers of this newspaper. For this, we obtained Nederlands Onderzoek Media (NOM) Print Monitor national level data on reach by age, gender, income and wealth, being a breadwinner or not, shopping for groceries or not, as well as reach by region.[9]

The market size is given by the total population over 13 years of age in the Netherlands. Data on this is provided by Statistics Netherlands (CBS). CBS also provided data on the consumer price index, which we use to express prices in year-2002 Euros, and geographical data that we use in Figure 3 below.

4 A model of demand

As argued above, when predicting merger effects in a two-sided market, key inputs into the economic analysis are price elasticities and indirect network elasticities on each side of the market, or equivalently

[8] Sp!ts is also part of the Telegraaf group, but we treat it as part of the outside good for the entire analysis. This is not likely to alter our conclusions on the readership side, as long as it remains a free newspaper. In Section 4.1 below we motivate our use of a model for the advertising side in which newspapers do not directly compete with one another. Given that we use this model also conclusions for the advertising market are likely to be unaffected.

[9] Reach differs from circulation in that reach is the number of people reading a newspaper, whereas circulation is the number of copies that are distributed. Circulation can be divided into paid and unpaid circulation. Most of the circulation is paid, and as already pointed out above, most of the paid circulation is paid subscriptions.

diversion ratios.

Lacking other sources of information on diversion ratios, we proceed to estimate the responsiveness of readership demand to changes in newspaper prices and advertising intensity and the responsiveness of advertising demand to changes in advertising prices and the circulation of a newspaper.[10]

For this, we use a model of demand for differentiated products on each side of the market. The next section introduces a model of advertising demand, the subsequent section then specifies a model of readership demand. Throughout, the superscript "r" stands for "readership" (as in the cover price of that newspaper) and the superscript "a" stands for "advertisement" (as in the price of an advertisement).

4.1 Advertising demand

We specify advertising demand to be linear in the log of the advertising price per reader. That is,

$$\log q^a_{jt} = \alpha^a \log\left(p^a_{jt}/q^r_{jt}\right) + \beta^a x^a_{jt} + \xi^a_{jt} + \varepsilon^a_{jt}, \tag{1}$$

where q^a_{jt} is the quantity of advertising in newspaper j at time t, which is measured in column millimeters, p^a_{jt} is the advertising price per column millimeter, and x^a_{jt} are characteristics of the newspapers from the point of view of advertisers, such as the demographics of readers of newspaper at time t.

Such a reduced form is natural in a model in which readers buy at most one newspaper and advertisers buy advertising slots from all platforms. It is similar to the one proposed by Rysman (2004), which is used also by Van Cayseele and Vanormelingen (2009) and Fan (2010), in that it assumes that there are no direct cross price effects and no direct network effects, so that the decision to advertise in a newspaper only depends on the costs and benefits of advertising in that newspaper and is independent of the decision to advertise in other newspapers. We follow them in imposing that the reduced form is of the constant elasticity form and additionally assume that the network effect enters the demand function in such a way that it is the price per reader which matters to the advertisers. This is a common assumption in theoretical models of media markets such as for instance Anderson and Gabszewicz (2008). It can also be justified by looking at the evolution of the average advertising price per reader for the merging parties around the time of the merger in Figure 1.

[10] An antitrust authority might instead have access to internal documents of the merging firms indicating how much of the loss in sales that is due to a price increase the firm has been considering is expected to benefit rival products.

In our reduced form, the elasticity of demand with respect to the advertising price per column millimeter is equal to α^a, and the elasticity with respect to the number of readers is given by the negative of that, $-\alpha^a$. We use an instrumental variables estimator to estimate α^a and at the same time control for newspaper fixed effects to capture the effect of unobserved (to the econometrician) characteristics of the newspapers in the eyes of advertisers. We also control for quarter dummies in order to account for changes in overall demand for print advertising. These time effects could originate in the business cycle, to which advertising demand is in general linked, and the appearance of online advertising as a possible substitute for print advertising. So, to summarize, we assume that $\xi^a_{jt} = \xi^a_j + \xi^n_t$. Our instrument is the total number of pages of content in the newspaper, which is related to the endogenous variable, p^a_{jt}/q^r_{jt}, through the increased value of the newspaper to readers, which translates into an increased circulation. It is unrelated to advertising demand if newspaper companies decide on this without knowing the realization of ε^a_{jt}, which is plausible as we already control for time effects and newspaper fixed effects. From the obtained estimate of α^a, marginal effects can be calculating by multiplying it by q^a_{jt}/p^a_{jt} and $-q^a_{jt}/q^r_{jt}$, respectively.

4.2 Readership demand

On the readership side, we estimate a Berry (1994) type logit model of demand for newspapers. However, departing from the usual practice, we do so on the municipality level. The advantage this is that the substitution patterns that are implied for the national level are much more realistic. This is because we add up cross effects over municipalities. If then, e.g., two regional level newspapers never compete because there is no municipality in which both are available, then added-up cross effects will be zero, whereas they will not if we use national level data with a standard logit model. In the following, however, we suppress the municipality subscript m, for the ease of the exposition.

We assume the potential market size to be the population above 13 years of age and that each consumer buys at most one newspaper. The utility from buying a newspaper depends, among other things, on the price of that newspaper and the amount of advertising in that newspaper. Formally, the utility of consumer i from buying newspaper j in t is given by

$$u^r_{ijt} = \alpha^r p^r_{jt} + \beta^r q^a_{jt} + \xi^r_{jt} + \varepsilon^r_{ijt},$$

where p^r_{jt} is the price of the newspaper, q^a_{jt} is the amount of advertising content in the newspaper, ξ^r_{jt} captures unobserved characteristics and ε^r_{ijt} is the part of the utility derived from buying newspaper j that is specific to individual i at time t. We assume that ε^r_{ijt} is distributed according to the type 1 extreme value distribution independently across j and t. Individuals buy one newspaper or choose the outside good, $j = 0$, buying no newspaper. The outside good yields average utility 0 so that $u^r_{i0t} = \varepsilon_{0t}$.

Under these assumptions, the market share of newspaper j at time t is given by

$$s^r_{jt} = \frac{\exp\left(\alpha^r p^r_{jt} + \beta^r q^a_{jt} + \xi^r_{jt}\right)}{1 + \sum_{l=1}^{J} \exp\left(\alpha^r p^r_{lt} + \beta^r q^a_{lt} + \xi^r_{lt}\right)}. \tag{2}$$

Similarly, for the outside good we have

$$s^r_{0t} = \frac{1}{1 + \sum_{l=1}^{J} \exp\left(\alpha^r p^r_{lt} + \beta^r q^a_{lt} + \xi^r_{lt}\right)}. \tag{3}$$

From (2) and (3), following Berry (1994), we obtain the estimation equation

$$\ln\left(s^r_{jt}\right) - \ln\left(s^r_{0t}\right) = \alpha^r p^r_{jt} + \beta^r q^a_{jt} + \xi^r_{jt},$$

in which the difference between the natural logarithm of the market share of good j and the natural logarithm of the market share of the outside good is equal to the utility from observed characteristics p^r_{jt}, q^a_{jt} and unobserved characteristic ξ^r_{jt}. The left hand side of this equation is observed because s^r_{jt} and s^r_{0t} are observed, and the coefficients α^r and β^r can be consistently estimated if ξ^r_{jt} is uncorrelated with p^r_{jt} and q^a_{jt}. For this to be plausible we control for a flexible time trend by means of year dummies to capture the increased importance of outside options such as online news and free newspapers and also control for newspaper-region fixed effects.[11] It is important to allow for different fixed effect per region as a national level newspaper with a focus on Amsterdam, such as Het Parool, will be valued differently, on average, in the region around Amsterdam, as opposed to in the south of the country.

From the estimates of α^r and β^r, and using the observed market shares, we can calculate the responsiveness of readership demand with respect to own prices,

$$\frac{\partial s^r_{jt}}{\partial p^r_{jt}} = s^r_{jt}\left(1 - s^r_{jt}\right)\alpha^r,$$

[11] There are 5 regions with on average about 3 million people living in each region. These regions are reasonably small in terms of geographical distance.

Table 1: Advertising demand parameter estimates

	(1)	(2)	(3)	(4)
log price per reader	-0.702	-0.636	-0.617	-0.738
	(0.085)	(0.092)	(0.138)	(0.147)
age and gender	No	Yes	Yes	Yes
income and wealth	No	No	Yes	Yes
region	No	No	No	Yes
obs.	1051	858	732	732

This table shows instrumental variables estimates from a regression of the natural logarithm of the column millimeters of advertising sold per quarter on the natural logarithm of the price of advertising per reader. We control for newspaper fixed effects and quarter dummies. Controlling for income and wealth includes controlling for the fraction of individuals who are breadwinners and the fraction of individuals who go shopping for groceries. We use the number of total pages of content in the newspaper as an instrument.

prices of other newspapers,

$$\frac{\partial s^r_{jt}}{\partial p^r_{kt}} = -s^r_{jt} s^r_{kt} \alpha^r,$$

own advertising,

$$\frac{\partial s^r_{jt}}{\partial q^a_{jt}} = s^r_{jt} \left(1 - s^r_{jt}\right) \beta^r,$$

and advertising in other newspapers,

$$\frac{\partial s^r_{jt}}{\partial q^a_{kt}} = -s^r_{jt} s^r_{kt} \beta^r.$$

5 Estimation results and estimated elasticities

In this section, we present our demand parameter estimates, on which our subsequent analysis is based. We start with the advertising demand parameters in Table 1. We only report the coefficient on the log price per reader, denoted by α^a in Section 4.1 above.

There are four specifications, which differ by the variables in x^a_{jt}. There are missing values for some of these variables, and therefore the number of observations decreases the more variables we include. More specifically, we do not include any variables in specification (1), control for age categories and gender in column (2), additionally for income and wealth categories as well as the fraction of bread winners and people shopping for groceries among the readers in specification (3), and finally in addition for region in specification (4). Throughout, we control for newspaper fixed effects and quarter dummies. The instrumental variables estimates of α^a are remarkably stable across specifications, and we estimate

Table 2: Readership demand parameter estimates

	est.	ste.
p	-0.00771	0.00014
mm	0.00918	0.00117
size	0.00264	0.00021
small format	0.08838	0.00346

Market level logit estimates. p is the subscription price per year, in Euros of 2002. *mm* are millimeters of advertising and are measured in million column millimeters, and size is measured in billion. A newspaper is of a small fromat if it has less than 2,800 column millimeters per page. We also include a full set of year dummies and region-paper fixed effects.

the elasticity of advertising demand with respect to the price per reader to be about -0.7.

Table 2 contains readership demand estimates. We estimate mean utility to decrease significantly in the subscription price, to increase in the amount of advertising in the newspaper, the amount of content, and that readers value newspapers to be of small format. Following Filistrucchi, Klein, and Michielsen (2010) we calculate the implied marginal effects and elasticities from the model. The average own price elasticity is about -1.75 and the average advertising elasticity is about 0.05. This means that readers are ad-loving, but this is not very pronounced. This is plausible in our case as it is possible to skip advertisements, unlike when watching a movie on TV, some advertisements may be informative and hence valued by readers, and the percentage of advertising content is relatively low.

6 A hypothetical merger

Competition authorities are, as a rule, required to assess whether a horizontal merger is likely to raise concerns with respect to unilateral or non-coordinated effects (i.e. whether the merger might increase the market power of the merging firms) and with respect to coordinated or collusive effects (i.e. whether the merger might make it more likely that collusion takes place in the market). In order to assess unilateral effects a competition authority needs to predict, at least to some extent, whether prices are likely to rise as a result of the merger.

From the point of view of economics, the correct way to evaluate whether a merger is likely to lead to higher prices would be to specify a model of the market in question, estimate demand in order to recover values for the parameters of the model and then use the models and the estimated parameters to predict

the price chosen by the firms after the merger. One can then compare the prices, consumer surplus and/or total welfare in the new equilibrium with those in the old equilibrium. If correctly undertaken it is rigerous as it involves making all the assumptions underlying the the analysis explicit and stating all the limitations of the data; and ideally, it allows the reader to evaluate the robustness of the results. In Section 6.4, we show the results of such a full merger simulation.

Merger simulation can be very time consuming. As a result, it is often not performed in practice. In fact, in many cases a SSNIP-type test is used to predict the effects of a merger. Specifically, the SSNIP test is often performed by using Critical Loss Analysis and Critical Elasticity Analysis formulas derived under the assumption of constant marginal costs and either linear or iso-elastic demand. In merger evaluation, the formulas are not used to set an (implicit) benchmark on when substitution across products is enough to consider that they are in the same relevant market (which is what is done for market definition). Instead, they are used to measure the likelihood of a substantial non-transitory increase in price by the merging parties. That means that instead of simulating the effects of a price increase by a hypothetical monopolist above the current (competitive) level, practitioners simulate the effects of a price increase above the current level by the merging parties, assuming rivals do not change their prices and check whether that price increase is profitable or not. In either case, the size of the price increase is given beforehand and is not chosen optimally by the firms.[12] Clearly, the simplification of the SSNIP test comes at the cost of the assumption that rivals prices remain unchanged after the merger.

In line with their quest for finding time-saving tools to evaluate a merger, Farrell and Shapiro (2010) propose measuring the upward pricing pressure that is due to a merger, allowing for threshold levels of efficiency gains with various levels of precision. As for the SSNIP test an assumption that underlies their analysis is that rivals do not react to price changes of the merging firms. Their approach has been incorporated in the 2010 US merger guidelines. Although the formulas proposed by Farrell and Shapiro (2010) are derived for a Bertrand oligopoly, Jaffe and Weyl (2011) generalize the concept to other forms of competition and argue that it can be used as a first order approximation to merger effects. In Section 6.2 we present results from a two-sided market extension of the UPP measure of Farrell and Shapiro (2010).

[12] This is the test in the EU. In the US, the formulas are often used to calculate the optimal price increase above the current level by the merging parties keeping rivals' prices constant. Also in the US, the formulas for Critical Loss Analysis (CLA) or Critical Elasticity Analysis (CEA) assume constant marginal costs and either linear or iso-elastic demand. As with market definition, the difference between the SSNIP and the HM test appears to be very small at first sight and it is a matter of debate whether this difference is in practice relevant or not. In Section 6.3 we present results from both versions of the test.

According to the EU merger guidelines, and up to the most recent version of the US ones, a first screening of mergers can be done based on the concentration they lead to on the relevant market. Although requiring market definition as a previous step in the analysis, such an assessment is *per se* the quickest and easiest one. It is well-known however that the relationship between market power as measured by the Lerner index and the HHI index holds perfectly only in case of Cournot competition with homogeneous products. Thus, once again, from a theoretical point of view simplicity comes at the cost of often unrealistic assumptions. We perform a market concentration analysis in Section 6.1.

In order to illustrate the different methods to assess unilateral merger effects, we apply them to the analysis of the effects of a hypothetical merger between NRC Handelsblad (NRC) and nrc.next (NRN) on the one hand, and De Telegraaf (TEL), Gooi- en Eemlander (GOO), Haarlems Dagblad (HAR), Leidsch Dagblad (LEI), and Noordhollands Dagblad (NOR).[13] Given our data set, we assess the merger as if it were to take place in 2009 and therefore use the market shares, market sizes, prices and ownership structure of 2009 as the pre-merger situation. We do so in the context of the demand model we have described in Section 4. Using the estimated parameters reported in Section 5, again following Filistrucchi, Klein, and Michielsen (2010), we recover marginal costs that would rationalize observed behavior of profit maximizing firms that compete in prices with differentiated products on each side of the market.[14] These estimates are then used for the SSNIP test, UPP analysis and the merger simulation. As explained in Section 2 above, we first simulate the equilibrium in what we take as the initial situation in which NRC and nrc.next become independent after having belonged to De Persgroep.

The next four sub-sections present each the application one of the above four different methods to the assessment of the unilateral effects of the above hypothetical merger in the Dutch newspaper industry. We will proceed in increasing order of complexity.

6.1 Herfindahl-Hirschman Index

One of the most common ways to asses market power is to use the HHI, which is given by the sum of the squared market shares in a market, multiplied by $10,000$. On the advertising side, assuming the

[13] The abbreviations in parentheses are used in Table 3 below.

[14] As explained in Filistrucchi, Klein, and Michielsen (2010) this involves first finding the derivatives of both demands with respect to prices on all sides of the market in order to write the first order conditions, then inverting the set of first order conditions, one for each newspaper and each price. Here, we incorporate the ownership structure in the industry. We find margins to be about 60 percent on the readership side and 40 percent on the advertising side. This is somewhat different from Kaiser and Wright (2006) and Song (2011), who find that often negative margin on the readers side for German magazines.

relevant product market is the one for advertising in paid daily newspapers in Dutch (thus excluding free newspapers) and the relevant geographic market is the national one, the pre-merger HHI is $2,174$ and the post-merger one is $2,366$, which means that the change that is due to the merger is ΔHHI of 192.[15]

Likewise, on the readership side of the market, assuming the relevant product market is the one for copies of paid daily newspapers in Dutch (once more excluding the free press) and the relevant geographic market is the whole of the Netherlands, the pre-merger HHI is $2,571$, the post-merger one is $3,099$, and hence ΔHHI is 528.[16] Applying the thresholds of the EU merger guidelines the merger would thus be investigated.

One of the major criticisms against the use of the HHI in screening mergers is that it is highly dependent on the definition of the relevant market. In fact, the above conclusions regarding the readership side may change drastically if we define the relevant geographic market as the municipality one. In such a case, the post-merger HHI and the ΔHHI calculated at the municipality level would also lead the merger to be scrutinized because of concerns about unilateral effects in many of the municipalities. At the municipality level, concentration is much higher, as indicated by a pre- and post-merger HHI of more than $5,000$ on average, because many newspapers are regional. In many of them, concentration would change considerably more due to the merger. Figure 3 shows a map of the Netherlands, where we indicate in which municipalities a merger would be scrutinized if the relevant geographic markets were to be defined as the municipalities.

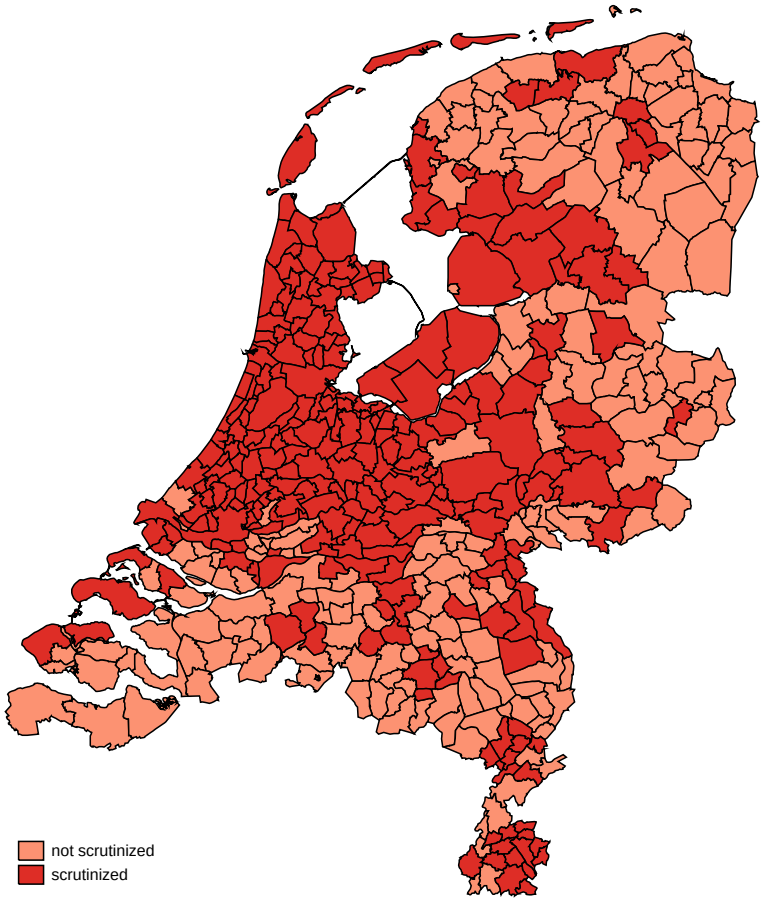
In addition to the problem of finding an appropriate definition of the geographical market, the use of the HHI leads to another potential fallacy in a two-sided market, namely the failure to account for the existence of indirect network effects. If these network effects are strong enough, the conclusions drawn from looking at concentration on each side of the market might be wrong even if the market definition on the two sides of the market is the correct one.[17]

[15] Here and in the following, we first aggregate the market shares by newspaper company, then square them, and finally add them up. This is necessary as newspaper publishing companies are multi-product firms.

[16] Absent a price, we do not have a straightforward way to estimate cross-price elasticities or diversion ratios for the free press. Therefore, even though it is straightforward to calculate HHIs without doing so, we prefer to abstract from them also in this section in order to be consistent in our comparison of the different methods for assessing unilateral effects.

[17] See Filistrucchi (2008) and Filistrucchi, van Damme, and Affeldt (2011) for a discussion of the correct SSNIP test for market definition in a two-sided market. While the former presents also the correct formulas for Critical Loss Analysis, the latter compares the theory to the practice of market definition in two-sided markets.

Figure 3: Municipalities in which merger would be scrutinized



6.2 Upward pricing pressure

UPP is a more refined measure of unilateral effects. It was proposed by Farrell and Shapiro (2010) and measures the tendency to raise prices of the merging firms due to the merger. The underlying idea is that if two firms merge, they have lower restraints from raising prices because part of the sales they would lose when increasing prices would go to the product of the other firm they have now merged with. Clearly, provided the products of merging parties are substitutes, UPP is always positive (assuming the merging firms are not colluding). For this reason, if one wants to use it to screen mergers, one has to establish a benchmark. Farrell and Shapiro (2010) propose to give an efficiency credit of 5 or 10 percent to the merging firms and propose different formulas for UPP, which differ in the way they take efficiency gains into account.

Allowing only for a direct effect of the efficiency gains, the correct UPP formula for two multi-product

firms j and k with differentiated products in a two-sided market which compete à la Bertrand are

$$UPP^r_{kj} = -D^{ra}_{kj}(p^a_j - mc^a_j) - D^{rr}_{kj}(p^r_j - mc^r_j) - e^r_k mc^r_k \tag{4}$$

for the readership side, and

$$UPP^a_{kj} = -D^{aa}_{kj}(p^a_j - mc^a_j) - D^{ar}_{kj}(p^r_j - mc^r_j) - e^a_k mc^a_k \tag{5}$$

for the advertising side. Here, e.g., p^a_j is the vector of advertising tariffs and mc^a_j is the vector of marginal costs of firm j on the advertising side, while e^r_k and e^a_k are the percentage efficiency credits given to the products of firm k, on the readers and the advertisers side respectively. D^{ra}_{kj} is the matrix containing diversion ratios when firm k increases the subscription prices and we look at the effect of this on advertising demands of firm j, hence the sub- and superscripts. This matrix can be calculated from the estimated price effects by pre-multiplying the matrix derivatives of advertising demands of firm j with respect to subscription prices of firm k by the inverse of the matrix of derivatives of advertising quantities of firm k with respect to readership prices of firm k. The other diversion ratios can be calculated accordingly. This yields a set of numbers, one for each newspaper and each market side.

Table 3 shows the results. It also shows results for the original one-sided measures proposed by Farrell and Shapiro (2010), ignoring the first term on the right hand side of (4) and the second term on the right hand side of (5). To be precise, the Table shows the UPP measures net of the granted efficiency gains, along with an efficiency credit of 5 percent. If the sum of the two is positive, then prices will be predicted to increase. This is the case throughout, except for column one. If UPP is used as a first screening device the merger would thus be scrutinized in most cases.

The first column shows instead that, if one were to consider the advertising market disregarding the two-sided nature of the market, then the merger would not give rise to competitive pressure. This is due to the assumed functional form for advertising demand, as in such a case no internalization of cross effects towards competitors is possible if direct price competition does not take place. In such a situation, one would tend to conclude that the merger does not raise concerns with respect to unilateral effects on the advertising side. However, once it is taken into account that advertising has an effect on newspaper readership, one finds that the merger would lead to upward pricing pressure also in the advertising market. This can be seen in the second column. Such an upward pricing pressure would persist even once an

Table 3: Upward pricing pressure

	advertising price			readership price		
	one-s. UPP	two-s. UPP	eff. credit	one-s. UPP	two-s. UPP	eff. credit
GOO	0.00	8.18	-0.02	7.93	8.19	-4.71
HAR	0.00	7.11	-0.04	6.90	7.12	-4.52
LEI	0.00	5.83	-0.05	5.66	5.85	-4.52
NOR	0.00	2.79	-0.08	2.72	2.81	-4.35
TEL	0.00	3.71	-0.38	3.62	3.77	-5.49
NRC	0.00	11.23	-0.21	10.57	11.69	-8.84
NRN	0.00	9.97	-0.11	9.39	10.63	-2.62

This table shows one- and two-sided UPP measures as defined in the text, as well as corresponding efficiency credits, which are given by 5% of the corresponding marginal costs of selling one additional column millimeter of advertising or newspaper subscription. All but the last two newspapers belong to the Telegraaf group, which is assumed to be merging with the NRC group consisting of the last two newspapers.

efficiency credit were granted to the merging firm. As a result, when properly taking the two-sided nature of the market into account, one would find that the merger does indeed raise concerns on the advertising market too. Hence, analyzing one side of the market disregarding the other would lead to a wrong decision in favor of the merging parties.

Interestingly, on the readership side of the market, once one allows for an efficiency credit of 5 percent, net upward pricing pressure would be negative for some newspapers (De Telegraaf and Noordhollands dagblad), meaning that these newspapers would be expected to lower their prices following the merger if efficiency gains of at least 5 percent were achieved through the merger.

Finally, comparing the first to the second and the fourth to the fifth column shows that accounting for the two-sided nature of the market always increases upward pricing pressure.

6.3 SSNIP-type test

The "Small Significant Non-Transitory Increase in Price" test (SSNIP test in short) was originally designed to define the relevant market, but it is often used to measure the likelihood of a substantial non transitory increase in price by the merging parties. In particular, practitioners use it to simulate a given price increase (usually 5 or 10 percent) above the current level by the merging parties, assuming rivals do not change their prices and check whether that price increase is profitable or not. If the price increase is profitable, it is judged to be likely to take place.

We use the extension of the SSNIP test to two-sided markets developed in Filistrucchi (2008) for market

definition.[18] On each side of the market, the SSNIP test asks whether an increase of the subscription prices by the merging parties of 5 percent is profitable, assuming rivals keep their prices unchanged.[19] The test is modified in such a way as to account for the presence of the indirect network effects in order to correctly assess the competitive constraints faced by the merged firm and therefore the profitability of a price increase. So that for instance in assessing whether an increase in the cover price of a newspaper leads to a loss in profits one takes into account that not only a higher cover price will lead to lower demand and profits from readers but also a lower readership will lead to lower demand and profits from advertisers. If then readers are found to appreciate advertising, the lower number of advertisements will lead to an additional loss in demand on the readers side and so on and so forth. In fact, positive indirect network effects between the different sides of the platform reduce the profitability of any price increase.

We implement both the US and the EU versions of the test and for the EU implement it either allowing or not allowing the merged firm to optimally adjust the price on the advertising side when the cover price is raised.[20] Throughout, we present the most complete version of the test, using the profit functions to numerically find optimal prices given the prices of the rivals and possibly own prices on one side of the market.[21] As a result the only difference with respect to the full merger simulation is not allowing rivals to react to the price increase.

[18] As discussed in van Damme, Filistrucchi, Gerardin, Keunen, Klein, Michielsen, and Wileur (2010), when using the SSNIP approach to assess the likelihood of a price increase post-merger in a two-sided market, similar issues as discussed in Filistrucchi (2008) for market definition arise, as one needs to decide which price the merged parties should be raising and whether to assess profitability by taking into account only profits on one side or on both sides of the market. In a two-sided market, in order to correctly assess the competitive constraints faced by the merged firm and therefore the profitability of a price increase, one should take both sides of the market into account. The risk of applying a test which does not account for feedback effects is that in such cases the merger will be found to be anti-competitive even if, according to the same standards used in a single-sided market, it should not. In addition, as explained invan Damme, Filistrucchi, Gerardin, Keunen, Klein, Michielsen, and Wileur (2010), in a non-transaction market such as the newspapers one, the test should be implemented by first raising the price on one side of the market then the price on the other side of the market. The reason is that there are in fact two interrelated markets and one needs to assess the competitive constraints faced by the merged firm on each of them.

[19] In the EU the test used in market definition is the "Small Significant Non-transitory Increase in Price" (SSNIP) test, in the US it is called the "Hypothetical Monopolist" (HM) test. The one just described above is the test in the EU. In the US one is supposed to calculate the optimal price increase above the current level by the merging parties, keeping rivals' prices constant. As in the case of market definition, the difference between the SSNIP and the HM test appears to be very small at first sight and it is a matter of debate whether this difference is in practice relevant or not.

[20] van Damme, Filistrucchi, Gerardin, Keunen, Klein, Michielsen, and Wileur (2010) argue that, whereas in the case of market definition the test should be conducted by allowing the monopolist to optimally adjust the price structure, in the assessment of the merger effects the issue is somewhat minor from a theoretical point of view. The reason is that in a two-sided market, the SSNIP test suffers from the same restrictive assumptions regarding rivals behavior that we already highlighted for a single-sided market. If one does not allow the merged firm to optimally adjust the price structure, as proposed by Evans and Noel (2008) for market definition, then the profitability of the rise in prices would be lower, as the optimal adjustment reduces the loss in profits due to the increase in prices. Since accounting for rivals reactions will in general tend to increase the profitability of the rise in prices, which of the two effects prevails is not *a priori* clear.

[21] We constrain the merged firm to set prices that are not negative and that do not exceed twice the prices we observe in our original data. In practice, both in the EU and in the US, the test is often conducted using formulas derived under the assumption of constant marginal costs and either linear or iso-elastic demand. See Filistrucchi (2008) for a discussion of these formulas and their extension to two-sided markets.

Table 4: SSNIP test

	average p^a	average p^n	profit change
initial situation	4.42	244.14	0.00
5% increase in p^a, no adjustment of p^n	4.64	244.14	3.05
5% increase in p^n, no adjustment of p^a	4.42	256.35	-2.43
5% increase in p^a, optimal adjustment of p^n	4.64	196.37	8.94
5% increase in p^n, optimal adjustment of p^a	8.83	256.35	35.36
optimal adjustment of both prices	8.83	157.34	61.99

This table shows results of different variants of the SSNIP test. These are average prices and profit changes when only the merging parties adjust prices. Profit changes are in percent.

Table 4 shows results of the different versions of the SSNIP test. It reports (estimated) advertising tariffs, subscription prices and profit changes (in percentage). The first row refers to the *status quo*, the last row to the US test. The latter shows that performing the US version of the SSNIP test to assess the merger would lead to the merger raising competitive concerns not on the readers market (as post merger the optimal price is lower), but on the advertisers market (as the optimal price increase exceeds 5 percents). Rows two to four refer instead to two different versions of the EU test (with or without the optimal adjustment of the price structure) for each market (advertising and readership). Consistently with our theoretical discussion, comparing the second row to the fourth and the third row to the fifth shows that indeed allowing the firms to optimally adjust the price on the other side of the market increases profitability of the price rise. In addition, a comparison of row one to row four and five shows respectively that when exogenously forced to raise price on the reader side of the market by 5 percent the merged firm would increase prices also on the advertise of the market, while when forced to raise the advertising tariff by 5 percent the merged firm would lower the cover price. The latter result moves in the same direction of the US test.

Overall, results from a SSNIP-type test would thus suggest that, contrary to what is predicted by an HHI analysis but consistently with a UPP analysis, the merger raises concerns of unilateral effects on the advertisers side of the market, and less so on the readers side of the market.

6.4 Full simulation and welfare analysis

From the point of view of economics, the correct way to evaluate whether a merger is likely to lead to higher prices would be to specify a model of the market in question, estimate demand in order to recover values for the parameters of the model and then use the model and the estimated parameters to predict the price chosen by the firms after the merger. If cost data are not available, it is possible to recover estimates

for them from the first order conditions of a model, as first proposed by Rosse (1970), and use also these estimates to predict the post-merger prices. One can then compare the prices, consumer surplus and/or total welfare in the new equilibrium with those in the old equilibrium. This can be done assuming there are no efficiency gains or allowing for a threshold level of efficiency gains.[22] Alternatively, one could also estimate the size of the (productive) efficiency gains necessary to counterbalance the post-merger tendency to increase prices and to leave consumer surplus unchanged.

In a two-sided market, assuming firms set prices on each side of the market and demands are interdependent, all of the above is possible but there are additional technical complications involved, due to the presence of two indirect network effects.[23] Filistrucchi, Klein, and Michielsen (2010) discuss this at length. Under some regularity conditions on the demand function and on the size of the network effects it is possible to simulate the new equilibrium.[24]

Here, we use their framework to recover marginal costs, simulate the new equilibrium and predict the unilateral effects of the hypothetical merger above. Table 5 summarizes the estimated effects of the merger on average prices, average quantities, and profits. Here, unweighted averages are taken. More detailed results are presented in the Appendix, in Tables 7, 8 and 9. The table shows that advertising prices would not be affected by the merger (a result of our specification of advertising demand), while subscription prices would rise by 1.5 percent.[25] As a result, circulation would decline by 2.4 percent, which in turn would lower advertising demand by 1.7 percent.[26] Overall, advertising profits would decline by 1.7 percent, while subscription profits would only marginally increase.[27] The merging parties

[22] In order to calculate the change in consumer welfare one needs to assume that marginal costs are unchanged or that they change of a given percentage. To evaluate instead the change in total welfare one needs to calculate the change in firm profits due to the merger, under the additional assumption that fixed costs are also unchanged or that they too changed of a threshold percentage. In fact, to the extent that a competition authority has a consumer welfare standard, the second assumption may not be necessary.

[23] More generally, a full simulation approach in a two-sided market is even more complex and time-consuming than in a traditional market. The reason is that in order to recover the parameters one needs to estimate two demand systems, collect more data, find more instruments and in order to calculate the new market equilibrium, one needs to solve a more complex supply model.

[24] As an alternative to the necessary assumptions on the demand function, White and Weyl (2011) propose a refinement of Nash equilibrium, insulating tariffs, which guarantees the existence and uniqueness of an equilibrium. In their setting firms do not choose prices but commit to a price schedule, whereby prices on one side of the market depend on participation on each and every platform on the other side of the market.

[25] Intuitively, the assumption of no direct cross-price effects on the advertising side implies that there are no price effects that could be internalized in addition by the merging parties. At the same time, changes in the optimal subscription prices will affect circulation and this will shift the advertising demand, but because of the constant elasticity specification for advertising demand it is the case that advertising prices will be unaffected by those shifts in demand, unless there are efficiency gains from the merger on the advertising side. Note, however, that advertising prices per reader will change.

[26] We assume here that platforms do not bundle advertising slots on the newspapers they own, neither before nor after the merger. See van Damme, Filistrucchi, Gerardin, Keunen, Klein, Michielsen, and Wileur (2010) for a discussion of how bundling may affect the welfare effects of a merger among two-sided platforms.

[27] Note that the decline in advertising demand and therefore in advertising profits would not take place in the absence of an

Table 5: Effects of the hypothetical merger

	merged	not merged
advertising price	0.000	0.000
column millimeters sold	-1.713	0.063
subscription price	1.524	0.052
circulation	-2.430	0.090
advertising profits	-1.713	0.063
readership profits	0.076	0.180
total profits	-0.604	0.135

This table shows the effects of the merger between the NRC Handelsblad, nrc.next and the Telegraaf group. Numbers are percentage changes.

would even lose in terms of profits, while outsiders would marginally gain.[28]

Contrary to the results of the HHI-based analysis but consistently with the results of UPP and SSNIP, the merger would seem to raise only modest concerns on the readers market and a big concern on the advertising market. The latter is due to the fact that as subscription prices are raised after the merger, readership declines and advertisers pay a much higher price per reader, although the price per column millimeter is unchanged. Clearly, it is the two-sided nature of the market that plays a role here.

Finally, Table 6 shows the effects of the merger on advertisers and readers welfare. For the former, we actually report the sum of the welfare changes, over all newspapers, relative to the situation in which all firms are independently owned. This is given by the negative of the sum of the integral over the demand functions (1), where the integral is taken from the advertising price per reader under the respective ownership situations to the the advertising price per reader when newspapers are independently owned.[29] For the readers, we report average welfare per person over 13 years of age per year, as implied by the estimated price coefficient and the well-known log-sum welfare formula for the logit model.

The table shows that readers welfare is almost unaffected by the hypothetical merger. Overall, results from full merger simulation suggest that, contrary to what is predicted by an HHI analysis but consistently with a UPP analysis and a SSNIP-type test, the merger raises concerns of unilateral effects more on the advertisers side of the market and less on the readers side of the market.

indirect network effect from readers to advertisers.

[28] This finding is reminiscent of the results of Salant, Switzer, and Reynolds (1983) for a Cournot oligopoly with homogeneous products. Here, however, firms set prices.

[29] We do not report absolute levels of welfare here, because the area under the demand function is not finite.

Table 6: Welfare

	advertisers	readers
all newspapers independently owned	0.00	37.70
ownership as of the end of 2009	-102.88	36.77
as before, only NRC and NRN independently owned	-81.85	37.10
as before, but NRC and NRN joined Telegraaf group	-115.48	36.81
all newspapers owned by same firm	-519.98	33.87

This table shows advertiser and reader welfare for different ownership combinations. The former is relative to the situation in which all newspapers are independently owned. Both are measured in Euros per year and reader NRC stands for NRC Handelsblad, and NRN stands for nrc.next.

7 Summary and conclusions

We investigate different ways to assess unilateral merger effects in a two-sided market by applying them to an hypothetical merger in the Dutch newspaper industry.

Lacking other sources of information on diversion ratios and profit margins, we first specify and estimate a structural model of demand for differentiated products on both the readership and the advertising side of the market. In particular, we estimate a log-linear demand for advertising slots and a logit demand for newspaper copies. This allows us to recover price elasticities and indirect network effects.

Surprisingly, our estimates indicate that not only a higher readership is associated with a higher demand for advertising, but also a higher level of advertising leads to a small rise in readership. So that readers would seem on average to like advertising. The finding is not in line with Argentesi and Filistrucchi (2007) for the Italian daily newspapers market, and also not with Van Cayseele and Vanormelingen (2009) for the Belgian newspaper market and Fan (2010) for the US daily newspapers market. We therefore proceed under the assumption that advertising has a positive, albeit small, effect on circulation and follow Filistrucchi, Klein, and Michielsen (2010) for recovering marginal costs from an oligopoly model of the supply side.

We use these estimates of price elasticities, network effects and marginal costs to compare different methods used to evaluate merger effects: HHI, SSNIP, UPP and a full merger simulation. This means that our results are based on the assumption that the estimated parameters are the true ones, which is subject to demand being correctly specified. However, making these assumptions enables us to perform what we believe is a fair comparison of methods in a realistic context, as it allows us to abstract from differences in the quality of the data used in the different approaches.

Our results indicate that in our case the projected effects of the merger on prices are generally lower once the two-sidedness of the market is taken into account. This is consistent with the newspaper market being characterized by a positive indirect network effect of readership on advertising demand higher than the positive indirect network effect of advertising demand on readership. In other words, the results show that "advertisers care more about readers than readers care for advertising". Since raising the newspaper price is likely to lead not only to a loss in readers but also to a loss in advertising, the post-merger tendency to increase prices will be lower than in the absence of network effects.

Overall, in our case, the effects of the hypothetical merger on subscription prices and readers welfare are found to be small. Importantly, with the exception of market concentration analysis, there does not seem to be a significant difference between the different methods used to assess the unilateral effects of the hypothetical merger we analyzed. In fact, since we used SSNIP and UPP formulae adjusted for two-sided platforms, the HHI-based analysis was the only one that did not take into account the two-sided nature of the market.

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Appendix: Additional tables and figures

Table 7: Subscription prices and circulation

	price per quarter					circulation in thousands				
	indep	init	pre	post	mon	indep	init	pre	post	mon
AD1	246.84	251.48	249.36	249.51	260.54	458.12	445.20	451.15	451.61	423.48
BAK	179.49	179.91	179.78	179.93	201.54	11.30	11.33	11.33	11.34	10.08
BND	245.78	247.19	247.09	247.18	255.06	115.25	114.54	114.46	114.53	109.65
BRA	254.93	255.58	255.48	255.58	263.22	132.17	132.00	131.91	132.00	126.47
EIN	250.91	251.30	251.20	251.29	258.30	110.79	110.82	110.75	110.82	106.60
GEL	251.89	252.72	252.61	252.72	262.43	153.35	153.08	152.96	153.07	144.83
GOO	237.94	246.12	245.81	250.14	259.65	29.56	28.14	28.08	27.33	26.19
HAR	234.67	242.55	242.28	246.03	254.26	43.29	41.28	41.21	40.27	38.86
LEI	229.69	235.41	235.18	238.26	246.68	34.35	33.19	33.13	32.49	31.17
LEW	233.80	234.34	234.25	234.36	244.90	94.56	94.58	94.52	94.59	89.08
LIM	270.92	271.11	271.03	271.10	276.53	128.19	128.32	128.26	128.32	124.58
NED	280.84	281.28	281.12	281.26	303.63	30.53	30.63	30.59	30.62	26.40
NOO	236.90	237.38	237.25	237.36	247.66	142.95	143.07	142.96	143.06	134.95
NOR	239.63	246.12	245.98	247.45	253.35	146.52	141.04	140.93	139.82	136.47
NRC	309.39	316.98	310.40	316.28	330.72	218.09	207.20	217.61	208.25	190.38
NRN	188.66	197.22	190.57	195.79	209.88	88.67	83.69	87.84	84.57	77.62
PAR	241.87	249.87	246.12	246.38	260.49	92.09	87.51	89.68	89.84	82.60
PZC	245.13	247.19	247.07	247.18	258.98	55.67	55.15	55.11	55.15	51.80
REF	258.15	258.61	258.45	258.57	280.02	54.94	55.14	55.07	55.12	47.84
STE	251.58	252.55	252.42	252.55	264.96	134.59	134.30	134.19	134.30	125.22
TEL	236.02	238.98	238.79	240.75	255.46	663.27	653.09	652.15	643.52	585.13
TRO	286.60	294.31	292.14	292.32	308.92	111.17	105.52	107.00	107.13	96.48
TWE	242.39	243.44	243.36	243.46	252.03	115.12	114.69	114.63	114.70	109.71
VOL	266.37	273.07	270.63	270.83	287.59	269.98	258.24	262.44	262.82	235.77

This table shows prices and quantities for different situations. Within each of the two panels, the columns are for independent ownership of all newspapers (indep), the initial ownership situation (init), the situation after the NRC Handelsblad and nrc.next have become independently owned (pre), the situation in which they are bought by the Telegraaf group (post), and finally the situation in which all newspapers are owned by the same company (mon).

Table 8: Advertising prices and sold quantities

	price per column millimeter					million column millimeters sold				
	indep	init	pre	post	mon	indep	init	pre	post	mon
AD1	17.43	17.43	17.43	17.43	17.43	5.91	5.79	5.84	5.85	5.59
BAK	0.39	0.39	0.39	0.39	0.39	5.19	5.20	5.19	5.20	4.78
BND	11.56	11.56	11.56	11.56	11.56	9.20	9.16	9.16	9.16	8.88
BRA	12.71	12.71	12.71	12.71	12.71	8.34	8.33	8.33	8.33	8.08
EIN	11.00	11.00	11.00	11.00	11.00	9.62	9.63	9.62	9.63	9.37
GEL	5.50	5.50	5.50	5.50	5.50	8.13	8.12	8.12	8.12	7.81
GOO	0.68	0.68	0.68	0.68	0.68	7.58	7.32	7.31	7.17	6.96
HAR	1.41	1.41	1.41	1.41	1.41	10.05	9.73	9.71	9.56	9.32
LEI	1.82	1.82	1.82	1.82	1.82	7.70	7.51	7.50	7.40	7.19
LEW	1.92	1.92	1.92	1.92	1.92	12.98	12.98	12.97	12.98	12.45
LIM	5.82	5.82	5.82	5.82	5.82	4.56	4.56	4.56	4.56	4.47
NED	0.71	0.71	0.71	0.71	0.71	2.03	2.03	2.03	2.03	1.83
NOO	3.16	3.16	3.16	3.16	3.16	11.77	11.77	11.77	11.77	11.30
NOR	2.72	2.72	2.72	2.72	2.72	9.29	9.04	9.04	8.99	8.84
NRC	7.32	7.32	7.32	7.32	7.32	6.16	5.94	6.15	5.96	5.60
NRN	3.86	3.86	3.86	3.86	3.86	2.10	2.02	2.09	2.03	1.91
PAR	2.90	2.90	2.90	2.90	2.90	5.97	5.76	5.86	5.87	5.53
PZC	1.79	1.79	1.79	1.79	1.79	7.99	7.94	7.93	7.94	7.60
REF	0.92	0.92	0.92	0.92	0.92	4.79	4.80	4.80	4.80	4.35
STE	4.89	4.89	4.89	4.89	4.89	7.75	7.74	7.73	7.74	7.37
TEL	13.11	13.11	13.11	13.11	13.11	12.27	12.14	12.12	12.01	11.24
TRO	3.43	3.43	3.43	3.43	3.43	3.33	3.21	3.24	3.24	3.01
TWE	3.18	3.18	3.18	3.18	3.18	8.24	8.21	8.21	8.21	7.96
VOL	7.68	7.68	7.68	7.68	7.68	5.77	5.59	5.65	5.66	5.24

This table shows prices and quantities for different situations. Within each of the two panels, the columns are for independent ownership of all newspapers (indep), the initial ownership situation (init), the situation after the NRC Handelsblad and nrc.next have become independently owned (pre), the situation in which they are bought by the Telegraaf group (post), and finally the situation in which all newspapers are owned by the same company (mon).

Table 9: Advertising and readership profits

	advertising profit					readership profits				
	indep	init	pre	post	mon	indep	init	pre	post	mon
AD1	43.71	42.84	43.24	43.27	41.36	64.07	64.33	64.24	64.37	65.03
BAK	0.86	0.86	0.86	0.86	0.79	1.70	1.71	1.71	1.71	1.74
BND	45.15	44.95	44.93	44.95	43.60	16.93	16.99	16.96	16.98	17.13
BRA	44.99	44.95	44.93	44.95	43.62	19.22	19.28	19.25	19.28	19.44
EIN	44.94	44.95	44.93	44.95	43.74	16.29	16.33	16.31	16.33	16.46
GEL	18.99	18.97	18.96	18.97	18.25	21.85	21.94	21.90	21.94	22.16
GOO	2.17	2.10	2.10	2.06	2.00	4.25	4.27	4.26	4.26	4.33
HAR	6.00	5.80	5.80	5.70	5.56	6.25	6.28	6.26	6.27	6.37
LEI	5.94	5.80	5.80	5.72	5.55	4.79	4.81	4.80	4.81	4.87
LEW	10.58	10.58	10.57	10.58	10.14	13.42	13.48	13.46	13.48	13.63
LIM	11.26	11.27	11.26	11.27	11.04	19.42	19.46	19.44	19.46	19.57
NED	0.61	0.61	0.61	0.61	0.55	3.90	3.93	3.92	3.93	3.98
NOO	15.81	15.82	15.81	15.82	15.18	20.30	20.39	20.35	20.39	20.62
NOR	10.70	10.42	10.42	10.36	10.18	22.36	22.44	22.40	22.43	22.70
NRC	19.13	18.46	19.11	18.52	17.39	28.91	29.04	29.07	29.05	29.30
NRN	3.44	3.30	3.42	3.33	3.13	12.08	12.12	12.14	12.13	12.22
PAR	7.34	7.08	7.20	7.21	6.80	12.78	12.84	12.83	12.87	13.00
PZC	6.07	6.03	6.02	6.03	5.77	8.54	8.57	8.56	8.57	8.66
REF	1.87	1.88	1.87	1.87	1.70	6.99	7.04	7.02	7.03	7.13
STE	16.09	16.07	16.06	16.07	15.30	19.38	19.47	19.44	19.47	19.71
TEL	68.28	67.55	67.48	66.85	62.53	83.74	84.39	84.15	84.29	85.25
TRO	4.85	4.67	4.72	4.72	4.39	14.91	14.96	14.94	14.98	15.09
TWE	11.10	11.07	11.07	11.07	10.73	17.96	18.01	18.00	18.02	18.17
VOL	18.82	18.24	18.45	18.46	17.11	35.69	35.87	35.81	35.91	36.17

This table shows advertising and readership profits in million Euros of 2002 and for different situations. Within each of the two panels, the columns are for independent ownership of all newspapers (indep), the initial ownership situation (init), the situation after the NRC Handelsblad and nrc.next have become independently owned (pre), the situation in which they are bought by the Telegraaf group (post), and finally the situation in which all newspapers are owned by the same company (mon).